Newberry Homes Ltd

Proposed Development on Land off Garstang Road East, Poulton-le-Fylde FY6 7HL

FRA & Drainage Strategy

D3941-R-01

March 2023

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Document Control Sheet

Proposed Development on Land off Garstang Road East, Poulton-le-Fylde FY6 7HL

FRA & Drainage Strategy

Job	Date	Issue	Copy
D3941	March 2023	Original	

Originator…… D Wallbank ……..

Checker…….. G Sanderson ……..……...

Approver…… D Wallbank ……..……...

Contents

Appendices

1. Introduction and Planning History

1.1. PSA Design Ltd have been commissioned to provide a Flood Risk Assessment (FRA) and Drainage Strategy to support the planning application for the erection of 21 residential dwellings.

1.2. The existing site and its location are illustrated at **Appendix A**. As can be seen, the site currently comprises predominantly 'greenfield' land. It is noted that the site has an extant planning consent for 21 dwellings (04/01484/FULMAJ) and the Council has confirmed in correspondence dated 10/04/2007 that the development was lawfully commenced. As part of the extant consent there was an approved Drainage Scheme (reproduced at **Appendix B**) with unrestricted discharge to the public surface water sewer located in Poulton Drive.

1.3. The Proposed Site Layout Plan reproduced at **Appendix C**.

1.4. This document sets of the issues relating to flood risk and seeks to set out the principles of the drainage strategy for the proposed development. Once these principles have been agreed with both the LPA, Council Drainage Engineer, LLFA and United Utilities via the planning application process, they will clearly be subject to subsequent detailed design and formal applications such as a part 1 s106 application to United Utilities for connection (direct or indirect) to the public sewer network.

2. Flood Risk Assessment

2.1. Although not specifically requested by the LPA, for completeness, consideration has been given to flood risk associated with the proposals.

2.2. The National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) set out Government policy aims on development and flood risk for England. The aim is to ensure flood risk is taken into account at all stages of the planning process, to avoid inappropriate developments in areas at risk of flooding, and to direct development away from areas of highest risk.

2.3. Flood mapping from the EA website is reproduced at **Appendix D**. This clearly indicates that the site is located within Flood Zone 1 and is at very low risk of flooding. Accordingly, with reference to Table 2 from PPG, the proposed development would fall into the "less vulnerable" category and, in accordance with Table 3, the site proposals within Flood Zone 1 would be

deemed “appropriate”.

There will therefore be no requirement for a Sequential Test or Exception Test to be carried out for this development.

2.4. The EA mapping indicates there is a low risk of surface water flooding in a small, isolated area within the site. This is as expected and results from localised depressions within the existing greenfield areas which may collect shallow areas of water in more extreme storm events. These discrete areas are contained within the site so do not result in any flood risk off-site and in any event would be dealt with as part of the formal drainage system proposed for the site as set out below.

There are therefore no pre-existing risks associated with the site from a flood perspective.

3. Drainage Strategy

3.1. North West SuDS Pro-Forma

3.1.1. The LPA has requested that the North West SuDS Pro-Forma (NWSPF) be completed to demonstrate compliance of the proposed surface water scheme. The completed form is included at **Appendix E** with the relevant aspects and supporting information set out below with reference to the relevant section of NWSPF as appropriate.

3.2. **Existing Drainage Situation** (NWSPF – Section 2)

3.2.1. As noted above, the existing site currently comprises a predominantly ‘greenfield’ site. There are no existing formal drainage or watercourses on the site.

3.2.2. Off the site, there is an existing United Utilities’ large diameter (1800mm) public SW sewer in Poulton Drive running across the site access road. There is also a 150mm diameter public foul sewer running alongside the SW sewer.

3.2.3. The UU sewer record is reproduced at **Appendix F**. The UU records confirm the sewer infrastructure as set out above.

3.3. **Proposed Surface Water Management Strategy**

3.3.1. With respect to dealing with surface water, National Planning Policy Framework (NPPF, 2021), requires that, for the range of annual flow rate probabilities, up to and including the 1% annual probability (1 in 100-year event) the developed rate of run-off from a proposed site should be no greater than the undeveloped rate of run-off for the same event. Even when the site is brownfield, the site should be treated as greenfield.

3.3.2. It is also important to account for climate change (CC) when making assessment of surface water run-off. As the development site is located within the Wyre Management Catchment area, reference to the peak rainfall allowance map sets out the allowances below:

Scenario	Event	Central Allowance	Upper End Allowance
3.3% annual exceedance rainfall event	2050s	25%	35%
	2070s	30%	45%
1% annual exceedance rainfall event	2050s	25%	40%
	2070s	35%	50%

Catchment Peak Rainfall Allowances - Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

3.3.3. Therefore CC should be taken into account by increasing the proposed rainfall intensity by 45% when assessing against the 3.3% (1 in 30) storm event and 50% when assessing against the 1% (1 in 100) storm event.

3.3.4. Given the nature of the proposed residential development, an additional uplift of 10% has been applied to allow for Urban Creep (UC).

3.3.5. It is important to note that since the approved drainage scheme would not have included for either of the above CC or UC allowances, this approach is considered to be very robust.

Hierarchical Approach – Soakaways (NWSPF Section 7)

3.3.6. Taking cognisance of the above (and in accordance with the hierarchical approach), the preferred surface water solution is to discharge to ground via soakaways. Even when there

are alternative sewer connections or watercourses available, infiltration must still be utilised unless it is proved unfeasible.

3.3.7. To this end percolation test pits were dug on site on 14th February 2023 as illustrated at **Appendix G**. As indicated, in each of the 6 pits dug across the site, groundwater was encountered at depths of between 0.7m and 1.1m below ground level.

3.3.8. **It can therefore be concluded that soakaways are not a feasible solution for dealing with surface water at this site.**

Hierarchical Approach – Watercourse (NWSPF Section 7)

3.3.9. The second solution in the hierarchical approach would be discharge to a watercourse, however this would not be feasible at this location, as there are no watercourses within the ownership of the Applicant or immediately adjacent to the site. However, it should be noted that the public SW sewer into which it is proposed to discharge (see below) itself discharges to a culverted watercourse some 100m to the south west of the site.

Hierarchical Approach – Surface Water Sewer

3.3.10. The next hierarchical solution would therefore be discharge to a SW sewer. As noted above, there is a 1800mm diameter public SW sewer running in a westerly direction in Poulton Drive across the site access road. It is therefore proposed to discharge to this existing SW sewer but restricted to Greenfield run-off rates for all storm events up to (and including) a 1 in 100 year event plus 50% uplift for CC, and 10% for UC (NWSPF Section 5).

3.3.11. Given the nature of the ground conditions set out above, there is no scope to incorporate volume control/long term storage, consequently, the Qbar (Approach 2) has been adopted in accordance with Technical Standards S6 (NWSPF Section 2).

3.3.12. The Qbar (i.e. 1 in 2 year greenfield run-off rate) has been calculated for the site (See **Appendix H**) and is 6.7l/s. Clearly, the restriction down to 6.7l/s for all storm events would provide significant betterment for the extreme flood events – for example, the existing greenfield run-off for the site in a 1 in 100 year storm event is currently 14.05 l/s (NWSPF Section 3 & 4) and more so when compared to the unrestricted discharge associated with the previously approved scheme which could have resulted in unrestricted discharges in excess of 200l/s for a 1 in 100 year storm event.

3.3.13. To restrict surface water run-off from the proposed development it would be necessary to provide some form of attenuation storage on site. There are numerous ways of providing this, however, given that the Developer is seeking to offer up the drainage system for adoption, oversized pipes are proposed in this instance. The design of the system should ensure that run-off is limited to 6.7l/s and that there is no flooding of the site up to and including the 1 in 100yr storm + 50% CC + 10% UC (NWSPF Section 5).

3.3.14. An outline design based on the above criteria has been modelled and illustrated on Drawing No. D3941-OD-01 reproduced at **Appendix I**. The supporting calculations are included as **Appendix J**. The calculations demonstrate that the above storm criteria base on a 6.7l/s restriction is adequately contained and maintained within the system (NWSPF Section 5).

Water Quality (NWSPF Section 6)

3.3.15. The SuDS design should seek to provide an appropriate management train of SuDS components to effectively mitigate the pollution risks associated with the different site uses.

3.3.16. In accordance with Table 4.3 of The SuDS Manual CIRIA C753, the pollution hazard level is considered to be 'Low' to 'Very Low' for the proposed development. Therefore, the requirements for discharge to surface waters state that the 'Simple index approach' should be used.

3.3.17. The first step of the simple index approach is to identify the pollution hazard indices for the proposed land use. Table 26.2 of The SuDS Manual states the following

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change (i.e. <300 movements/day)	Low	0.5	0.4	0.4
Total		**0.7**	**0.6**	**0.45**

Total Pollution Hazard Indices

3.3.18. Suitable SuDS should then be selected with a total pollution mitigation index that equals or exceeds the pollution hazard index. Given that the highest pollution hazard level (Low) is

associated with property driveways, it is proposed that these be formed in permeable paving in order to provide a level of primary treatment.

3.3.19. Table 26.3 of The SuDS Manual sets out the indices for proposed SuDS features. Those features included on the proposed design presented are listed in the table below. Where treatment components are used together in series a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components.

Type of SuDS Component	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable Pavement	0.7	0.6	0.7
Total	**0.7**	**0.6**	**0.7**

Total Pollution Hazard Indices – Proposed SuDS Features

3.3.20. It can be seen that the total mitigation index for the proposed SuDS features is greater or equal to the required pollution hazard index for the proposed land use. Therefore, the proposed system meets the water quality requirements.

3.3.21. **It has therefore been demonstrated that a SuDS solution that meets with the requirements of current legislation is deliverable within the constraints of the site.**

3.4. **Surface Water Summary**

3.4.1. Clearly the above approach represents a robust treatment of surface water attributable to the proposed development which would be in accordance with the 'hierarchical' approach and the NWSPF. Moreover, the proposals represent significant betterment to the unrestricted discharge previously approved for the site.

3.4.2. It is also clear that there will be ample capacity within the existing UU system downstream, as this was designed and constructed to accommodate unrestricted discharge from the previously approved scheme.

3.5. **Proposed Foul Drainage System**

3.5.1. As noted above, there is a 150mm diameter foul sewer running along Poulton Drive across the site frontage and it is therefore proposed to discharge foul drainage to this sewer. This is indicated on Drawing D3941-OD-01 reproduced at **Appendix I**.

3.5.2. Subject to United Utilities formal approval and formal s106 process, it is clear that there is a means of dealing with foul sewage from the proposed development.

3.6. **Phasing**

3.6.1. The drainage system will be constructed early in the construction phase and would be operational prior to occupation of any residential unit.

3.7. **Maintenance of Proposed SuDS Systems** (NWSPF Section 8)

3.7.1. It is important during any development process to consider the long-term maintenance of the proposed drainage system. The way this is processed will largely depend on how the system is taken forward at detailed design.

3.7.2. The SuDS will be reviewed and approved by the Local Planning Authority (LPA) in consultation with the Lead Local Flood Authority (LLFA) and United Utilities, to ensure it meets the relevant standards. It is understood that the system will be offered up for adoption by United Utilities. Failing this, the SuDS would remain private and be maintained and managed by the land owner in accordance with a SuDS management plan. This plan could also be secured through planning condition or legal agreement if necessary.

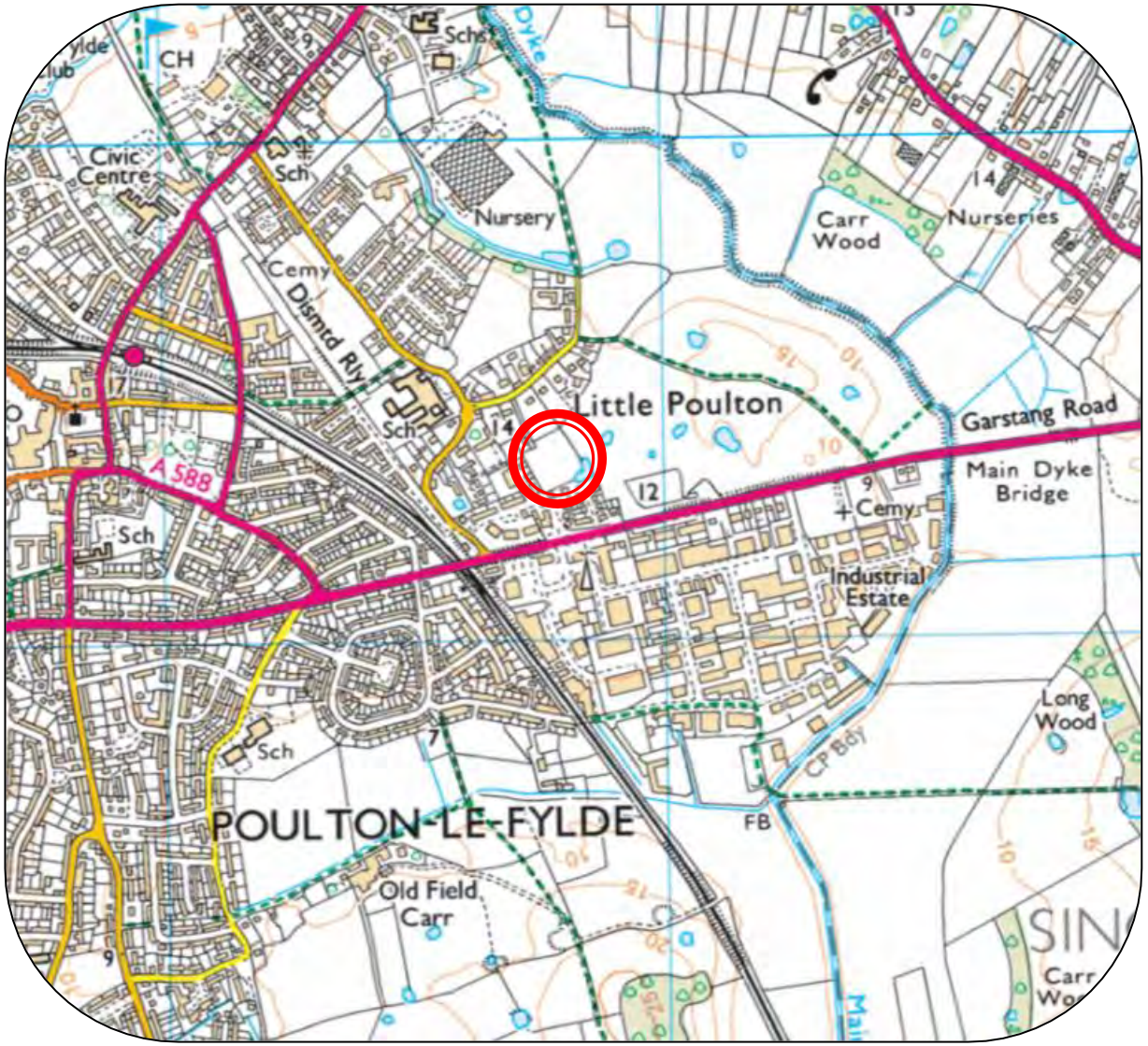
4. Conclusion

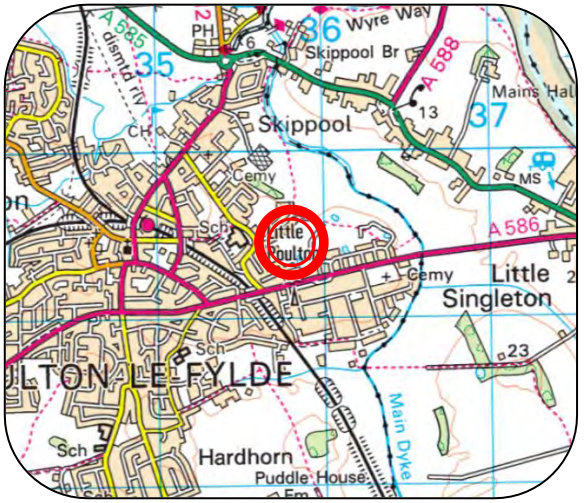
4.1. **It has been demonstrated, that the proposed development would be deemed appropriate development in terms of flood risk and a SuDS solution that meets with the requirements of current legislation is deliverable within the constraints of the site and will ensure that flood risk both on and off site will not be exacerbated. Furthermore, the current proposals represent significant betterment when compared to the unrestricted discharge previously approved for the site.**

4.2. **The proposed strategy would therefore be in accordance with relevant Local Plan policy, NPPF and the North West SuDS Pro-Forma. Accordingly, there should be no flood risk or drainage reasons why the proposals should not be granted planning consent.**

Appendix A

Existing Site and Location





PSA DESIGN	PSA Design The Old Bank House 6 Berry Lane, Longridge Preston, PR3 3JA Tel. 01772 786066	Client	**Newbury Homes Ltd**	Drawn	HP	Date	**07/03/2023**	Drawing No. **Figure 1**
		Job	**Garstang Road, Poulton**	Checked	DLW			
		Title	**Site Location Plan (indicative site boundaries shown)**	Approved	DLW	Scale	**NTS**	Rev

PSA DESIGN	PSA Design The Old Bank House 6 Berry Lane, Longridge Preston, PR3 3JA Tel. 01772 786066	Client	**Newbury Homes Ltd**	Drawn	HP	Date	**07/03/2023**	Drawing No. **Figure 2**
		Job	**Garstang Road, Poulton**	Checked	DLW			
		Title	**Site Area Plan**	Approved	DLW	Scale	**NTS**	Rev

Appendix B

Approved Drainage Scheme – Extant Consent

PlastiDrain

Important : Please read the following advice
Information given on this drawing is subject to Local Authority Approval. Pipe diameters and gradients to be in accordance with British Standard Code of Practice BS EN 752, and current Building Regulations. For pipe bedding recommendations refer to Hepworth technical literature.

Warning : This drawing may be unsuitable for certain purposes
This drawing has been prepared only for the purpose of illustrating the design of Hepworth's drainage systems and preparing an estimated schedule of materials. The drawing should not be used for any other purpose and in particular (but without limitation) is not to be used as a plan for construction without further consultation with Hepworth Building Products Ltd. Hepworth Building Products Ltd makes no warranty, guarantee or representation in relation to the suitability of the design for a particular scheme and accepts no responsibility for any use of the drawing other than for the purposes for which it was prepared, save where the express consent of Hepworth Building Products Ltd to such use has been previously obtained.

Product Key - see details below

Foul Drain
Surface Water Drain
} 100 mm diameter unless stated

Foul / Surface Water
Threshold Drain
HepFlow Linear Drainage
RWP Connection
WPC Waste Pipe Connection
WC WC Connection
SS Stub Stack
SVP Soil and Vent Pipe Connection (fully ventilated)
AAV Soil Pipe with Air Admittance Valve
Inlet Gully
Square P Gully
Square P Gully with horizontal inlet
Access Gully
Vertical Inlet Hopper (trapped)
Paved Area Gully
Paved Area Gully with horizontal inlet
Yard Gully
Rodding Point
Mini Access Chamber
Polypropylene Inspection Chamber :-
100 mm inlets 0.595 M deep - round cover
100 mm inlets max 1.200 M deep - round cover
150 mm inlets max 1.200 M deep - round cover
Reduced Access Telescopic PPIC -
100 mm inlets 1.200 - 3.00 M deep
150 mm inlets 1.200 - 3.00 M deep
Constructed chamber plus 100 mm PPIC base
Constructed chamber plus 150 mm PPIC base
Constructed chamber - Traditional channelwork
Other items -
Road gully with grade C-250 grating

04/01484/FULMAJ

WYRE BOROUGH COUNCIL PLANNING
RECEIVED
9 FEB 2007

Rev	By	Description	Date
A	CE	Revised drainage layout.	7/02/07

Hepworth Building Products

Hazlehead, Crow Edge
Sheffield
S36 4HG
Tel (01226) 763561
Fax (01226) 766057

Project
Garstang Road East
Poulton-Le-Fylde

Client
David McGrath

Drawn by	Date completed	Scale
C.Eastwood	19/12/06	1: 200

Drawing No: HP12328
Revision: A

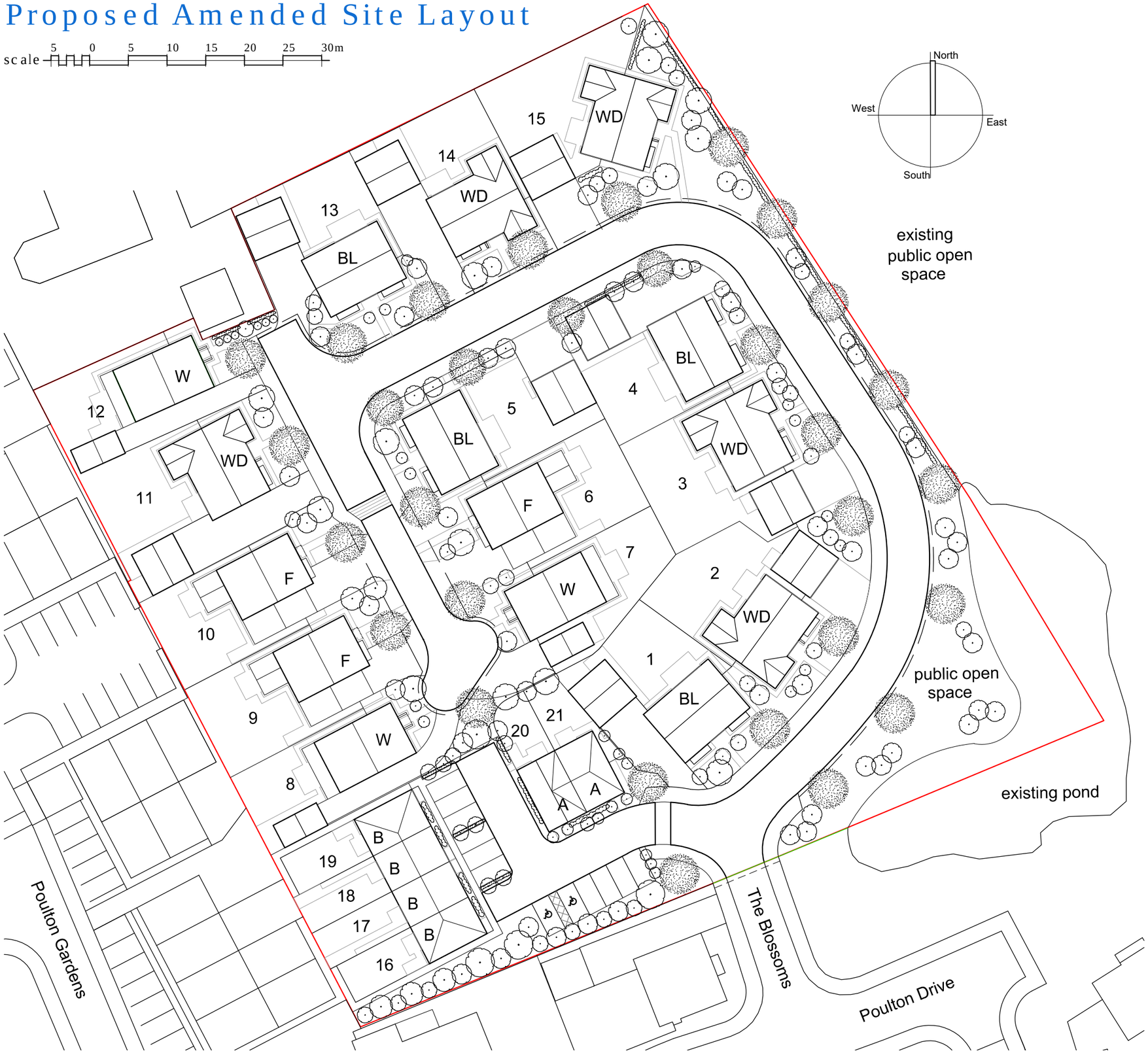
Threshold Drain
HepFlow linear drainage Connection detail
Internal Waste Pipe Connection Detail DC1–P
Soil & Vent Pipe Stub Stack or WC Connection DC2–P
External Rainwater Pipe. Connection Detail DC4–P
Square Access Gully Connection Detail GC3–P
Paved Area Gully Connection Detail GC6–P
Rodding Point Installation Detail AP1–P
Mini Access Chamber Installation Detail AP2–P
Polypropylene Inspection Chamber Installation Detail AP3–P
Reduced Access Telescopic PPIC Installation detail AP6
Polyethylene Road gully Connection Detail GC11–P
PPIC base used with concrete ring manhole

Appendix C

Proposed Site Layout Plan

Proposed Amended Site Layout

scale 5 0 5 10 15 20 25 30m



All project and associated works shall comply with the relevant statutory requirements including but not limited to the applicable planning and building control legislation whether or not specifically shown on this plan.

OVERALL SITE AREA approx. 1.1067Ha (2.73a)

APPROVED EXTANT PERMISSION ref 04/01484
21 Dwellings = 2 affordable + 19 open market

housetype ref	description type	number of each housetype	overall no of bedrooms: open sale	overall no of bedrooms: affordable
open market housing				
WD9A	5 bed detached	3	15	– –
WD8A	5 bed detached	3	15	– –
WD7A	4 bed detached	2	08	– –
WD6A	3 bed detached	5	15	– –
WD4A / 5A	2 bed flat	6	12	– –
	total open market	19 units	65 bedrooms	
affordable housing				
WD4A	1 bed flat	2	– –	2
	total affordable	2 units	2 bedrooms	
overall total		21 units	67 overall bedrooms	

approved POS	21 units (67 beds)	0.084Ha (0.2a)

PROPOSED AMENDED LAYOUT HOUSETYPES
21 Dwellings = 6 affordable + 15 open market

housetype ref	description type	number of each housetype	overall no of bedrooms: open sale	overall no of bedrooms: affordable
open market housing				
WD	4 bed detached	3	20	– –
BL	4 bed detached	4	16	– –
F	3 bed detached	3	09	– –
W	3 bed detached	3	09	– –
	total open market	15 units	54 bedrooms	
affordable housing				
A	3 bed semi det	2	– –	6
B	2 bed mews	4	– –	8
	total affordable	6 units	14 bedrooms	
overall total		21 units	68 overall bedrooms	

proposed POS	21 units (68 beds)	0.147Ha (0.36a)

increase in POS area of 75% above the current extant approval

FYLDE DESIGN
hello@fyldedesign.com
telephone_0773 954 2345

dwg	PROPOSED AMENDED SITE LAYOUT
project	Residential Development adjoining Garstang Road, Poulton le Fylde
client	THE BAXTER GROUP

date	sheet	scale	drawing no	revision
27.07.2022	A3L	1;500	FD2102_10	A

Appendix D

EA Flood Mapping

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**335786/439361**	**7 Mar 2023 11:46**

Your selected location is in flood zone 1, an area with a low probability of flooding.

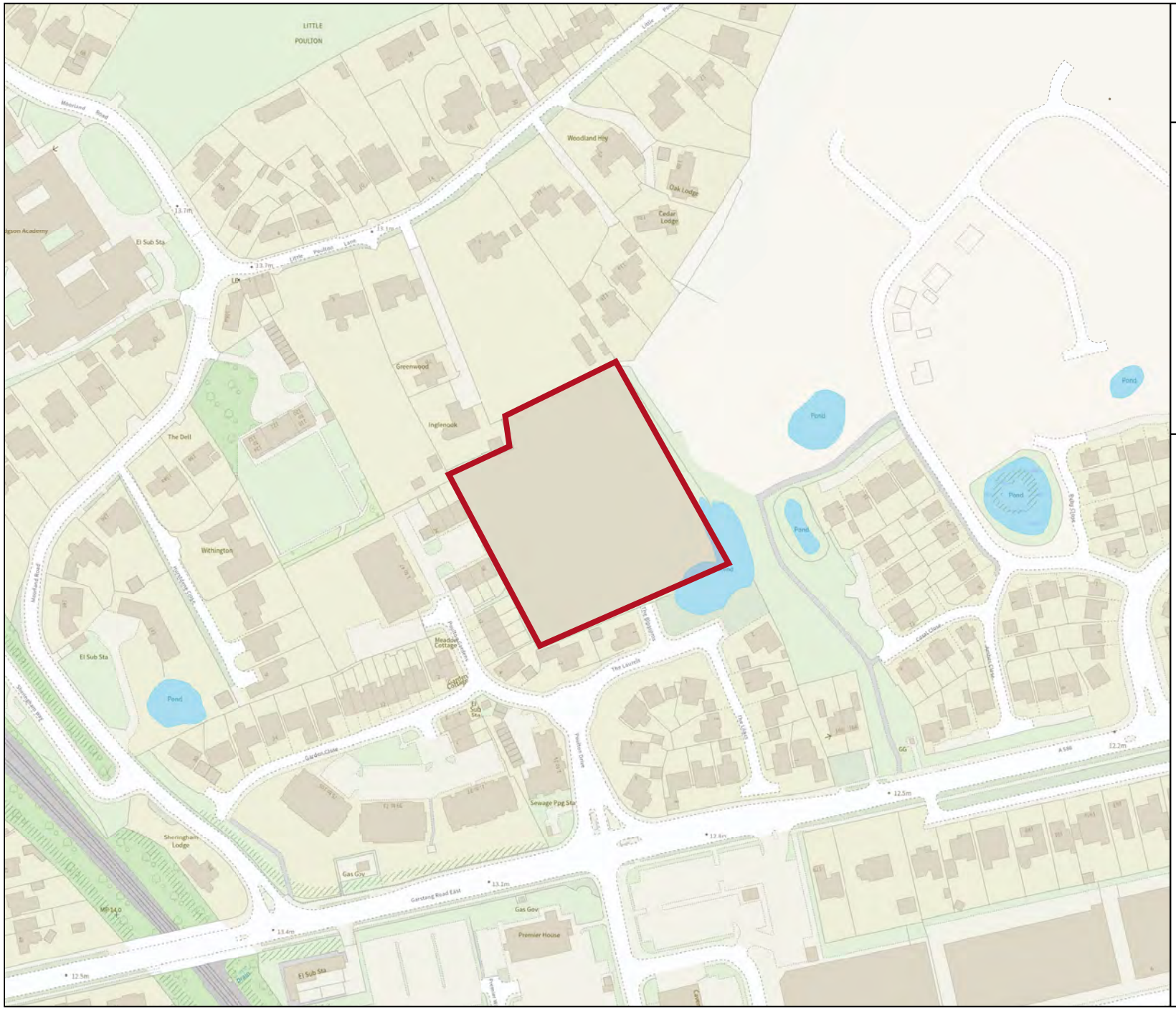
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

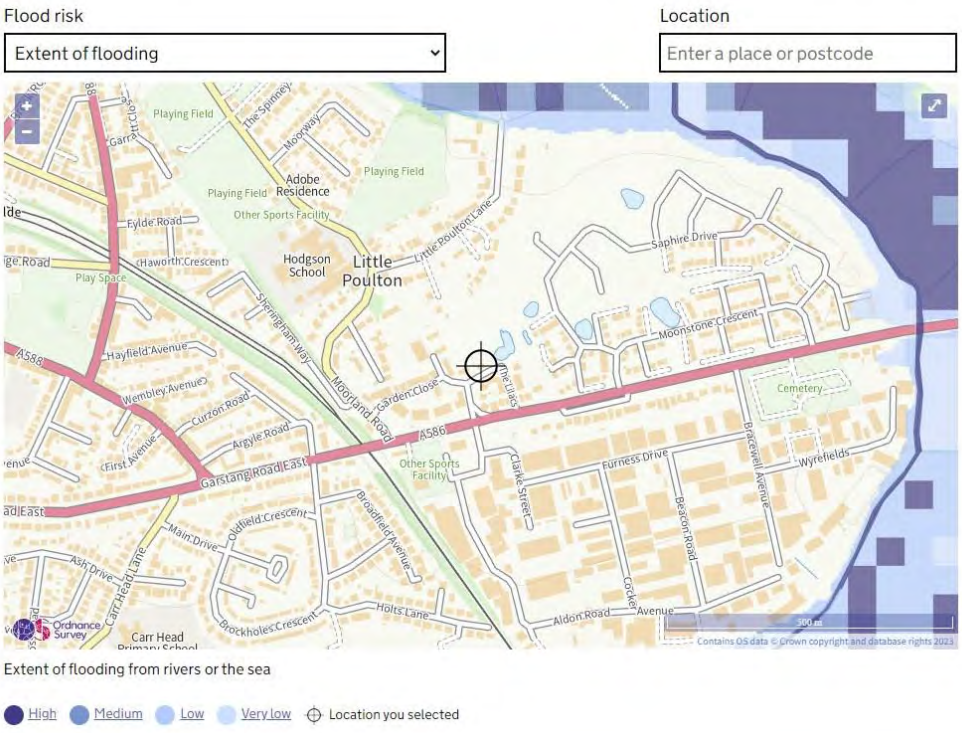
Location (easting/northing)
335786/439361

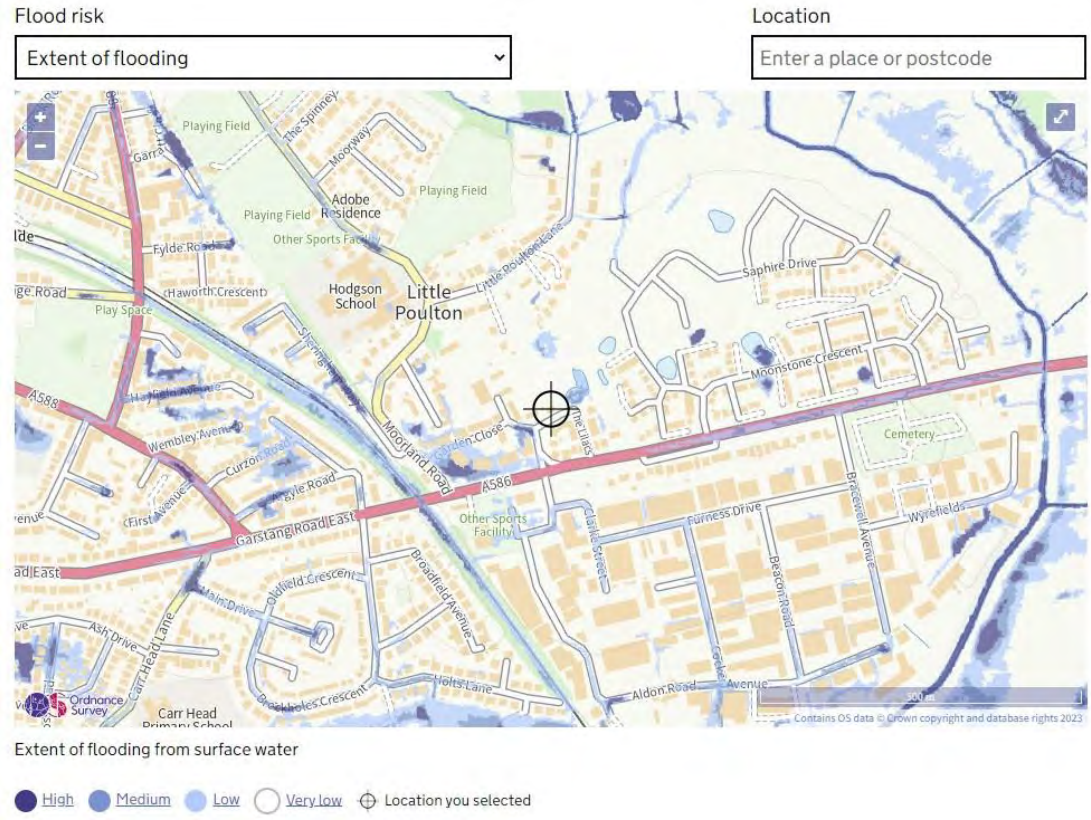
Scale
1:2500

Created
7 Mar 2023 11:46

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m


Flood risk
Extent of flooding
Location
Enter a place or postcode
Playing Field
The Spinney
Moorway
Adobe Residence
Other Sports Facility
Fylde Road
Haworth Crescent
Hodgson School
Little Poulton
Little Poulton Lane
Saphire Drive
Moonstone Crescent
Cemetery
Play Space
Hayfield Avenue
Wembley Avenue
Curzon Road
Argyle Road
First Avenue
Garstang Road East
Shenghams Way
Moorland Road
Garden Close
The Lilacs
A586
Other Sports Facility
Clarke Street
Furness Drive
Beacon Road
Bracewell Avenue
Wyrefields
Oldfield Crescent
Broadfield Avenue
Main Drive
Ash Drive
Carr Head Lane
Brockholes Crescent
Holts Lane
Aldon Road
Cocker Avenue
Carr Head Primary School
Ordnance Survey
Contains OS data © Crown copyright and database rights 2023
Extent of flooding from rivers or the sea
High
Medium
Low
Very low
Location you selected


Flood risk
Extent of flooding
Location
Enter a place or postcode
Playing Field
The Spinney
Moorway
Adobe Residence
Other Sports Facility
Fylde Road
Haworth Crescent
Hodgson School
Little Poulton
Little Poulton Lane
Saphire Drive
Moonstone Crescent
Cemetery
Play Space
Wembley Avenue
Curzon Road
Argyle Road
First Avenue
Garstang Road East
Moorland Road
Garden Close
The Lilacs
A586
Other Sports Facility
Clarke Street
Furness Drive
Beacon Road
Bracewell Avenue
Wyrefields
Oldfield Crescent
Broadfield Avenue
Main Drive
Ash Drive
Carr Head Lane
Brockholes Crescent
Holts Lane
Aldon Road
Carr Head Primary School
Ordnance Survey
Contains OS data © Crown copyright and database rights 2023
Extent of flooding from surface water
High
Medium
Low
Very low
Location you selected

Appendix E

NW SuDS Pro-Forma

SECTION 1 . APPLICATION & DEVELOPMENT DETAILS

Planning Application Reference *(if available)*	TBC
State type of planning application *i.e. Pre-application, Outline, Full, Hybrid, Reserved Matters* *Information only required if drainage is to be considered as part of reserved matters application*	Full Application
Developer(s) Name:	Newberry Homes Ltd
Consultant(s) Name:	PSA Design Ltd
Development Address *(including postcode)*	Land off Garstang Road East, Poulton-le-Fylde FY6 7HL
Development Grid Reference *(Eastings/Northings)*	335797,439346
Total Development Site Area (Ha)	1.01Ha
Drained Area (Ha)* of Development	0.5Ha
Please indicate the flood zone that your development is in. Tick all that apply. *Based on the Environment Agency Flood Map for Planning and the relevant Local Authority Strategic Flood Risk Assessment (to identify Flood Zones 3a/3b).*	Flood Zone 1 ✓ Flood Zone 2 ☐ Flood Zone 3a ☐ Flood Zone 3b ☐
What is the surface water risk of the site? Tick all that apply. *Based on the Environment Agency Surface Water Flood Map.*	High ☐ Medium ☐ Low ✓
Have you submitted a Site Specific Flood Risk Assessment (FRA)? *See separate guidance notes for clarification on when a FRA is required*	Yes ✓ No ☐
Have you submitted a Sustainable Drainage Strategy?	Yes ✓ No ☐
Does your drainage proposal provide multi-functional benefits via SuDS?	Yes ✓ No ☐
Expected Lifetime of Development *(years)* *Refer to Planning Practice Guidance "Flood Risk and Coastal Change" Paragraph 026*	100

Development Type:		**State Proposed Number of Units**
Greenfield Site • *Site is wholly undeveloped, and a new drainage system will be installed*	✓	21
Previously Developed/ Brownfield Site • *Site is already developed, and the entirety of the existing surface water drainage system will be used to serve the new development (evidence must be provided to prove existing surface water drainage system is reusable);* ***OR*** • *Where records of the previously developed system are not available so that the hydraulic characteristics of the system cannot be determined or where the drainage system is not in reasonable working order i.e. broken, blocked or no longer operational for other reasons.*	☐	
Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 1.	See FRA/ Drainage Strategy and Appendices	

SECTION 2 : IMPERMEABLE AREA AND EXISTING DRAINAGE

	Existing (E)	Proposed (P)	Change (P – E)
State Impermeable Area (Ha)	0	0.5	0.5
Evidence Required: Plans showing development layout of site with existing and proposed impermeable areas.			✓

Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?	Yes ✓ No ☐ Don't Know ☐
Evidence Required: Plan(s) showing existing layout to include all: • Watercourses, open and culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes, gullies etc. • Infiltration features - soakaways, filter drains etc.	✓

Drainage Design *Outline planning applications should be able to demonstrate that a suitable drainage system is achievable.* *All other type of planning application should provide full details or reference to previous planning application where drainage details have been submitted or approved.*	
Select which design approach you are taking to manage water quantity *(refer to Section 3.3 SuDS Manual)* **Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5)** • *The attenuated runoff volume for the 1 in 100 year 6 hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100 year 6 hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha* • *The discharge rate for the critical duration 1 in 1 year event is restricted to the 1 in 1 year greenfield runoff rate* • *The discharge rate for the critical duration 1 in 100 year event (plus climate change allowance) is restricted to the 1 in 100 year greenfield runoff rate* **Approach 2 – Qbar (Technical Standards S6)** • *Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100 year event (plus climate change allowance) are limited to Qbar (1 in 2 year greenfield rate) or 2 l/s/ha, whichever is greater.*	☐ ✓
Evidence Required: Plans showing: • Existing flow routes and flood risks • Modified flow routes • Contributing and impermeable areas • Current (if any) and proposed 'source control' and 'management train' locations of sustainable drainage components (C753 Chapter 7) • Details of drainage ownership • Details of exceedance routes (Technical Standards S9) • Topographic survey • Locations and number of existing and proposed discharge points	✓

Note consideration should be given to manage surface water from both impermeable and permeable surfaces (including gardens and verges) likely to enter the drainage system.	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 2.	See FRA/ Drainage Strategy and Appendices

SECTION 3 : PEAK RUNOFF RATES – TECHNICAL STANDARDS S2, S3 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) *Previously developed sites - In line with S3 should be equivalent to Greenfield runoff rates – discuss with LLFA if this is not achievable pre-application*
Qbar *(Approach 2)*		6.7	6.7
1 in 1 Year Event *(Approach 1)*		5.9	4.6
1 in 30 Year Event		11.5	4.81
1 in 100 Year Event* *(Approach 1)*		14.1	6.7
** Total discharge at the 1 in 100 year rate should be restricted to the greenfield runoff volume for the 1 in 100 Year 6 hour event with additional volumes (long-term storage volume) released at a rate no greater than 2 l/s/ha where infiltration is not possible. The climate change allowance should only be applied to the proposed rate and not the existing or greenfield rate.*			
Evidence Required: Methodology used to calculate peak runoff rate clearly stated and justified. Impermeable areas plan, supported by topographical survey confirming positive drainage. Hydraulic calculations and details of software used.			✓ ✓

State the hydraulic method used in your calculations *(Refer to Table 24.1 of The SuDS Manual)*	IH124

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 3.	See FRA/ Drainage Strategy and Appendices	

SECTION 4 : DISCHARGE VOLUME – TECHNICAL STANDARDS S4, S5 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	**Existing Volume (m^3)**	**Greenfield Volume (m^3)**	**Proposed Volume (m^3)**
1 in 100 Year 6 Hour Event *(Approach 1)*	N/A	N/A	N/A
Does the below statement apply to your development proposal? Long term storage is not achievable on this site and, in accordance with S6 of the Non Statutory Technical Standards for SuDS, the surface water discharge rates for events up to and including the 1 in 100 year critical event are limited to Qbar (Approach 2)			Yes ✓ No ☐
Evidence Required: Approach to managing the quantity of surface water leaving the site clearly stated and justified Methodology used to calculate discharge volume clearly stated and justified. Hydraulic calculations and details of software used.			☐ ☐

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 4.	

SECTION 5 : STORAGE – TECHNICAL STANDARDS S 7 AND S 8

State climate change allowance used (%)	50
State housing density (houses per ha)	21
State urban creep allowance used (%)	10
Evidence Required: State / used in appropriate industry standard surface water management design software.	✓

State storage volume required (m^3) *(excluding non-void spaces)* *Must include an allowance for climate change and urban creep*	260
Have you incorporated interception into your design? *(Refer to Chapter 24 of The SuDS Manual C753)* *Where possible, infiltration or other techniques are to be used to try and achieve zero discharge to receiving waters for rainfall depths up to 5mm.*	Yes ☐ No ✓
Evidence Required: Drainage plans showing location of attenuation and all flow control devices and supporting calculations.	✓See Report

Summarise how storage will be provided for 1 in 30 year event on site. *Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas **and** no flooding occurs offsite in a 1 in 100 year (plus climate change allowance) event.*	Within oversized pipe system
Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site. *Where storage above the 1 in 30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by calculations used in appropriate industry standard surface water management design software. It is important to run a range of duration events to ensure the worst case condition is found for each drainage element on the site*	Within oversized pipe system
Evidence Required: Plans showing size and location of storage and supporting calculations. Where there is controlled flooding, extents and depths must be indicated.	✓ See Report

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 5.	See FRA/ Drainage Strategy and Appendices

SECTION 6 : WATER QUALITY PROTECTION

Contaminated surface water run-off can have negative impacts on the quality of receiving water bodies. The potential level of contamination will influence final the design of an appropriate treatment train as part of your sustainable drainage system.

Is the proposal site known to be or potentially contaminated?	Yes ☐	No✓
• *If the site is contaminated, it should be demonstrated that the sustainable drainage system will not increase the risk of pollution to controlled waters though the mobilisation of contaminants and/or creation of new pollution pathways.*		

Confirm the *Pollution Hazard Level* of the proposed development - Tick ALL that apply

Refer to Pollution Hazard Indices for different Land Use Classifications in Table 26.2 of The SuDS Manual C753 for further guidance.

Pollution Hazard Level *Tick ALL that apply*		**Surface water run-off from the proposed development will drain from:**
VERY LOW	✓	• Residential roofs
LOW	✓	• Other roofs (typically commercial/industrial roofs) • Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home-zones and general access roads) • Non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day
MEDIUM	☐	• Commercial yard and delivery areas • Non-residential car parking with frequent change (e.g. hospitals, retail) • All roads except low traffic roads and trunk roads/motorways[2]
HIGH	☐	• Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites) • Sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured • Industrial sites • Trunk roads and motorways[1]

If the development's Pollution Hazard Level is 'Very Low' or 'Low', has the sustainable drainage design been risk assessed and appropriate mitigation measures included?	Yes ✓	No☐
• *If the proposed development has a very low or low polluting potential, you should design your sustainable drainage system to include an appropriate treatment train in accordance with The SuDS Manual (C753).*		

If the development's Pollution Hazard Level is 'Medium' or 'High', is the application supported by a detailed water quality risk assessment?	Yes ☐	No☐
• *If the proposed development has a high polluting potential, a detailed risk assessment will be required to identify an appropriate SuDS treatment train and ensure compliance with Paragraph 170 of the National Planning Policy Framework.* • *If the proposed development has a medium polluting potential, a detailed risk assessment may be required depending on the nature, scale and location of the development.*		

Has pre-application advice on water quality been obtained from the Environment Agency?	Yes ☐	No✓
If YES, provide details:		

[2] Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 6.	See FRA/ Drainage Strategy and Appendices

SECTION 7 : DETAILS OF YOUR SUSTAINABLE DRAINAGE SYSTEM

a) Function of your Sustainable Drainage System

Do your proposals store rainwater for later use (as a resource)?	Yes ☐ No ✓
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	

Do your proposals promote source control to manage rainfall close to where it falls? (e.g. promoting natural losses through soakage, infiltration and evapotranspiration)	Yes ☐ No ✓
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7a.	

b) Hierarchy of Drainage Options – Planning Practice Guidance

The proposed method of discharge are set out within order of priority. Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 1: Into the ground (via infiltration)		Yes ☐ No ✓	
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	**A.** Completed Infiltration Checklist from The SuDS Manual (C753) Appendix B *An editable version of this form is available on SusDrain website.*	✓	A. Site investigation to demonstrate that the ground is not free draining. Test results to be provided in accordance with: • The methodology within BRE 365 (2016), ***OR*** • Falling head permeability tests BS EN ISO 22282-2: 2012
☐	**B.** British Geological Survey (BGS) Infiltration SuDS Map	☐	B. NOTE: where an applicant is unable to access a site to undertake testing, e.g. where unable to access a site for an outline application, they can submit a *SuDS GeoReport or similar.*
☐	**C.** Infiltration testing to BRE 365 (2016) or falling head permeability tests to BS EN ISO 2228-2: 2012 ***(optional for outline)***	☐	C. Evidence to confirm that infiltration to ground would result in a risk of deterioration to ground water quality.
☐	'Plan B' sustainable drainage plan and statement of approach with an alternative discharge method, in case infiltration proposals are proven not feasible upon	☐	D. Geotechnical advice from a competent person* which determines that infiltration of water to ground would pose an unacceptable risk of geohazards to the site and/or local area.

	further site specific ground investigation e.g. to consider seasonal variations to groundwater.		**Note: Competent person may include a Chartered Engineer, Chartered Geologists, Registered Ground Engineering Professionals (RoGEP).*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 2: To a surface water body *(select type)* ***NOTE:*** *Consent from LLFA or Permit from Environment Agency may be required – refer to guidance*		Yes ☐ No ✓ N/A ☐	
		☐ Main river ☐ Ordinary watercourse	☐ Canal ☐ Other water body
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	Surface water body / watercourse survey and report	☐ ✓	Plan showing nearby watercourses and waterbodies **AND** Statement providing justification in your Sustainable Drainage Strategy ***Note:*** *Where discharge of any element in the hierarchy is discounted, an applicant should provide justification. If the reasoning for discounting a discharge of surface water to watercourse relates to issues associated with third party land or the securing of any other required consent, it may be necessary for the applicant to provide evidence to the local planning authority to support their proposed approach.*

Proposed method of surface water discharge		**Is this proposed?**	
Hierarchy Level 3: To a surface water sewer or highway drain *(select type)*		Yes ✓ No ☐ N/A ☐	
		✓Surface water sewer	☐ Highway drain
If YES - Evidence Required		**If NO – Evidence Required** **Tick ALL that apply**	
☐	Written correspondence from Water and Sewerage Company/ Highway Authority regarding proposed connection.	☐ ☐	Plan showing nearby sewers and highway drains **AND** Statement providing justification in your Sustainable Drainage Strategy

Proposed method of surface water discharge		**Is this proposed?**
Hierarchy Level 4: To combined sewer		Yes ☐ No ✓ N/A ☐
If YES - Evidence Required		**If NO – Evidence Required**
☐	Written correspondence from Water and Sewerage Company	N/A

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7b.	See FRA/ Drainage Strategy and Appendices	

c) Proposed SuDS Component Types

	Tick ALL that apply				
Within property boundary	☐ Rainwater harvesting	☐ Green/ blue roofs	✓ Pervious avements *[**Type:** A ☐ B ☐ C ✓*	☐ Soakaway	☐ Bio retention systems

	Tick ALL that apply				
Within development site boundary *(not property)*	☐ Infiltration system *[**Type:** ☐ Surface level ☐ Below ground]*		☐ Filter strips	☐ Filter drains	☐ Swales
	☐ Bio retention system	☐ Detention basins	☐ Ponds and wetlands	☐ Attenuation tanks/ Oversized pipes	☐ Other (state below)
	If 'Other' please state:				

Off site *(not within the boundary of the proposed development)*	***Please state:***

I confirm that the above selected components have been designed in accordance with The SuDS Manual (C753).	I confirm ✓
I confirm that the management of flows resulting from rainfall in excess of a 1 in 100 year plus climate change rainfall event, and their exceedance route(s), has been fully considered in order to minimise the risks to people, property (new and existing) and infrastructure.	I confirm ✓

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7c.	See FRA/ Drainage Strategy and Appendices	

SECTION 8 : OPERATION AND MAINTENANCE – TECHNICAL STANDARD S 12 AND NATIONAL PLANNING POLICY FRAMEWORK

The applicant is responsible to ensure that ALL components selected in Section 7 can be maintained for the design life of the development. This information is required so the Local Planning Authority can ensure the maintenance and management of the sustainable drainage system. The Local Planning Authority will discuss how this will be secured (e.g. via planning condition or planning obligation).

	Information Provided?
Management Plan	Yes ☐ No ✓ N/A
Evidence Required: **Plan/ drawing provided to show the position of the different SuDS components with:** • Key included to identify any of the adopting bodies that you will be offering your sustainable drainage components for adoption *(relates to maintenance and management arrangements below).* • Plan/ drawing to identify any areas where certain activities are prohibited, detailing reasons why. **Action plan for accidental pollutant spillages.**	☐ ☐

	Information Provided?
Maintenance Schedule	Yes ☐ No ✓ N/A
Evidence Required: A copy of the maintenance schedule including: 1. **Proactive and preventative maintenance** Detailing regular, occasional and remedial maintenance activities including recommendations for inspection and monitoring. This should include recommended frequencies, advice on plant/ machinery required and an explanation of the objectives for the maintenance proposed and potential implications of not meeting them. 2. **Reactive and corrective maintenance** (e.g. product repair and replacement). Including advice on excavations, or similar works, in locations that could affect the SuDS components/ adjacent structures.	☐

	Information Provided?
Maintenance and Management Arrangements	Yes ✓ No ☐
Evidence Required: Evidence of formal agreement with the party responsible for undertaking maintenance. Please select any of the adopting bodies that you will be offering your sustainable drainage components for adoption. Tick all that apply. ✓ **Water and Sewerage Company** *Section 104 agreement (Water Industry Act 1991)* ☐ **Highway Authority** *Section 278/38 agreement (Highways Act 1980)* ☐ **Local Authority Public Open Space** *[Refer to Local Authority Policy]* Please select the arrangement(s) for all non-adopted sustainable drainage components. Tick all that apply. ☐ **Management Company** ✓ **Property Owner** *(for SuDS components within property boundary only)* ☐ **Other** (please state)	☐

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 8.	See FRA/ Drainage Strategy and Appendices	

DECLARATION AND SUBMISSION

This pro-forma has been completed using evidence from information which has been submitted with the planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Completed by	G Sanderson	**Email Address**	gs@psadesign.co.uk
		Telephone Number(s)	01772 786066
Signed off by	D Wallbank	**Accreditation(s) and/or Qualification(s) of Signatory**	B.Eng (Hons) Civil Engineering, C Eng, MICE
Date *(dd/mm/yyyy)*	7/3/2023	**Company**	PSA Design Ltd

Client Details			
Name	Mr D Thornhill	**Company**	Newberry Homes Ltd

Appendix F

United Utilities' Sewer Record


THE BLOSSOMS
THE LAURELS
1
2
1
150
300
1800
0
3
6m

Appendix G

Percolation Test Pits

Trial Pit 1: Water encountered at 0.8m BGL

Trial Pit 2: Water encountered at 0.9m BGL

Trial Pit 3: Water encountered at 0.7m BGL

Trial Pit 4: Water encountered at 0.9m BGL

Trial Pit 5: Water encountered at 1.1m BGL

Trial Pit 6: Water encountered at 0.7m BGL

PSA DESIGN engineering your environment CIVIL, STRUCTURAL, GEOTECHNICAL, TRANSPORT	PSA Design The Old Bank House 6 Berry Lane, Longridge Preston, PR3 3JA Tel. 01772 786066	Client	**Newberry Homes Ltd**	Drawn	DW	Date	**February 2023**	Drawing No. **Figure 1**
		Job	**Land off the Blossoms, Poulton le Fylde**	Checked				
		Title	**Percolation Test Locations**	Approved		Scale	**NTS**	Rev

Trial Pit 1: Water encountered at 0.8m BGL

Trial Pit 2: Water encountered at 0.9m BGL

Trial Pit 3: Water encountered at 0.7m BGL

Trial Pit 4: Water encountered at 0.9m BGL

Trial Pit 5: Water encountered at 1.1m BGL

Trial Pit 6: Water encountered at 0.7m BGL

PSA DESIGN engineering your environment CIVIL, STRUCTURAL, GEOTECHNICAL, TRANSPORT	PSA Design The Old Bank House 6 Berry Lane, Longridge Preston, PR3 3JA Tel. 01772 786066	Client	**Newberry Homes Ltd**	Drawn	DW	Date	**February 2023**	Drawing No. **Figure 2**
		Job	**Land off the Blossoms, Poulton le Fylde**	Checked				
		Title	**Percolation Test Pits**	Approved		Scale	**NTS**	Rev

Appendix H

Qbar Greenfield Run-off Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Graham Sanderson
Site name:	Land off Poulton Drive
Site location:	Poulton

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

Site Details

Latitude:	53.84639° N
Longitude:	2.97755° W
Reference:	214753685
Date:	Mar 06 2023 12:08

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.010

Methodology

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

SPR estimation method: Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	925	925
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

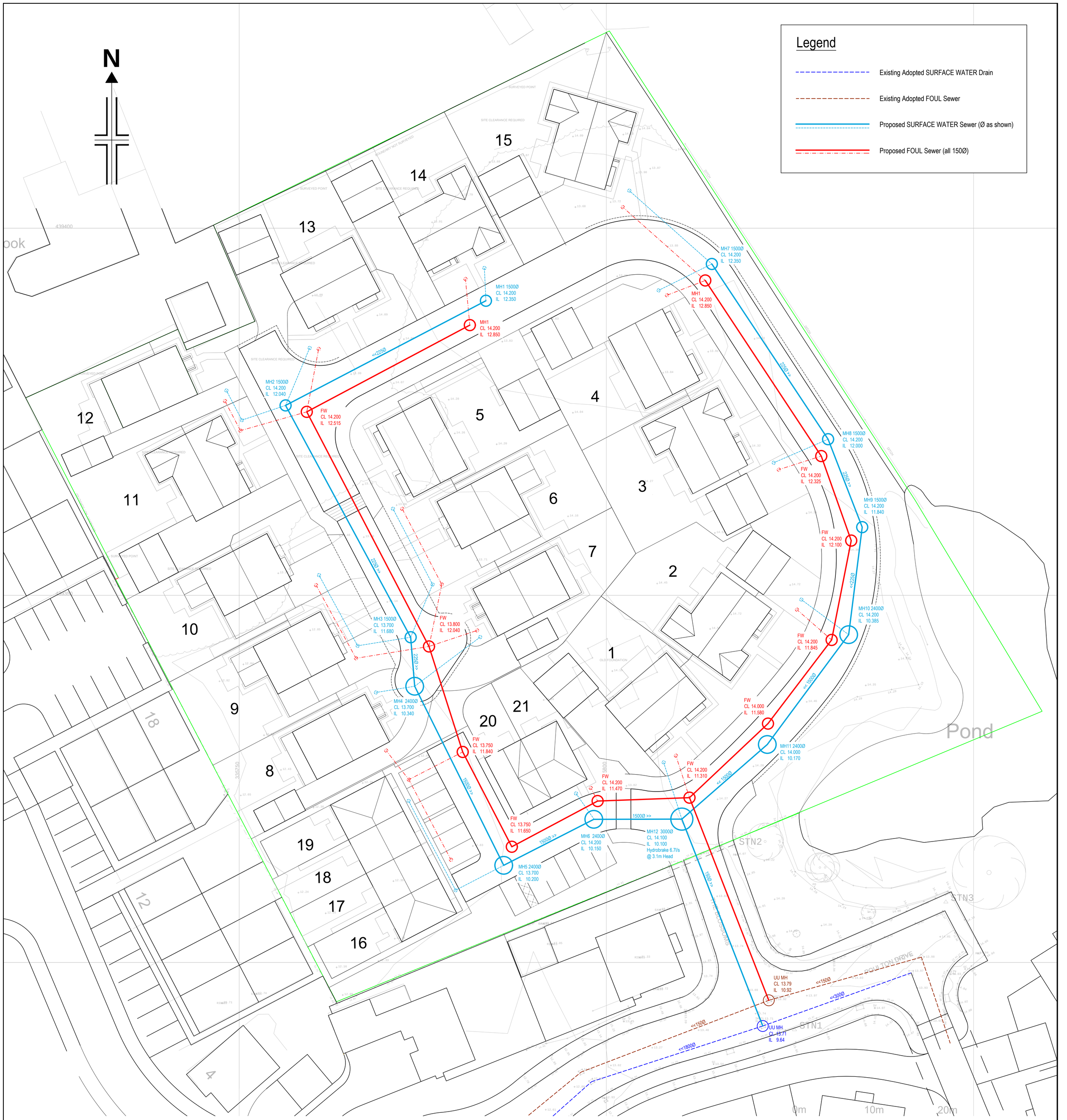
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	6.76	6.76
1 in 1 year (l/s):	5.88	5.88
1 in 30 years (l/s):	11.49	11.49
1 in 100 year (l/s):	14.05	14.05
1 in 200 years (l/s):	16.01	16.01

Appendix I

Proposed Drawings

D3566-OD-01 - Proposed Drainage Strategy
D3566-OD-02 – Areas Drawing



Notes

1. Do not scale from this drawing, work to levels and dimensions shown, if not available refer to notes, if in doubt, refer to Engineer.
2. The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to to be commencement or continuation of any works.
3. Drawing to be read in conjunction with all other scheme drawings and relevant specifications.
4. Contractor to be responsible for the location and protection of all existing services.
5. Work to be undertaken in accordance in accordance with Design and Construction Guidance for foul and surface water sewers (App Ver 2.0) and Building Regulations - Document H.
6. All existing land drains encountered on site during construction are to be re-connected/diverted as necessary (not connected into the new system without prior approval)
7. All drains to be laid soffit to soffit unless otherwise indicated.
8. Steeper gradients may be used instead of backdrops.
9. Cover levels shown are approximate only and should be altered to suit finished surface levels.
10. Minimum depth of cover to crown of pipe without protection should be as follows:
    0.35m - Gardens and Pathways with no vehicular loading
    0.50m - Driveways, Parking Areas and Narrow Accesses with height restrictions to prevent entry by vehicles with a gross weight in excess of 7.5 tonnes
    0.9m - Driveways, Parking Areas and Narrow Accesses with limited access to vehicles with a gross weight in excess of 7.5 tonnes. Agricultural land and public open space.
    1.2m - Other Highways and Parking Areas with unrestricted access to vehicles with a gross weight in excess of 7.5 tonnes
11. All rainwater pipes (RWP) to be terminated at roddable gullies connected to a minimum 100mm dia. drain.
12. Unless stipulated otherwise or invert levels are provided, all surface water pipes to be minimum 100mm dia. laid at 1 in 100. Foul sewers to be minimum 100mm dia laid at 1 in 80 (1 in 40 if no WC connected).
13. Proposed PCC Manholes & Inspection Chambers and access points are to be as those defined in Design and Construction Guidance for foul and surface water sewers (App Ver 2.0). MH & IC diameters specified are minimum diameters and if necessary should be increased to accommodate minimum benching widths.
14. 450Ø diameter IC's > 1,2m deep to include reducing ring to reduce opening to max 350mm Ø
15. Drainage under carriageways - Pipes up to 300mmØ to be structured walled PVCu or Clay. Pipes greater than 300Ø to be Concrete in accordance with BS 5911-1 and BS EN 1916. All pipes to be in accordance with Design and Construction Guidance for foul and surface water sewers (App Ver 2.0).
16. All plot drainage to be in accordance with Building Regulations - Document H.
17. Road gullies shall be trapped 450Ø x 900mm deep with Class D400 frame and grating to BS EN 124 (unless otherwise approved. Outlets to be minimum 150mm diameter.
18. All drains in the vicinity of existing or proposed trees to be constructed in accordance with the requirements of NHBC.
19. Any drains passing through brick footings are to have r.c. lintels over and flexible joints either side. All drainage passing through external walls to have cement fibre sheet collars provided either side of wall to prevent vermin entry. All drains running under building to be encased in 100mm granular fill.
20. Where drain is within 1m of a building, the trench is filled with concrete up to the underside of the foundations and where the trench is further away than 1m from the building, the trench is filled with concrete to a level below the lowest level for the building equal to the distance from the building, less 150mm.
21. Installation of threshold drains to be the responsibility of the contractor in consultation with the scheme Architect. Threshold drainage should be installed where appropriate to ensure no surface water migration into properties. Where possible the contractor should assure that all private driveways are laid to disperse surface water to adjoining landscaped areas.
22. Drainage indicated on drawing around buildings spaced out for illustrative purposes, exact positions of drains may be altered to suit and determined on site prior to commencement of work (subject to maintaining minimum gradients and cover). Any revisions are to be subject to the approval of the Local Building Inspector and Structural Engineer.
23. Not all soil & rainwater pipes may be shown. Additional connections to be approved with Engineer, subject to minimum gradients and diameters.
24. All outfall levels and existing pipe levels should be checked prior to construction to ensure the design is deliverable and no clashes occur. Contractor to report any discrepancies to Engineer immediately.
25. Condition of any existing drainage to be used as part of proposed system to be checked prior to construction and any defects remedied.
26. All building drainage up to connection into chambers shown to be as per Architects Building Regulations drawings.

Outfall connection subject to S106 Part 1 and 2 Approval.

Drainage scheme subject to detailed design

REV	DATE	AMENDMENT DETAILS	DRAWN	CHECKED	APPROVED
P1	07/03/23	For Planning	GS	DLW	GS

Newberry Homes Limted

Land off Garstang Road East
Poulton-le-Fylde

Outline Drainage Proposal

Drwg No. **D3941-OD-01**

Rev. **P1**

Scale **As Shown**

Sheet Size **A1**

Date **07 March 2023**

Drawn **GS** | Checked | Approved

PSA DESIGN
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mail@psadesign.co.uk

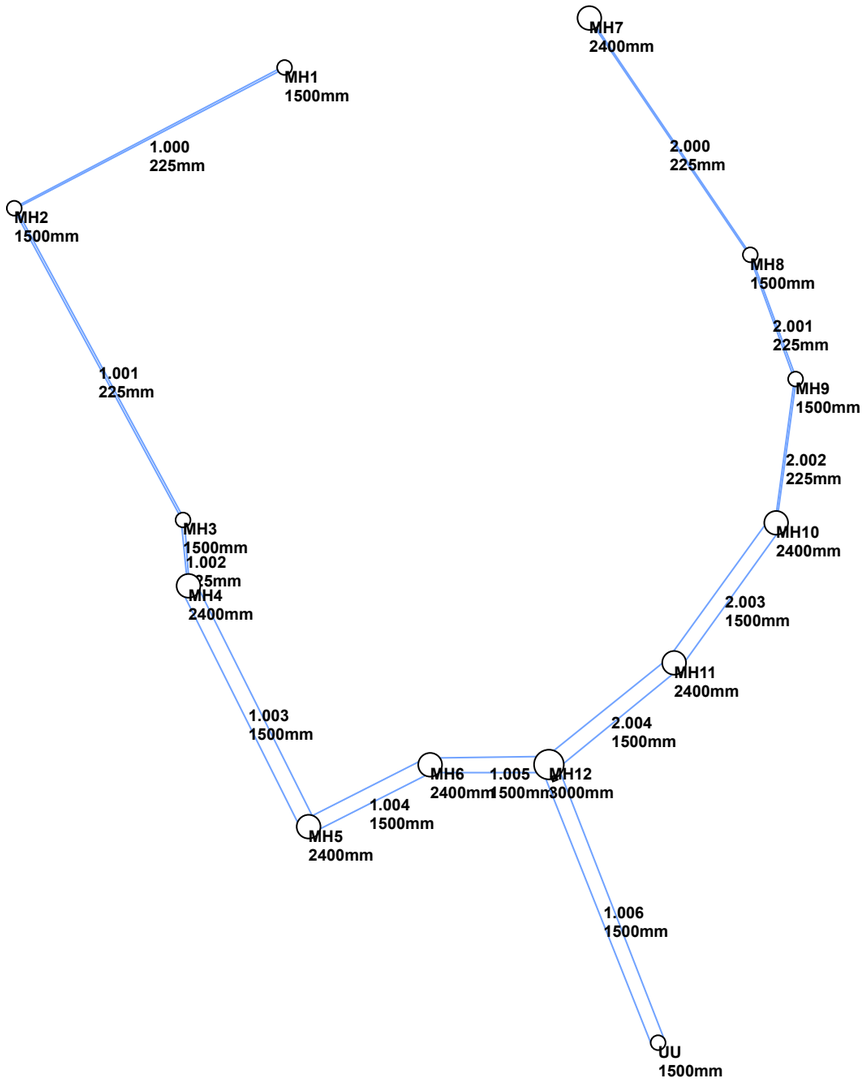
P:\Jobs\Development\D3941 - Garstang Road, Poulton - Drainage\CAD\Drawings\D3941-OD-01 - Outline Drainage Proposal.dwg

MH Ref	Area	MH Ref	Area
MH1	620m^2	MH7	620m^2
MH2	875m^2	MH8	875m^2
MH3	675m^2	MH9	675m^2
MH4	355m^2	MH10	355m^2
MH5	515m^2	MH11	515m^2
MH6	185m^2	MH12	185m^2

Contributing Areas Drawing

Appendix J

Surface Water System Hydraulic Calculations



MH Ref	Area	MH Ref	Area
MH1	620m^2	MH7	620m^2
MH2	875m^2	MH8	875m^2
MH3	675m^2	MH9	675m^2
MH4	355m^2	MH10	355m^2
MH5	515m^2	MH11	515m^2
MH6	185m^2	MH12	185m^2

Contributing Areas Drawing

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
MH1	0.062	4.00	14.200	1500	464.358	737.825	1.850
MH2	0.087	4.00	14.200	1500	437.079	723.571	2.160
MH3	0.068	4.00	13.700	1500	454.111	691.995	2.020
MH4	0.035	4.00	13.700	2400	454.661	685.323	3.360
MH5	0.052	4.00	13.700	2400	466.784	660.930	3.500
MH6	0.018	4.00	13.900	2400	479.050	667.197	3.750
MH7	0.062	4.00	14.200	2400	495.122	742.836	1.850
MH8	0.030	4.00	14.200	1500	511.360	718.853	2.200
MH9	0.007	4.00	14.200	1500	515.931	706.267	2.360
MH10	0.030	4.00	14.200	2400	513.971	691.704	3.815
MH11	0.010	4.00	14.200	2400	503.673	677.523	4.030
MH12	0.036	4.00	14.000	3000	491.036	667.223	3.900
UU			13.710	1500	502.056	639.047	3.920

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	MH1	MH2	30.779	0.600	12.350	12.040	0.310	99.3	225	4.39	49.3
1.001	MH2	MH3	35.877	0.600	12.040	11.680	0.360	99.7	225	4.85	47.3
1.002	MH3	MH4	6.695	0.600	11.680	11.610	0.070	95.6	225	4.93	47.0
1.003	MH4	MH5	27.239	0.600	10.340	10.200	0.140	194.6	1500	5.08	46.4
1.004	MH5	MH6	13.774	0.600	10.200	10.150	0.050	275.5	1500	5.17	46.0
1.005	MH6	MH12	11.986	0.600	10.150	10.100	0.050	239.7	1500	5.24	45.7
2.000	MH7	MH8	28.963	0.600	12.350	12.000	0.350	82.8	225	4.34	49.6
2.001	MH8	MH9	13.390	0.600	12.000	11.840	0.160	83.7	225	4.49	48.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.312	52.2	8.3	1.625	1.935	0.062	0.0	60	0.963
1.001	1.309	52.1	19.1	1.935	1.795	0.149	0.0	94	1.213
1.002	1.337	53.2	27.6	1.795	1.865	0.217	0.0	115	1.347
1.003	3.071	5427.4	31.7	1.860	2.000	0.252	0.0	79	0.884
1.004	2.579	4557.5	37.9	2.000	2.250	0.304	0.0	94	0.824
1.005	2.766	4887.3	39.9	2.250	2.400	0.322	0.0	93	0.880
2.000	1.438	57.2	8.3	1.625	1.975	0.062	0.0	58	1.030
2.001	1.430	56.9	12.2	1.975	2.135	0.092	0.0	71	1.146

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.002	MH9	MH10	14.694	0.600	11.840	11.660	0.180	81.6	225	4.66	48.1
2.003	MH10	MH11	17.526	0.600	10.385	10.170	0.215	81.5	1500	4.72	47.8
2.004	MH11	MH12	16.303	0.600	10.170	10.100	0.070	232.9	1500	4.82	47.4
1.006	MH12	UU	30.254	0.600	10.100	9.790	0.310	97.6	1500	5.36	45.3

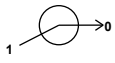
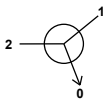
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.002	1.448	57.6	12.9	2.135	2.315	0.099	0.0	73	1.176
2.003	4.752	8397.6	16.7	2.315	2.530	0.129	0.0	48	0.994
2.004	2.806	4958.7	17.9	2.530	2.400	0.139	0.0	63	0.698
1.006	4.342	7672.7	61.0	2.400	2.420	0.497	0.0	92	1.372

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	30.779	99.3	225	Circular	14.200	12.350	1.625	14.200	12.040	1.935
1.001	35.877	99.7	225	Circular	14.200	12.040	1.935	13.700	11.680	1.795
1.002	6.695	95.6	225	Circular	13.700	11.680	1.795	13.700	11.610	1.865
1.003	27.239	194.6	1500	Circular	13.700	10.340	1.860	13.700	10.200	2.000
1.004	13.774	275.5	1500	Circular	13.700	10.200	2.000	13.900	10.150	2.250
1.005	11.986	239.7	1500	Circular	13.900	10.150	2.250	14.000	10.100	2.400
2.000	28.963	82.8	225	Circular	14.200	12.350	1.625	14.200	12.000	1.975
2.001	13.390	83.7	225	Circular	14.200	12.000	1.975	14.200	11.840	2.135
2.002	14.694	81.6	225	Circular	14.200	11.840	2.135	14.200	11.660	2.315
2.003	17.526	81.5	1500	Circular	14.200	10.385	2.315	14.200	10.170	2.530
2.004	16.303	232.9	1500	Circular	14.200	10.170	2.530	14.000	10.100	2.400
1.006	30.254	97.6	1500	Circular	14.000	10.100	2.400	13.710	9.790	2.420

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	MH1	1500	Manhole	PCC	MH2	1500	Manhole	PCC
1.001	MH2	1500	Manhole	PCC	MH3	1500	Manhole	PCC
1.002	MH3	1500	Manhole	PCC	MH4	2400	Manhole	PCC
1.003	MH4	2400	Manhole	PCC	MH5	2400	Manhole	PCC
1.004	MH5	2400	Manhole	PCC	MH6	2400	Manhole	PCC
1.005	MH6	2400	Manhole	PCC	MH12	3000	Manhole	PCC
2.000	MH7	2400	Manhole	PCC	MH8	1500	Manhole	PCC
2.001	MH8	1500	Manhole	PCC	MH9	1500	Manhole	PCC
2.002	MH9	1500	Manhole	PCC	MH10	2400	Manhole	PCC
2.003	MH10	2400	Manhole	PCC	MH11	2400	Manhole	PCC
2.004	MH11	2400	Manhole	PCC	MH12	3000	Manhole	PCC
1.006	MH12	3000	Manhole	PCC	UU	1500	Manhole	PCC

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
MH1	464.358	737.825	14.200	1.850	1500		0	1.000	12.350	225
MH2	437.079	723.571	14.200	2.160	1500		1 0	1.000 1.001	12.040 12.040	225 225
MH3	454.111	691.995	13.700	2.020	1500		1 0	1.001 1.002	11.680 11.680	225 225
MH4	454.661	685.323	13.700	3.360	2400		1 0	1.002 1.003	11.610 10.340	225 1500
MH5	466.784	660.930	13.700	3.500	2400		1 0	1.003 1.004	10.200 10.200	1500 1500
MH6	479.050	667.197	13.900	3.750	2400		1 0	1.004 1.005	10.150 10.150	1500 1500
MH7	495.122	742.836	14.200	1.850	2400		0	2.000	12.350	225
MH8	511.360	718.853	14.200	2.200	1500		1 0	2.000 2.001	12.000 12.000	225 225
MH9	515.931	706.267	14.200	2.360	1500		1 0	2.001 2.002	11.840 11.840	225 225
MH10	513.971	691.704	14.200	3.815	2400		1 0	2.002 2.003	11.660 10.385	225 1500
MH11	503.673	677.523	14.200	4.030	2400		1 0	2.003 2.004	10.170 10.170	1500 1500
MH12	491.036	667.223	14.000	3.900	3000		1 2 0	2.004 1.005 1.006	10.100 10.100 10.100	1500 1500 1500
UU	502.056	639.047	13.710	3.920	1500		1	1.006	9.790	1500

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	45	10	0
30	45	10	0
100	50	10	0

Node MH12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	10.100	Product Number	CTL-SHE-0096-6700-3100-6700
Design Depth (m)	3.100	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.7	Min Node Diameter (mm)	1200

Results for 1 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	10	12.424	0.074	12.5	0.1864	0.0000	OK
15 minute summer	MH2	10	12.161	0.121	30.0	0.3220	0.0000	OK
15 minute winter	MH3	10	11.858	0.178	43.6	0.4475	0.0000	OK
120 minute winter	MH4	118	10.713	0.373	15.5	1.7731	0.0000	OK
120 minute winter	MH5	114	10.714	0.514	17.3	2.4955	0.0000	OK
120 minute winter	MH6	114	10.714	0.564	16.9	2.6114	0.0000	OK
15 minute winter	MH7	10	12.421	0.071	12.5	0.3726	0.0000	OK
15 minute winter	MH8	10	12.093	0.093	18.4	0.1930	0.0000	OK
15 minute winter	MH9	10	11.936	0.096	19.7	0.1756	0.0000	OK
120 minute winter	MH10	114	10.715	0.330	7.9	1.5478	0.0000	OK
120 minute winter	MH11	112	10.713	0.543	8.9	2.4856	0.0000	OK
120 minute winter	MH12	118	10.715	0.615	13.8	4.4690	0.0000	OK
15 minute summer	UU	1	9.790	0.000	4.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	MH1	1.000	MH2	12.5	0.754	0.239	0.5115	
15 minute summer	MH2	1.001	MH3	30.0	1.069	0.576	0.9961	
15 minute winter	MH3	1.002	MH4	43.0	1.377	0.808	0.2083	
120 minute winter	MH4	1.003	MH5	14.3	0.393	0.003	11.8914	
120 minute winter	MH5	1.004	MH6	15.8	0.384	0.003	7.8449	
120 minute winter	MH6	1.005	MH12	11.2	0.253	0.002	7.6885	
15 minute winter	MH7	2.000	MH8	12.4	0.950	0.217	0.3801	
15 minute winter	MH8	2.001	MH9	18.3	1.156	0.322	0.2120	
15 minute winter	MH9	2.002	MH10	19.4	1.262	0.337	0.2261	
120 minute winter	MH10	2.003	MH11	8.3	0.370	0.001	7.5350	
120 minute winter	MH11	2.004	MH12	6.3	0.128	0.001	10.2175	
120 minute winter	MH12	Hydro-Brake®	UU	4.6				87.6

Results for 30 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	11	12.851	0.501	30.5	1.2548	0.0000	SURCHARGED
15 minute winter	MH2	11	12.761	0.721	66.1	1.9128	0.0000	SURCHARGED
15 minute winter	MH3	11	12.168	0.488	90.9	1.2248	0.0000	SURCHARGED
240 minute winter	MH4	236	11.635	1.295	22.3	6.1535	0.0000	OK
240 minute winter	MH5	236	11.635	1.435	21.0	6.9625	0.0000	OK
240 minute winter	MH6	236	11.635	1.485	15.1	6.8756	0.0000	OK
15 minute summer	MH7	10	12.469	0.119	30.5	0.6249	0.0000	OK
15 minute winter	MH8	10	12.173	0.173	45.2	0.3572	0.0000	OK
15 minute winter	MH9	10	12.015	0.175	48.3	0.3202	0.0000	OK
240 minute winter	MH10	232	11.635	1.250	11.5	5.8702	0.0000	OK
240 minute winter	MH11	236	11.635	1.465	13.1	6.7065	0.0000	OK
240 minute winter	MH12	236	11.635	1.535	17.3	11.1641	0.0000	SURCHARGED
15 minute summer	UU	1	9.790	0.000	4.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	MH1	1.000	MH2	26.3	0.827	0.504	1.2241	
15 minute winter	MH2	1.001	MH3	61.7	1.550	1.184	1.4269	
15 minute winter	MH3	1.002	MH4	90.7	2.282	1.707	0.2636	
240 minute winter	MH4	1.003	MH5	16.7	0.411	0.003	45.6338	
240 minute winter	MH5	1.004	MH6	13.6	0.404	0.003	24.0532	
240 minute winter	MH6	1.005	MH12	10.3	0.251	0.002	21.0869	
15 minute summer	MH7	2.000	MH8	30.5	1.125	0.534	0.7812	
15 minute winter	MH8	2.001	MH9	44.9	1.364	0.790	0.4407	
15 minute winter	MH9	2.002	MH10	47.7	1.537	0.829	0.4567	
240 minute winter	MH10	2.003	MH11	9.8	0.392	0.001	29.0754	
240 minute winter	MH11	2.004	MH12	3.9	0.126	0.001	28.6142	
240 minute winter	MH12	Hydro-Brake®	UU	4.8				122.9

Results for 100 year +50% CC +10% A Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	11	13.496	1.146	40.6	2.8693	0.0000	SURCHARGED
15 minute winter	MH2	11	13.355	1.315	84.9	3.4884	0.0000	SURCHARGED
240 minute winter	MH3	232	13.231	1.551	26.1	3.8911	0.0000	SURCHARGED
240 minute winter	MH4	232	13.231	2.891	30.3	13.7416	0.0000	SURCHARGED
240 minute winter	MH5	232	13.231	3.031	28.9	14.7041	0.0000	SURCHARGED
240 minute winter	MH6	232	13.231	3.081	25.9	14.2626	0.0000	SURCHARGED
240 minute winter	MH7	232	13.231	0.881	7.4	4.6374	0.0000	SURCHARGED
240 minute winter	MH8	232	13.231	1.231	11.0	2.5452	0.0000	SURCHARGED
240 minute winter	MH9	232	13.231	1.391	11.8	2.5488	0.0000	SURCHARGED
240 minute winter	MH10	232	13.231	2.846	15.4	13.3683	0.0000	SURCHARGED
240 minute winter	MH11	232	13.231	3.061	19.7	14.0139	0.0000	SURCHARGED
240 minute winter	MH12	232	13.231	3.131	23.2	22.7697	0.0000	SURCHARGED
15 minute summer	UU	1	9.790	0.000	4.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	MH1	1.000	MH2	33.7	0.847	0.646	1.2241	
15 minute winter	MH2	1.001	MH3	78.4	1.971	1.505	1.4269	
240 minute winter	MH3	1.002	MH4	26.1	1.238	0.491	0.2663	
240 minute winter	MH4	1.003	MH5	22.7	0.442	0.004	47.9538	
240 minute winter	MH5	1.004	MH6	23.8	0.398	0.005	24.2489	
240 minute winter	MH6	1.005	MH12	17.1	0.254	0.003	21.1011	
240 minute winter	MH7	2.000	MH8	7.4	0.831	0.129	1.1519	
240 minute winter	MH8	2.001	MH9	11.0	1.024	0.193	0.5325	
240 minute winter	MH9	2.002	MH10	11.8	1.112	0.205	0.5844	
240 minute winter	MH10	2.003	MH11	11.3	0.413	0.001	30.8542	
240 minute winter	MH11	2.004	MH12	-8.8	0.124	-0.002	28.7012	
240 minute winter	MH12	Hydro-Brake®	UU	6.7				152.9