



Development Design Solutions
Unit 23 Basepoint
Bromsgrove Enterprise Park
Isidore Road
Bromsgrove
B60 3ET



Flood Risk Assessment

Stourport on Severn, Worcestershire, DY13

December 2020 Rev F



Preface

Property Address:	Land west of Pearl Lane, Stourport on Severn, DY13				
NGR:	E: 379633 N: 269862				
Existing Development	Agricultural land				
Proposed Development	331 new dwellings				
Site Area:	15 hectares				
Date of Inspection:	20 th March 2017/ Meeting with Kirsten Huizer on site 18 th April 2017				
DDS Contact	Cormac O'Connor				
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Project Number:	0056				
Version Control:	Status:	Date:			
	Rev F	December 2020			
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Version Control

Version Control	
Date and Version	Update
March 2017 - Rev 0	Initial Issue
April 2017 - Rev A	Amendments following email comments and site visit with Kirsten Huizer of NWWM
December 2018 – Rev B	Number of units changed from up to 420 to 400
October 2019 – Rev C	Drainage Strategy updated following infiltration testing
October 2020 – Rev D	Report and drainage strategy updated to suit new layout. Number of dwellings changed to 333
October 2020 – Rev E	Report and drainage strategy updated to suit new layout
December 2020 – Rev F	Report and drainage strategy updated to suit new layout. Number of dwellings changed to 331

1. Scope of Instruction and Brief

Objectives

1.1 Development Design Solutions (DDS) were commissioned by Barratt West Midlands (the Client) to undertake a Flood Risk Assessment to support a full planning application for a proposed residential development of 331 dwellings, to the west of Pearl Lane, Stourport on Severn.

Data Sources

1.2 This report is based upon a detailed review of the following information:

- Environment Agency Flood Maps
- North Worcestershire Water Management Team (NWWM) correspondence
- Wyre Forest District Council (WFDC) Strategic Flood Risk Assessment Level 1&2 (September 2019)
- Severn Trent Water (STW) Developer Enquiry Response
- CIRIA SuDS Manual 2016
- Codes for Adoption March 2020

1.3 Enquiries have been made with North Worcestershire Water Management (NWWM), part of Wyre Forest District Council (WFDC), to obtain historic surface water flooding information and to gain an understanding of the local flood risk. A meeting was held on site with Kirsten Huizer of NWWM on 18th April 2017. A copy of the correspondence with NWWM can be found at **Appendix G**. An online meeting was also held with Kirsten on 13th October 2020.

1.4 A Developer Enquiry was applied for with STW and the response can be found at **Appendix F**.

Report Preparation

1.1 The revised National Planning Policy Framework published in June 2019 (NPPF) sets out the Government's planning policies on development in relation to flood risk. The Guidance on Flood Risk and Coastal Change provides advice on how to take account of and address the risks associated with flooding and coastal change in the planning process.

1.2 This FRA has been prepared in accordance with the requirements of the NPPF and the relevant guidance.

2. Site Description

Site Location

- 2.1 The proposed development site is located between the A451 Dunley Road and Pearl Lane within the Worcestershire town of Stourport on Severn. The centre of the town is located approximately 4km to the north east of the site.
- 2.2 The site's general location is shown in Figure 1 below.



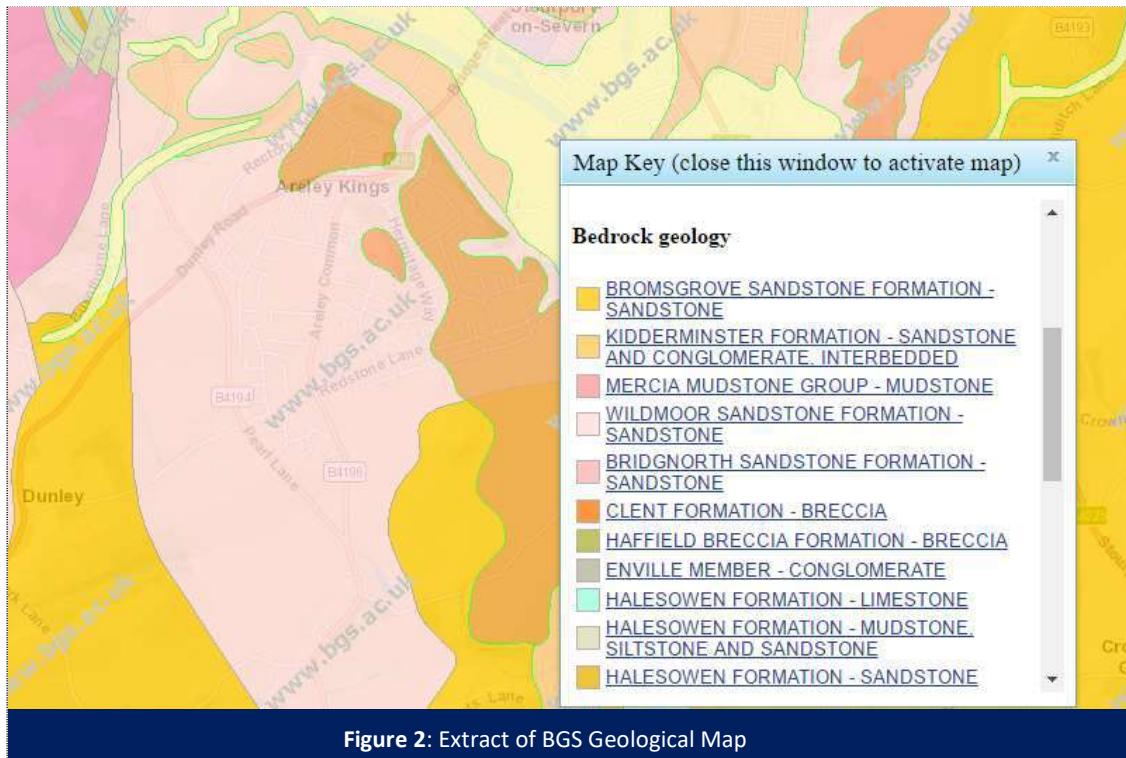
Site Description

- 2.3 The site is currently used for agriculture purposes and is bounded to the north by Dunley Road (A451), to the south by two large residential dwellings, to the east by Pearl Lane and to the west by another field. There is an existing residential development to the east of Pearl Lane.
- 2.4 To the north, south and east of the site there is a wooded area, varying in width between 10 and 20m.
- 2.5 A topographical survey was carried out by Healer Surveys in January 2017. The site is split into two parcels, the large parcel to the north and a smaller parcel to the south, bounded by a fence line. The northern parcel falls in two directions from the north-western corner at 54.20m AOD to the north-eastern corner at 47.70m AOD, and to the southern fence line at 38.40m AOD. The southern parcel falls from west to east from 40.50m AOD to 36.30m AOD.

- 2.6 A copy of the topographical survey can be found in **Appendix A**.

Geology

- 2.7 From a review of the British Geological Survey online map (see Figure 2), the site is underlain by the Wildmoor Sandstone Formation. This geology comprises sandstones, generally silty or argillaceous, fine to medium grained, bright orange red to dark brick-red, with subordinate siltstone and mudstone.
- 2.8 Sandstones are generally considered to be a suitable stratum for surface water infiltration.
- 2.9 A copy of the nearest historical borehole log, approx. 800m to the south of the site can be found in **Appendix C**.
- 2.10 An intrusive ground investigation was carried out by Georisk in September 2019. The exploratory holes indicated that the sites geology comprised topsoil up to 600mm deep overlying dense sands and sandstone of the Wildmoor Sandstone Formation, which confirms the BGS data. A selection of the boreholes are shown at **Appendix D**.



Catchment Details

- 2.11 The site is located within the Severn Valley Catchment. The nearest watercourse to the site is the Burnthorne Brook, which is located approximately 500m north of the site. The Burnthorne Brook is designated as an Ordinary Watercourse, a tributary of the River Severn.
- 2.12 The River Severn is located approximately 1.6km northwest of the site.

Existing Site Drainage

- 2.13 There is no positive drainage system serving the site, and it is understood that under normal rainfall conditions, surface water infiltrates naturally through the soil into the ground water. It has also been advised by NWWM that the adjacent residential development predominately drains by infiltration.
- 2.14 There is a surface water outlet structure at the lowest part of the site (see Figure 3), which from discussions with NWWM was installed to alleviate localised surface water flooding within a small corner of the site, which was most prevalent in 2012 following extreme rainfall. The outlet structure was intended to convey flood flows into the adjacent drainage network to reduce the risk of flooding to Pearl Lane and nearby properties.



Figure 3: Existing Outfall Structure

- 2.15 There is an 800mm ductile Iron STW Aqueduct which runs from north to south through the site. STW have been contacted to confirm the status of the asset however, it is believed to be carrying water from Trimley Reservoir to the north. This pipe will be subject to an easement (protective no build zone) of 10m.
- 2.16 There is a small, culverted watercourse (assumed at 225mm) known as the Dunley Brook crossing the site to the south from west to east which carries spring water from a nearby hill. The culvert outfalls into a Highway Drain within the verge adjacent to Pearl Lane. This pipe will need to be preserved or diverted within any proposed development layout; however, it has never been formally discovered following site investigations. An easement of 5m has been assumed for this asset.
- 2.17 Sewer records obtained from STW, show that there is a 225mm public surface water sewer running from north to south along Pearl Lane. From the topographical survey and discussions with NWWM, it is also evident that

there is a concrete attenuation tank with a hydrobrake flow control device within Pearl Lane opposite Chiltern Close. This tank is believed to be an STW asset although not shown on the sewer records.

- 2.18 Surface water sewers from this area ultimately outfall into a partly open/ partly culverted watercourse (discharging into Malvern Hills district at Malvern Edge Court). Due to Riparian Ownership laws, any upgrades to these sewers would require permission from the respective landowners which may prevent upgrades taking place.
- 2.19 There are no foul sewers located immediately adjacent the site, the nearest foul sewer is in Cheviot Close 60m from Pearl Lane although, the nearest accessible sewer is in Redhouse Road.
- 2.20 The STW records surrounding the site are included in **Appendix F**.

3. Development Proposals

- 3.1 The proposed development comprises 331 new dwellings, associated private drives, access roads and landscaped areas. The proposed development layout has been produced and shown in **Appendix B**.
- 3.2 The estimated proposals will result in a total impermeable area of approximately 5.5ha (approx.36% impermeable) with a 10% allowance for Urban Creep in private areas. The remainder of the site will be permeable surfacing, predominantly consisting of gardens and open landscaped areas with some areas of low-level shrub planting.

4. Flood Risk

- 4.1 This section identifies what potential sources of flooding could affect the site and includes further details on how flooding might occur.

Fluvial

- 4.2 The closest Main River to the subject site is the River Severn which is located approximately 1.6km northwest of the site.
- 4.3 As shown below, the entire site is located within Environment Agency Flood Zone 1 (land having a less than 1 in 1,000 annual probability of river or sea flooding in any year).

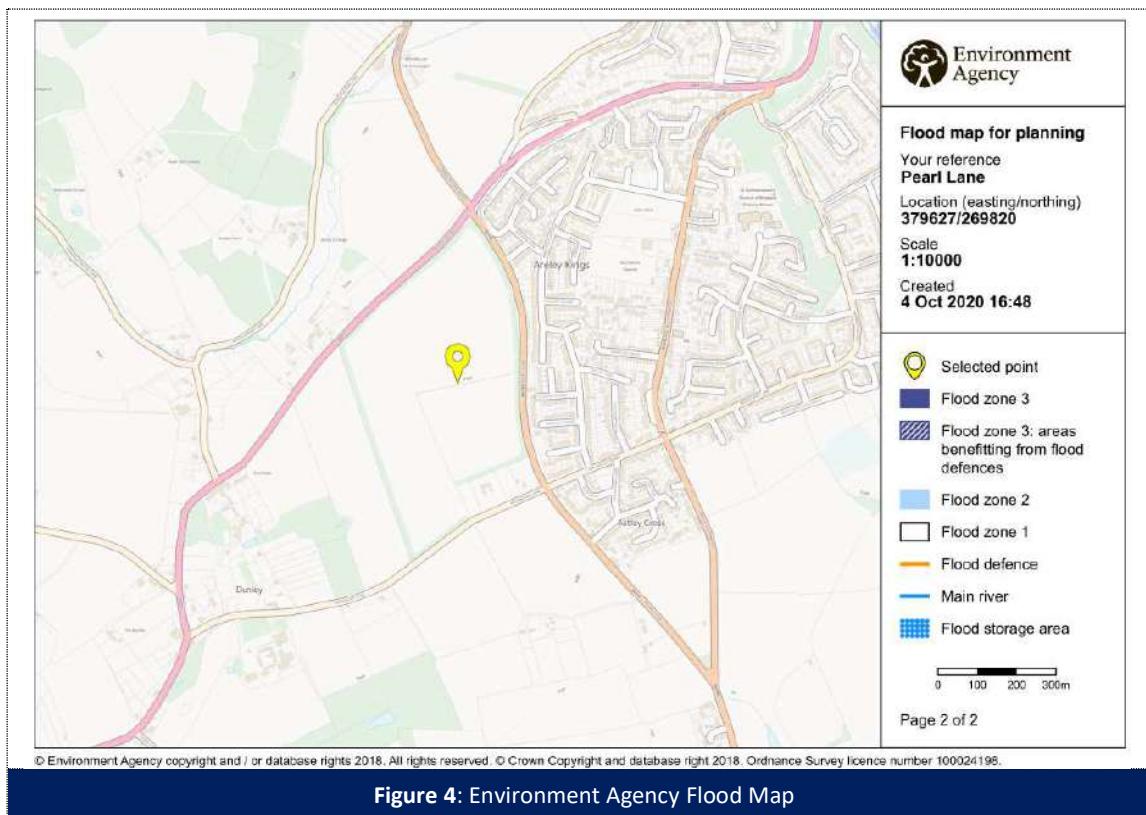
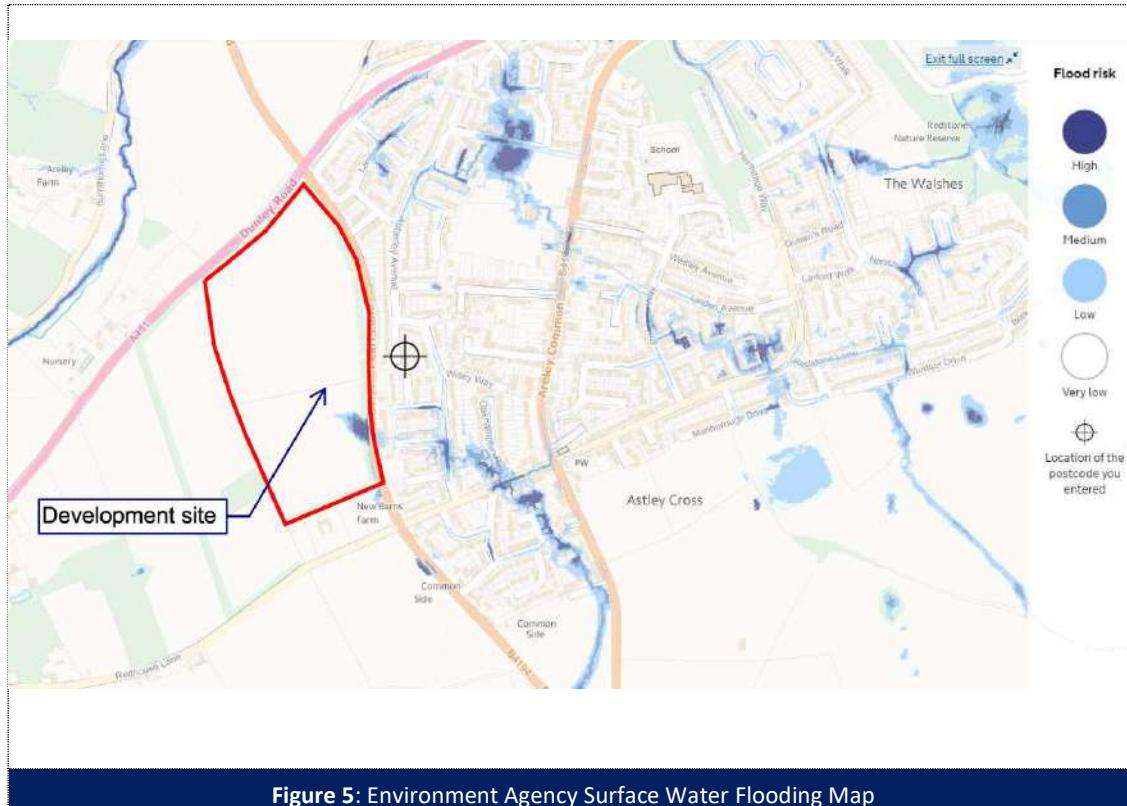


Figure 4: Environment Agency Flood Map

Surface Water

- 4.4 According to the Environment Agency Surface Water Flood Map, most of the site is at 'very low' risk of surface water flooding however, there is an area of flooding indicated at the south-eastern part of the site at the boundary with Pearl Lane. This has been confirmed following recent discussions and correspondence with NWWM and was caused due to a combination of the surface water sewer network being overloaded and run off from the site entering Pearl lane.

- 4.5 The surface water drainage proposals for the development are likely to eliminate this flooding as run off from approximately 50% of the impermeable area will discharge to a lined attenuation basin and slowly discharge into the public sewerage system. The discharge from the site will be restricted to 5l/s subject to approval from Severn Trent Water.



- 4.6 Due to the topography of the fields to the west, overland flows will enter the site on the central western boundary and could flow towards proposed dwellings. To reduce the risk of this occurring, a cut off land drain is proposed just inside the site boundary to intercept any flows and direct them into the ground via infiltration.

4.7 It is therefore considered that the risk of surface water flooding to the site post development is considered 'low'

Groundwater

- 4.8 Appendix F of the WFDC Strategic FRA – Groundwater Flood Maps, show the site to be in a potential area susceptible to ground water flooding. This data shows the proportion of each 1km grid square where geological and hydrogeological condition show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring.

4.9 Four risk categories are shown on the Groundwater Flood Maps. Most of the site is within the lower risk categories and a proportion of the northern half of the site is within the higher risk categories. A copy of the map is shown at **Appendix I**.

- 4.10 Following communication with NWWM, flooding has been recorded within existing dwellings on Cheviot Close in February and June 2020. The cause of the flooding is believed to be overland flows from the development site, failure of the public sewerage system and groundwater flows caused by flooding at development sites lowest point opposite Cheviot Close. A typical cross section of Pearl Lane - Cheviot Close, illustrating different flood mechanisms is shown at **Appendix G**, which has been supplied by NWWM.
- 4.11 As part of the site investigation works no groundwater was encountered in any of the boreholes during the monitoring phase and historical BGS borehole records located to the south, indicate that groundwater was encountered at 55ft. (18m).
- 4.12 The ground water monitoring would suggest that the normal water table within the site is generally low, however there may still be a groundwater flood risk if too much water is discharged into the ground following the development of the site.
- 4.13 To minimise this risk a significant proportion of the site will therefore be drained positively to a lined attenuation basin before discharging to the nearby public sewers in Pearl Lane at a maximum rate of 5l/s subject to approval from Severn Trent Water.

Sewers

- 4.14 As discussed in section 2.16, on the STW Records there is a 225mm public surface water sewer located in Pearl lane however, there is also an attenuation tank and network of highway drainage which serve Pearl Lane.
- 4.15 Following discussions with NWWM, it is understood that sewers within Pearl Lane are operating at near to capacity, and have a history of flooding although, STW's Developer Enquiry response states that a discharge to the 225mm public sewer may be acceptable.
- 4.16 It is understood that the existing public surface water sewer network within the adjacent residential development to the east of Pearl Lane is currently subject to a STW modelling exercise and flow monitors are to be installed. Results of the testing will be monitored with STW and once conclusions are drawn, STW may need to jet and potentially upgrade these sewers including the attenuation tank to alleviate any future flooding. As discussed in section 2.17 it may be difficult to upgrade sewers downstream of the site due to Riparian laws.
- 4.17 The risk of sewer flooding to the site is 'low' however it is expected that proposed finished floor levels should be set at least 450mm above any known surface water flooding levels in Pearl Lane.

Reservoirs and Lakes

- 4.18 The Environment Agency Reservoir Flood Map shows that the site is not at risk from reservoir flooding.
- 4.19 As discussed in section 2.14 there is an 800mm Aqueduct crossing the site which is understood to be carrying water from Trimley Reservoir to the north. It is considered that flows passing through the Aqueduct would not pose a flood risk to the site.

- 4.20 The risk of flooding from reservoirs and lakes is 'low'.

Artificial Sources

- 4.21 There are no canals near the subject site.

- 4.22 The risk of flooding from artificial sources is 'low'.

5. Drainage Strategy

5.1 A drainage strategy for both surface and foul water has been carried out and is shown in **Appendix E**.

Guidance

5.2 This drainage strategy has been developed in accordance with the following national standards for guidance:

- CIRIA C753, The SuDS Manual, 2016.
- Environment Agency, Report – SC030219, Rainfall runoff management for developments, 2013.
- Building Regulations 2010, Part H, Drainage and Waste Disposal.
- Codes for Adoption March 2020.

Basis of Design

5.3 The proposed development will create impermeable areas in the form of 331 dwellings, driveways, and access roads. The total estimated impermeable area that will be positively drained is approximately 5.5ha including an 10% allowance for Urban Creep in private areas only. The remaining areas around will form soft landscaping areas and planting.

5.4 The proposed development will increase both the rate and volume of surface water run-off compared with its existing condition. This additional surface water needs to be managed so that it does not exacerbate existing or create new flood risk elsewhere during their intended lifetime using SuDS.

Design Criteria

5.5 Considering the absence of any positive surface water drainage system, the site is considered as a greenfield site. In line with the National Standards for SuDS, for greenfield developments, the peak run-off rate from the development to any highway drain, sewer, or surface water body for the 1 in 1 year and the 1 in 100-year rainfall event should not exceed the peak greenfield runoff rate for the same events.

5.6 The National Standards for SuDS considers that any proposed surface water drainage system should consider flood risk to the development in the following flood events:

- The 1 in 30-year event – water should be stored in areas designated to hold and/or convey water.
- The 1 in 100-year event - flooding should not occur within any part of a building or utility plant susceptible to water unless in an area designated to hold and/or convey water.
- Exceedance flow – events exceeding the 1 in 100-year event – So far as is reasonably practicable, flows are managed in exceedance routes that minimise the risks to people and property.

Discharge Hierarchy

5.7 The proposed surface water drainage system should follow the ‘discharge hierarchy’ as stated in the Buildings Regulations (Part H). The surface run-off should be disposed of as high up the hierarchy as is reasonably practicable:

- Infiltration and reuse.
- Surface water body.
- Surface water sewer, highway drain, or another drainage system.
- Combined sewer.

Surface Water Strategy

5.8 Infiltration testing was carried out by Georisk Management in September 2019. Results of these are shown in **Appendix D**. Results indicated that some of the site was suitable for storm water infiltration, however the rates are still considered ‘low’ at around $2-5 \times 10^{-6}$ m/s on average. 4 of the 24 tests that were carried out across the site failed and infiltration in these areas will not be feasible.

5.9 For parcels where infiltration was feasible and adjacent to areas of POS, proposed dwellings, private and shared driveways are to be drained by private infiltration basins. Where infiltration was feasible but insufficient space was available for an infiltration basin, proposed dwellings, private and shared driveways will be drained to individual or shared cellular soakaways.

5.10 Where infiltration testing failed and was deemed unsuitable, dwellings and driveways will be positively drained into the proposed surface water drainage network.

5.11 The proposed roads which will be offered for adoption by Worcestershire County Council will also be positively drained with conventional gullies and pipework into the proposed surface water drainage network.

5.12 The surface water drainage network will drain to an open attenuation basin at the south east of the site which will be adopted by Severn Trent Water under a S104 agreement. The basin will be lined by an impermeable geotextile to prevent water entering the ground reducing the risk of groundwater flooding to nearby existing properties. Flows entering the basin will be attenuated to a maximum water level of 300mm below the top of bank level.

5.13 The outfall sewers from the attenuation basin will run along Pearl Lane to the existing Severn Trent Water manhole Ref 8501.

5.14 In accordance with the SuDS Manual, infiltration structures should be designed to half drain in under 24 hours during the 1 in 10-year storm. Due to infiltration rates being relatively low on this site, this criterion cannot be met for every structure, however, all infiltration structures will be designed not to flood during the 100-year return

period plus 40% climate change. Approval will be required for this strategy from NWWM prior to detailed design commencing.

- 5.15 An outline surface water drainage strategy can be found at **Appendix E**.

Foul Water Strategy

- 5.16 Severn Trent Water's Developer Enquiry response states that proposed foul flows from potentially 400 new dwellings with an average flow of around 6.5 l/s (at 2 x dry weather flow) would have an adverse effect on the (receiving) sewer network and that hydraulic modelling would need to be carried out to determine the available capacity.
- 5.17 Since the STW Developer Enquiry response, the number of proposed dwellings has reduced to 331, however it is likely that hydraulic modelling will still be required.
- 5.18 If it is deemed that there is insufficient capacity in the receiving network, STW would need to upgrade their sewers as necessary in line with the proposed development phasing.
- 5.19 The nearest foul water sewers that could potentially accommodate the development are situated in Dunley Road, 450m to the north of the site or Redhouse Road, 200m to the south of the site. Based on existing sewer levels, it is recommended that a connection be made to the existing 150mm public foul sewer in Redhouse Road.
- 5.20 An indicative foul water drainage strategy can be found at **Appendix E**.

Finished Floor Levels

- 5.21 It is recommended that finished floor levels are generally set at least 150mm above adjacent ground levels where possible and at least 450mm above any recorded or observed levels of surface water flooding.

Safe Access and Egress

- 5.22 Access and egress proposals from the development have been considered in an additional report however, it is recommended that the primary access point to the site is positioned away from any known surface water flooding areas.

6. Conclusions


- 6.1 Development Design Solutions (DDS) were commissioned by Barratt West Midlands (the Client) to undertake a Flood Risk Assessment to support a full planning application for a proposed residential development of 331 dwellings, to the west of Pearl Lane, Stourport on Severn.
- 6.2 The Flood Risk Assessment has been prepared in accordance with the National Planning Policy Framework in respect of the proposed scheme of development.
- 6.3 Following the completion of this assessment, the following conclusions can be drawn:
- The current Environment Agency Flood Maps show that the site is wholly located within Flood Zone 1 (land having a less than 1 in 1,000 annual probability of river or sea flooding in any year).
 - There is a history of surface water flooding at the south-eastern part of the site and within Pearl Lane, however, it is likely following STW's flow monitoring exercise that a combination of maintenance and upgrades to STW's public surface water network along with implementation of SuDs on the proposed development would reduce or eliminate this flooding.
 - Groundwater flooding maps in the WFDC Strategic FRA show that the site is in an area at risk of surface water flooding, and that there is a recent history of flooding in Cheviot Close that is partly due to groundwater flooding. However, groundwater monitoring as part of the site investigation indicated that no groundwater was found in any of the exploratory holes and it is proposed that over 50% of the development sites run off will drain to the public sewerage system. A cut off land drain is also proposed along the western boundary to intercept any overland flows from the adjacent fields.
 - Therefore, the actual risk of groundwater flooding post development is low.
 - Based on infiltration testing carried out in September 2019, it is deemed that the site is generally suitable for storm water infiltration, however, 4 of the tests failed. SuDS methods such as soakaway crates, and private infiltration basins are proposed. Where infiltration is not feasible, areas will be positively drained to the attenuation basin at the south east of the site and finally outfall to the existing public sewerage system.
 - Foul water from the development could be discharged to nearby STW sewers subject to hydraulic modelling and potential sewer upgrades.
 - The existing aqueduct and culverted watercourse running through the site must be maintained in its current position.
- 6.4 Overall, it is deemed that the flood risk to the site is low.
- 6.5 It would be imperative to start discussions early with WCC, STW and NWWM to ensure that all parties are satisfied with the proposals prior to planning.
- 6.6 From a flood risk and drainage perspective, it should therefore be recommended that this development be included in the WFDC Local Development Plan.

7. Appendices

Appendix A – Topographical Survey



NORTH





Appendix B – Proposed Development Layout

Disclaimer
 Images, layouts and plans are intended for illustrative purposes only and should be treated as general guidance only.
 Plans and layouts including parking arrangements, social infrastructure, drainage, footpaths, play areas and public open spaces may change to reflect changes in the planning permission for the development. The developer and the person to whom full details of any planning consents including layouts and plans will be available.
 Plans, layouts and landscaping are not intended to form part of any contract or warranty unless specifically indicated in writing into the contract.
 The name of the Post Office is the name of the scheme only and may not be the designated postal address, which may be determined by The Post Office.

Legend

- Application boundary
- House type coding
- Plot handing (as or opposite)
- Affordable Housing
- Existing vegetation
- Indicative Trees (refer to Landscape Plan)
- SUDs
- Adopted carriageway & private drives to be block paved
- Screen wall with timber infill panel
- Close-board fence
- Knee Rail
- Garden Gate
- Bin locations
- Shed locations



Key Plan [N/S]



Schedule of Accommodation						
Site Name: Land off Pearl Lane - Stourport						
Date: 09-12-20						
Barratt - Open Market Houses						
House Type Code						
Beds	Storey Height	Number	Sq Ft	Total Sq Ft		
Kenley	2	2	11	624	6864	
Bedsbury	2	2	17	975	13113	
Maldstone	3	2	930	2490		
Ellerton	3	2	16	830	13280	
Moresby	3	2	3	855	2565	
Collaton	3	2	10	863	8630	
Ennerdale	3	2	31	917	28427	
Bewdley	3	2	12	977	11242	
Kingsville	4	2.5	4	1073	4252	
Kingsley	4	2	19	1085	20615	
Rennford	4	2	4	1139	4556	
Open Market Summary						
Bedroom Provision						
1 Beds:	0	0.0%	Total Dwellings:		130	
2 Beds:	28	21.5%	Total Sq Ft:		114986	
3 Beds:	75	57.7%				
4 Beds:	27	20.8%				
5 Beds:	0	0.0%				
Affordable						
House Type Code	Beds	Storey Height	Number	Sq Ft	Total Sq Ft	
AH55 (affordable)	1	2	1	434	434	
AH55 (affordable)	1	2	1	519	519	
AH60 (affordable)	1	2	2	448	896	
AH61 (affordable)	1	2	2	465	930	
AH78 (affordable)	2	2	2	636	1272	
AH79 (affordable)	2	2	19	1593	3186	
AHS1	2	2	37	842	31154	
AHS2	3	2	7	930	6510	
AHS5	3	2	7	958	6706	
AHS4	4	2	4	1104	4416	
Amersham	2	3	6	584	3504	
Maldon	2	3	6	676	4056	
Falkirk 1	2	3	2	657	1274	
Falkirk 2	2	3	4	665	2660	
Affordable Summary						
Bedroom Provision						
1 Beds:	6	7.2%	Total Dwellings:		83	
2 Beds:	59	71.1%	Total Sq Ft:		65917	
3 Beds:	14	16.9%				
4 Beds:	4	4.8%				

Site Areas								
						Access & Regulations		
Gross Development Area:						39,723.12 m² / 10.27 ac		
Net Development Area:						21,433.90 m² / 5.28 ac		
Open Space Provision (including SuDS):								
14,946 m² / 3.65 ac						6.05%		
Ancillary Areas (Infrastructure etc):								
0.66 m² / 0.02 ac						0.27%		
Bedroom Provision								
1 Beds:	6	1.0%	Total Dwellings:		331			
2 Beds:	15	12.7%	Total Sq Ft:		313544			
3 Beds:	44	39.3%						
4 Beds:	69	58.5%						
5 Beds:	0	0.0%						
Efficiency Calculations								
Housing Density (Per Gross Hectare):						N/A		
37.9								
Net to Gross Ratio:						N/A		
14,946 m² per Net Hectare:						14,946 m²		

J	PLOTS 266 - 268 re-planned to accommodate the revised site access.	11.12.20	S/N
H	Triple garage plot 268 & 262 replaced and replaced with a double garage plot 266. Area of play indicated on layout and also movement from 266 to west of the total number of plots 261	11.12.20	BG
G		05.12.20	SW
F	Access onto Derby Road revised 30m NE to avoid entering 30C and Permit block redesigned to bring access road into the site. This caused a number of plot adjustments however overall number of units remained the same and the total number of plots remained unadjusted. These changes were made at the request of the division.	19.12.20	BG
E	Cycle paths and footpaths which meet external highways omitted and replaced by verges. Bin & Bike stores in apartments also rationalised on plot 266.	05.12.20	BG
D	Overall number of plots reduced by 1 in order to fulfil POS requirements. Other minor amendments also made to suit the layout.	21.09.20	BG
C	Net Site Area adjusted.	16.09.20	BG
B	1x Roseberry omitted and replaced with 1x affordable unit (plots 7 & 8) at required division.	15.09.20	BG
A	Schedule updated.	09.09.20	SW



01530 276276

Pearl Lane
Land off Pearl Lane
Stourport - on - Severn

Drawing Title
Proposed Site Layout Sheet 1 of 2

Scale

1:500 @ A1

Date

07.09.2020

Drawn By

SW





Appendix C – BGS Borehole Records

Town or Village Anthony

County Waukesha Six-inch quarter sheet 21 NW-4

For Mr. Nashley R.D.C.

Exact site of well NGR SO 8006 6846

British Geological Survey

British Geological Survey

Attach a tracing from
a map, or a sketch-
map, if possible.

Level of ground surface
above sea level (O.D.)

If well-top is not at ground level, state how far ...

above; ~~at~~ ~~at~~
below; ft.

SHAFT

ft.; diameter

ft. Details of headings.

BORE 100

ft.; diameter of bore: at top

ins.; at bottom

1

ins. Lengths,

Water struck at depths below well top, of (feet) 55

Rest-level of water _____ ft. above well-top. Suction at _____ ft. Yield on _____ hours' pumping, _____ gal.
 days
 per _____ with depression to _____ ft. below well-top, Capacity of pump _____ g.p.h. Recovery to

Quality of water (attach copy of analysis if available).

Well made by P. G. Liver and Son, Ltd.

Information from Saints

Date of well Sept. 1946

10. The following table shows the number of hours worked by each employee.

Additional notes in space overleaf.

Additional notes in space overleaf.

Continued over leaf.

Appendix D – Site Investigation Data



Georisk Management Ltd.
Tel: 0121 553 4044
email: enquiries@georisk-uk.com
www.georisk-uk.com

Borehole No.

WS02

Sheet 1 of 1

Project Details			Sheet 1 of 1
Project Name	Project No.	Co-ords:	Hole Type
Pearl Lane, Stourport	19212	-	WLS
Equipment:	Dynamic Percussive Sampling Rig	Level:	Scale 1:25
Client:	Barratt West Midlands	Dates:	Logged By NM
22-08-2019			

Remarks: Borehole backfilled with arisings upon completion.
Groundwater not encountered during drilling.



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Borehole No.
WS04

Appendix E – Drainage Strategy