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Leicestershire County Council
Barton Road
Barlestone
Flood Risk Assessment

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Flood Risk Assessment

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Notice

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EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of Leicestershire County Council in respect of a planning application for the proposed residential development located off Barton Road, Barlestone, Leicestershire (approximate grid reference: SK419057).

This report demonstrates that the proposed development is not at significant flood risk, subject to the recommended flood mitigation strategies being implemented.

The site is located in Flood Zone 1 (Land at Low Probability of Flooding) according to the Environment Agency Flood Map for Planning. The site is elevated significantly above the nearest watercourses and associated flood zones.

The Risk of Flooding from Surface Water mapping indicates that the site is predominately at low risk of flooding from pluvial sources. There is a low risk flow route through the site along the eastern boundary associated with a ditch. The areas of medium risk are associated with isolated topographic depressions and will not preclude development in these areas.

The site is considered to be at low risk of flooding from groundwater, sewer, canal and reservoir sources.

The proposals will mitigate the development's impact on the current runoff regime using appropriate surface water management. The development will discharge surface water at a restricted greenfield rate. Attenuation will be provided for storage up to the 1 in 100-year event including climate change. Foul water will be discharged separately to the public sewer in Barton Road. Severn Trent Water have confirmed that there is capacity to enable this connection.

In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area, subject to suitable management of surface water runoff discharging from the site.

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1. INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of Leicestershire County Council in respect of a planning application for the proposed residential development located off Barton Road, Barlestone, Leicestershire.

1.2 This FRA is intended to support an outline planning application and, as such, the level of detail included is commensurate and subject to the nature of the proposals. Summary information is included as **Table 1.1**.

Table 1.1: Site Summary

Site Name	Land off Barton Road
Location	Barlestone, Leicestershire
NGR (approx.)	SK419057
Application Site Area (ha)	3.25 (approximately)
Development Type	Residential
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	More Vulnerable
Environment Agency Office	East Midlands
Lead Local Flood Authority	Leicestershire County Council
Local Planning Authority	Hinckley and Bosworth Borough Council

Sources of Data

i. Topographical Survey by Malcolm Hughes Chartered Land Surveyors, reference 54250/1
ii. Site Visit by BWB Consulting in November 2020
iii. Hinckley and Bosworth Borough Council Strategic Flood Risk Assessment
iv. Leicestershire County Council Preliminary Flood Risk Assessment
v. Severn Trent Water Sewer Records
vi. Severn Trent Water Pre-development Enquiry
vii. British Geological Survey Drift & Geology Maps

Existing Site

1.3 The site is located to the west of the village of Barlestone, Leicestershire. The site is surrounded by greenfield land to the north, existing residential development to the east, Barton Road to the south and the A447 to the west.

1.4 The site's location is illustrated within **Figure 1.1.**

Figure 1.1: Site Location

1.5 The site is greenfield and is considered to be entirely permeable. The site is divided into two field parcels by a ditch depression identified along the central field boundary. An existing pond was also identified in the southeast of the western field close to this ditch depression. An additional ditch is present adjacent to the site's eastern boundary.

1.6 The topographical survey of the existing site is included in **Appendix 1**. The site generally falls from the northwest towards the southeast with a high point of 130.50m Above Ordnance Datum (AOD) and a low point of 125.12m AOD.

1.7 BWB Consulting undertook a site visit in November 2020. The central ditch was considered to be an informal feature with no evidence of an onwards connection identified during the site visit. The condition of the ditch during the site visit is shown in **Figure 1.2**. The topographical survey identified the ditch to have a maximum width of approximately 0.5m with shallow depths due to its informal nature. The topographical survey information also notes that no connections under Barton Road were identified.

Figure 1.2: Informal Ditch along Central Boundary

1.8 The existing pond was identified to be relatively dry with no clear inflow or outflow. The condition of the pond during the site visit is shown in **Figure 1.3**. The topographical survey identified the existing pond to be surrounded by an embankment elevated between 127.23m AOD to 128.05m AOD with water levels recorded at the time of the survey around 126.66m AOD.

Figure 1.3: Existing Pond

1.9 The ditch on the eastern boundary also did not have a clear onwards connection; however, based on the sewer mapping provided by Severn Trent Water, it is thought that this ditch is most likely to convey flows under Barton Road in a southerly direction. The topographical survey also identified this feature to be relatively shallow with depths generally less than 500mm.

1.10 The existing waterbodies within the site boundary are shown in **Figure 1.4**.

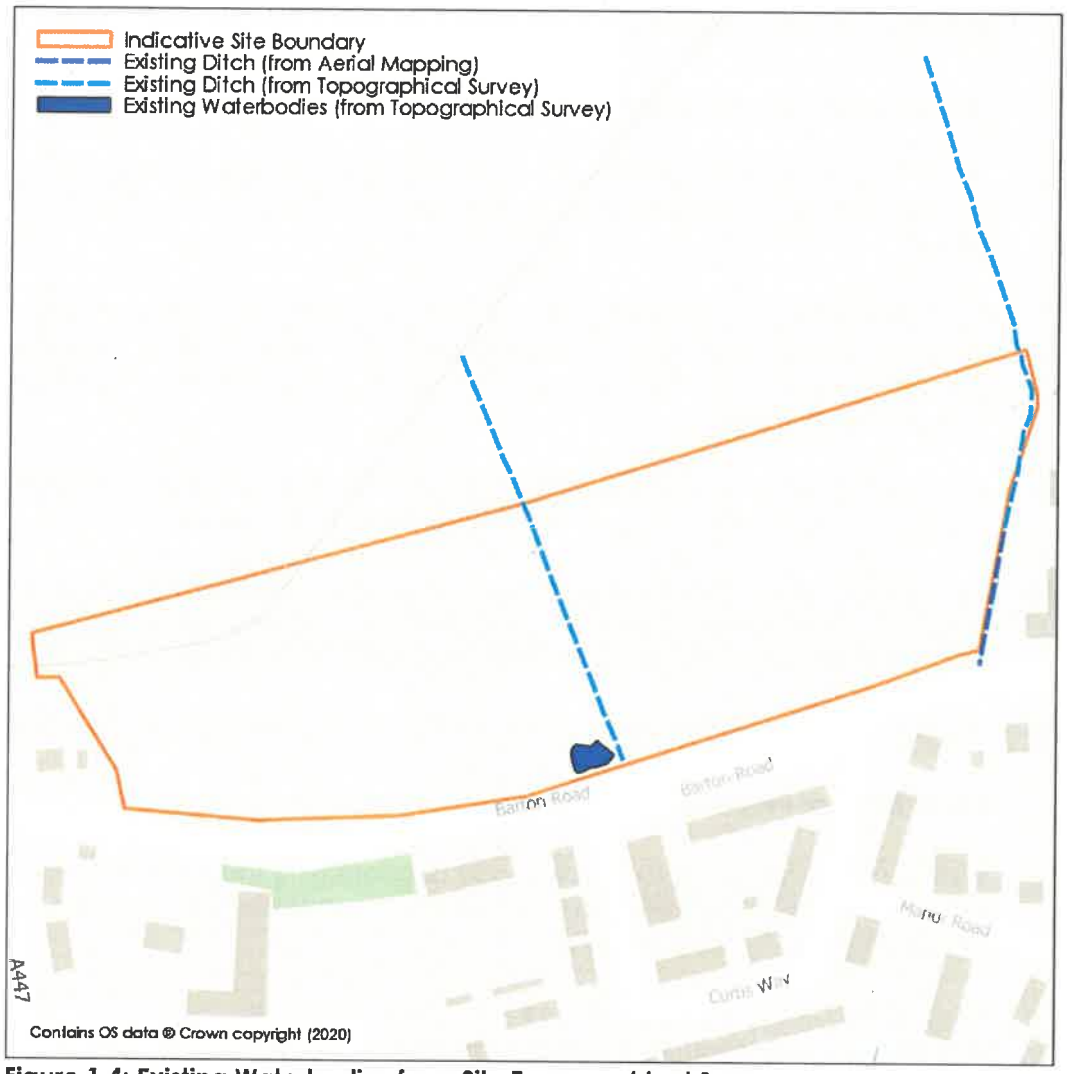


Figure 1.4: Existing Waterbodies from Site Topographical Survey

Proposed Development

1.11 The proposed development is residential with an area of open space in the west. The site vehicular access is towards the southeast of the proposed development onto Barton Road. An additional pedestrian access route onto Barton Road is proposed to the southwest around the open space.

1.12 The current proposals are shown in **Appendix 2**.

2. FLOOD RISK PLANNING POLICY

National Planning Policy Framework

2.1 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance is also available online[2].

2.2 The Planning Practice Guidance sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

2.3 The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing an FRA.

2.4 The Planning Practice Guidance includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3).

2.5 This FRA is written in accordance with the NPPF and the Planning Practice Guidance.

Flood Map for Planning

2.6 With particular reference to planning and development, the Flood Map for Planning produced by the Environment Agency identifies Flood Zones in accordance with Table 1 of the Planning Practice Guidance.

2.7 Flood Zone 1 (Low Probability) is defined as land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability).

2.8 Flood Zone 2 (Medium Probability) is defined as land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).

2.9 Flood Zone 3a (High Probability) is defined as land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.

2.10 Flood Zone 3b (The Functional Floodplain) is defined as land where water has to flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

2.11 The site is shown to be located within Flood Zone 1, as shown in **Figure 2.1**.

[1] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, February 2019
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance

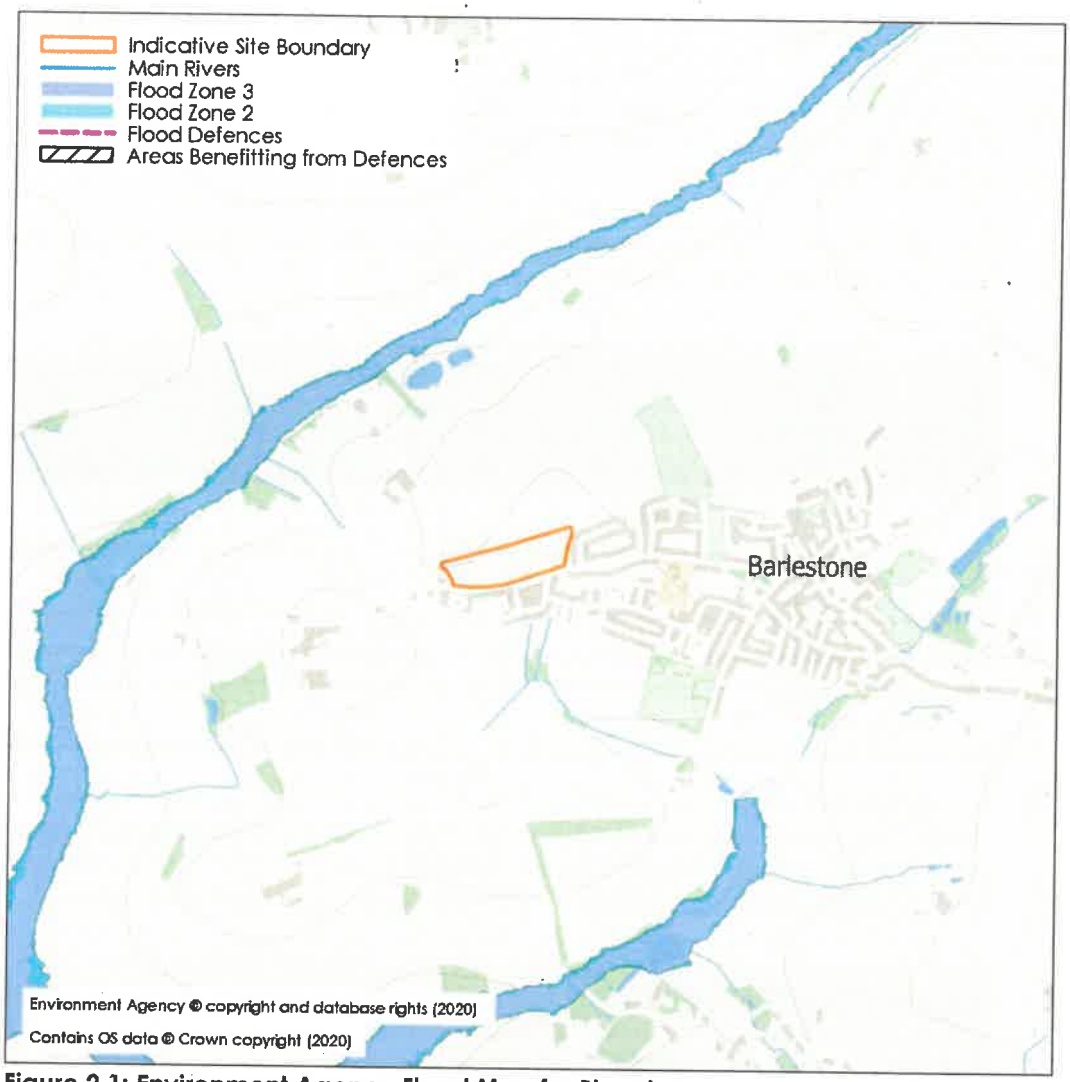


Figure 2.1: Environment Agency Flood Map for Planning

The Design Flood

2.12 The Planning Practice Guidance identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.13 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200 chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

2.14 Predicted future change in peak river flows caused by climate change are provided by the Environment Agency[3], with a range of projections applied to regionalised 'river basin districts'.

2.15 The site falls within the Humber river basin district. **Table 2.1** identifies the relevant peak river flow allowances from this river basin district.

Table 2.1: Peak River Flow Allowance for the Humber River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
H++	20%	35%	65%
Upper End	20%	30%	50%
Higher Central	15%	20%	30%
Central	10%	15%	20%

2.16 When determining the appropriate allowance for use in a Flood Risk Assessment the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.2** provides a matrix summarising the Environment Agency's guidance on determining the appropriate allowances.

Table 2.2: Application of the Appropriate Climate Change Allowance

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance				Use none of the allowances
2 or 3a	Use the upper end allowance	Use the higher central and upper end to assess a range of allowances	Use the higher central and upper end to assess a range of allowances	Use the central and higher central to assess a range of allowances	Use the central allowance
3b	Use the upper end allowance	Development should not be permitted	Development should not be permitted	Development should not be permitted	Use the central allowance
*If development is considered appropriate when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the upper end allowance.					

[3] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1

2.17 The site is located entirely within Flood Zone 1, the proposed development is classified as 'More Vulnerable', and it has an anticipated lifespan of approximately 100 years. Therefore, the Central allowances for the '2080s' epoch will be considered.

2.18 Therefore, to ensure the development is designed adequately for its lifetime an allowance of 20% will be applied to the design flood to be considered within the developments recommended flood management and resilience strategy.

2.19 The extreme climate change scenarios (H++) allowances are reserved for Nationally Significant Infrastructure Projects (NSIPs), new settlements and urban extensions, where an additional 'sensitivity test' is required. Therefore, this does not need to be considered for this development.

Strategic Flood Risk Assessment

2.20 A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.21 The Hinckley and Bosworth Borough Council Level 1 SFRA[4] has been reviewed in the production of this FRA. The SFRA provides information specific to the site location in the form of fluvial, surface water and groundwater flood risk mapping, as well as records of historical flooding. Information from the Level 1 SFRA will be referenced within **Section 3** where applicable.

2.22 The Hinckley and Bosworth Borough Council Level 2 SFRA[5] has also been reviewed. The site is included as Land at Barton Road, Barlestone (AS455) but is considered to be at low risk of flooding from fluvial and pluvial sources and was not subject to further detailed assessment.

Preliminary Flood Risk Assessment

2.23 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities.

2.24 The Leicestershire County Council PFRA[6] considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. No historical instances of flooding at the site are referenced. Information from the PFRA will be referenced within this report where applicable.

[4] Level 1 Strategic Flood Risk Assessment (Hinckley and Bosworth Borough Council, July 2019)
[5] Level 2 Strategic Flood Risk Assessment (Hinckley and Bosworth Borough Council, May 2020)
[6] Preliminary Flood Risk Assessment (Leicestershire County Council, June 2011)

3. POTENTIAL SOURCES OF FLOOD RISK

3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the site in its current condition, and the impacts which the development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial			X		The site is located in Flood Zone 1 and is elevated by 12m and 18m above the nearest Environment Agency Main Rivers, respectively.
Canals				X	There are no canals in the vicinity.
Groundwater			X		The site is underlain by low permeability layers and is shown to fall across an area predicted to be at low to high susceptibility to groundwater flooding.
Reservoirs and waterbodies			X		The site is shown to fall outside the area at risk of reservoir failure.
Pluvial runoff		X			The Risk of Flooding from Surface Water mapping shows the site is at very low to low risk of flooding from pluvial sources. The site is considered to be at risk from the shallow ditch on the eastern boundary.
Sewers			X		The nearby sewer network directs flows away from the site by gravity. In the event of exceedance overland flows are expected to be managed within the channel of the highway or directed in an easterly direction away from the site.
Effect of Development on Wider Catchment			X		Development will not result in impedance of surface water flow route.
		X			The development will increase the area of impermeable surfaces leading to a potential increase in runoff.

Fluvial Flood Risk

3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

3.3 The Environment Agency Flood Map for Planning identifies the entire site, including its proposed access and egress, to be located in Flood Zone 1. The nearest Environment Agency Main River, the River Sence is approximately 4km northwest of the site. The nearest Environment Agency Flood Zones are associated with two unnamed ordinary watercourses (UOW) which join to form a tributary of the River Sence.

3.4 The UOWs are approximately 500m north west and 1km south of the site. A review of the Environment Agency Light Detection and Ranging (LiDAR) data shows that the site is elevated above these two UOWs. The locations of the cross sections interrogated are shown in **Figure 3.1**.

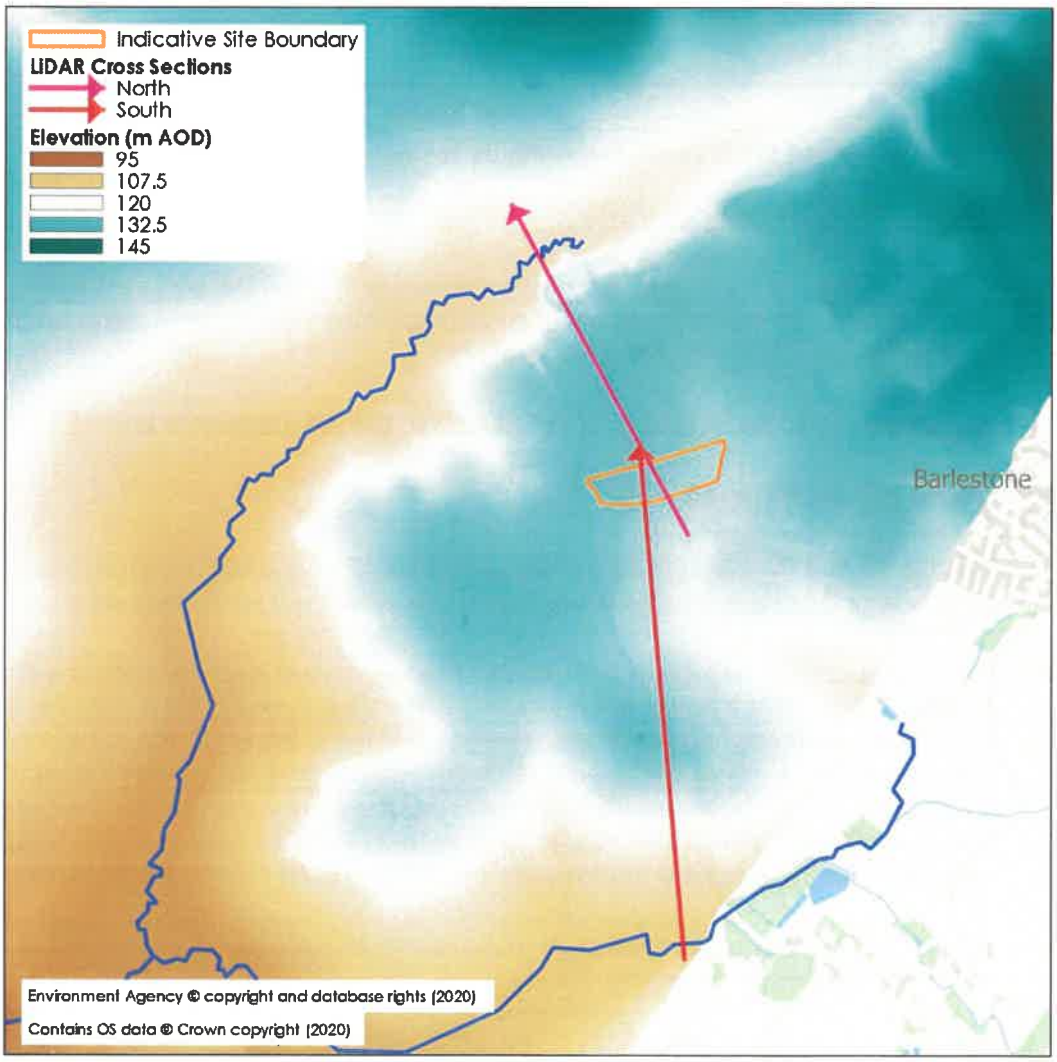


Figure 3.1: LiDAR Cross Sections

3.5 **Figure 3.2** and **Figure 3.3** show the site to be elevated approximately 12m and 18m above the northern and southern UOWs respectively.

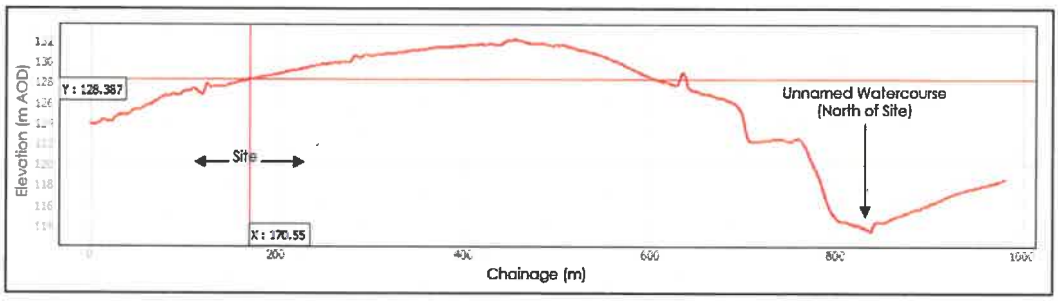


Figure 3.2: LiDAR Cross Section showing UOW north of the site

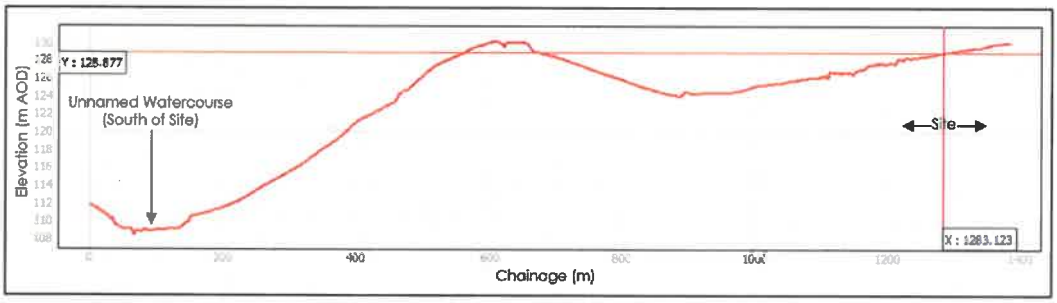


Figure 3.3: LiDAR Cross Section showing UOW south of the site

Unnamed Ditch Watercourses

3.6 Based on the site levels the ditch watercourses at the centre and east of the site fall southwards towards Barton Road. The risk associated with these watercourses will be outlined within the Pluvial Flood Risk section.

3.7 The overall risk of flooding from fluvial sources to the site is therefore low.

Flood Risk from Canals

3.8 The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders and boreholes and manages water levels by transferring it within the canal system.

3.9 Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

3.10 Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

3.11 The Ashby-de-la-Zouch Canal is located 3km southwest of the site. Based on available contour data the site is elevated at least 30m above the canal and is therefore not considered to be at risk from this source.

Groundwater Flood Risk

3.12 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.13 The British Geological Survey (BGS) mapping indicates the entire site to be underlain entirely by Gunthorpe Member – Mudstone. The Environment Agency classifies this bedrock type as a Secondary B Aquifer, suggesting low permeability.

3.14 The BGS mapping indicates that the western portion of the site is expected to be underlain by Glaciofluvial deposits, Mid Pleistocene – Sand and Gravel superficial deposits. The eastern portion of the site is expected to be underlain by Oadby Member – Diamicton superficial deposits. The Glaciofluvial deposits are classified as Secondary A Aquifers and the Oadby Member deposits are classified as Secondary (undifferentiated) Aquifers. This suggests permeable layers in the west and lower permeability layers in the east.

3.15 The Hinckley and Bosworth Borough Council SFRA includes mapping of groundwater susceptibility in 1km grid squares. The site is split between two grid squares. The west of the site is included in a square with less than 25% susceptibility and the east of the site is included in a square with greater than 75% susceptibility. The mapping is based on 1km grid squares and therefore is not site specific, with the potential that the classification is based upon a single event located some distance from the site. No further details on the exact means by which the classification was produced is included within the SFRA. The Leicestershire County Council PFRA notes that the majority of the county is underlain by non-permeable or lower permeability geology.

3.16 The BGS online borehole log records include a record approximately 200m east of the site, located to the north of the existing residential development on Little Mill Close. The record confirms the presence of sandstone, siltstone and mudstone in vicinity of the site and did not appear to refer to groundwater strike or emergence.

3.17 The site is underlain by lower permeability layers and nearby boreholes did not report groundwater strikes or emergence; therefore, the site is considered to be at low risk of flooding from groundwater sources.

Pluvial Flood Risk

3.18 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure, is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

3.19 Risk of flooding from surface water mapping has been prepared, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 3.4**.

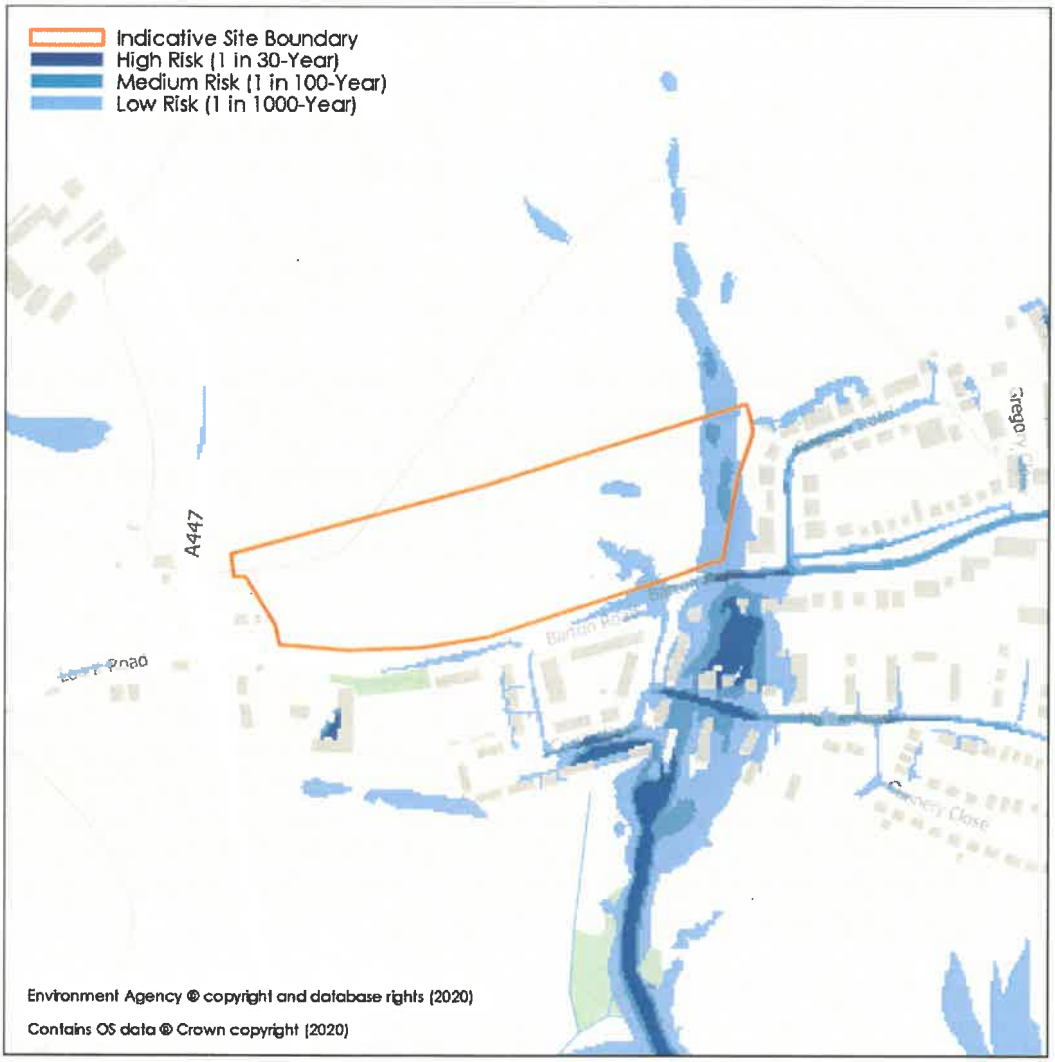


Figure 3.4: Risk of Flooding from Surface Water Mapping

3.1 The site is predominately at very low to low risk of flooding from surface water sources. The mapping indicates that high risk overland flows pool around residential properties to the south of Barton Road and are therefore outside of, and directed away from, the site.

3.2 A low risk surface water flow route traverses the east of the site from north to south. A number of isolated areas of medium risk are present along this low risk flow route. The flood depths during the medium risk design event are predicted to be less than 150mm and the modelled hazard rating is low. The areas of medium risk are associated with isolated topographic depressions and will not preclude development in these areas.

3.3 The surface water flow route would appear to correspond with a ditch depression. To the north of the site there is a plateau which directs flows either into the UOW to the north of the site or to the ditch within the site. The upstream catchment appears to be rural in nature and relatively limited. The area of the upstream catchment is considered to be less than 0.5km^2 based on the Flood Estimation Handbook (FEH) catchment data. The indicative floodplain for this watercourse is relatively confined; however, the topographical survey suggests the feature is generally less than 0.5m deep. A connection under Barton Road has not been identified by the topographical survey or a site visit; however, sewer mapping (**Appendix 3**) indicates the head of a surface water sewer around the downstream extent of the ditch suggesting a possible connection.

3.4 The surface water flood risk mapping does not indicate the presence of a flow route associated with the ditch following the field boundary in the centre of the site. This feature is considered to be an informal depression, with no apparent connection under Barton Road identified during the site visit or by the topographical survey.

3.5 The site access onto Barton Road is shown to be at very low to low risk of flooding from pluvial sources. The low risk event is beyond the design standard. However, the modelled predicted flood depths are less than 300mm during this event.

3.6 Due to the risk associated with the ditch on the eastern boundary, the site is considered to be at medium risk of flooding from pluvial sources. Appropriate mitigation measures are outlined in **Section 4**.

Flood Risk from Sewers

3.7 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.8 The Severn Trent Water records for the site are included as **Appendix 3**. The nearest public sewer networks to the site are located on Barton Road.

3.9 A 225mm combined sewer runs along the length of Barton Road from Hinckley Road in an easterly direction. A combined rising main enters the system from the north and a foul water sewer enters from the south. This combined network is understood to be at least 3.0m deep.

3.10 A 225mm surface water network is located to the southeast of the site and directs flows by gravity in an easterly direction. The head manhole is located adjacent to the eastern parcel of the proposed development and, therefore, flows are expected to be relatively low. The network is at least 1.6m deep in this area.

3.11 In the event of exceedance, flood flows are likely to be managed within the channel of the highway. Furthermore, in the event of exceedance the local topography suggests flows will be directed towards a low point in the east, away from the proposed development.

3.12 The flood risk from sewers is therefore considered to be low.

Effect of Development on Wider Catchment

Impedance of Flood Flows

3.13 The low risk surface water flow route to the east of the site should be considered during the master planning process, to prevent impedance of flood flows.

Development Land Use/Drainage Considerations

3.14 The proposed development will increase the impermeable area within the site boundary and consequently will increase the surface water runoff. Suitable mitigation will be outlined in **Section 4**.

4. FLOOD RISK MITIGATION

4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Development Levels

4.2 Finished floor levels of the proposed residential dwellings should be set a minimum of 150mm above the surrounding ground to reduce any residual flood risk. This is appropriate given the identified low flood risk across the site.

4.3 Ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.

4.4 Due to isolated areas of surface water flood risk, buildings should not be located in existing topographical depressions. Built development should also be located outside of any identified pluvial flow route.

4.5 Where external areas are located within pluvial flow routes this should be accounted for within the masterplan, to ensure flows are not impeded.

Safe Access and Egress

4.6 The proposed access and egress route is located entirely in Flood Zone 1 and is at very low to low risk of flooding from surface water sources. Therefore, dry access and egress is available during the 1 in 100-year design event.

Surface Water Drainage

4.7 To mitigate the development's impact on the current runoff regime it is proposed to incorporate surface water attenuation and storage as part of the development proposals.

4.8 Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement, reference *BRD-BWB-ZZ-XX-RP-CD-0001_SDS*.

4.9 In brief, the development will discharge surface water at a restricted rate with attenuation being provided in the form of SuDS detention basins with capacity for the 1 in 100-year storm with an allowance for climate change.

4.10 The development should be designed with exceedance in mind and the road network used to convey excess overland flows towards the attenuation points.

Foul Water Drainage

4.11 It is proposed to drain used water from the development separately to surface water.

4.12 The local sewerage operator has confirmed capacity for the proposed development (**Appendix 4**). The correspondence identified that the recommended foul water connection point is manhole 0606, located to the south of the eastern development parcel.

4.13 Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement, reference *BRD-BWB-ZZ-XX-RP-CD-0001_SDS*.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated Planning Practice Guidance. The FRA has been produced on behalf of Leicestershire County Council in respect of a planning application for the proposed residential development located off Barton Road, Barlestone, Leicestershire.

5.2 This FRA is intended to support an outline planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

5.3 This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**:

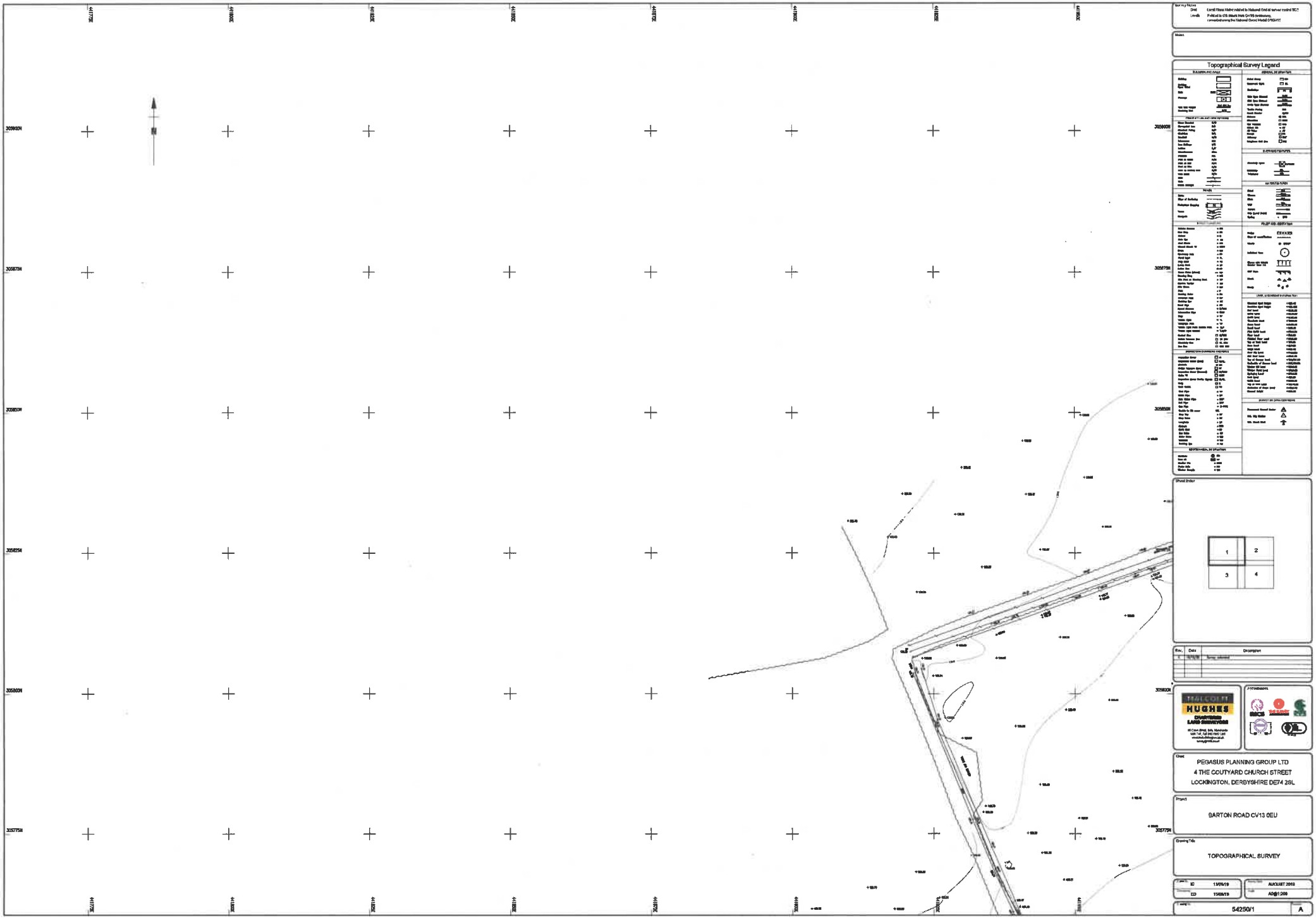
Table 5.1: Summary of Flood Risk Assessment

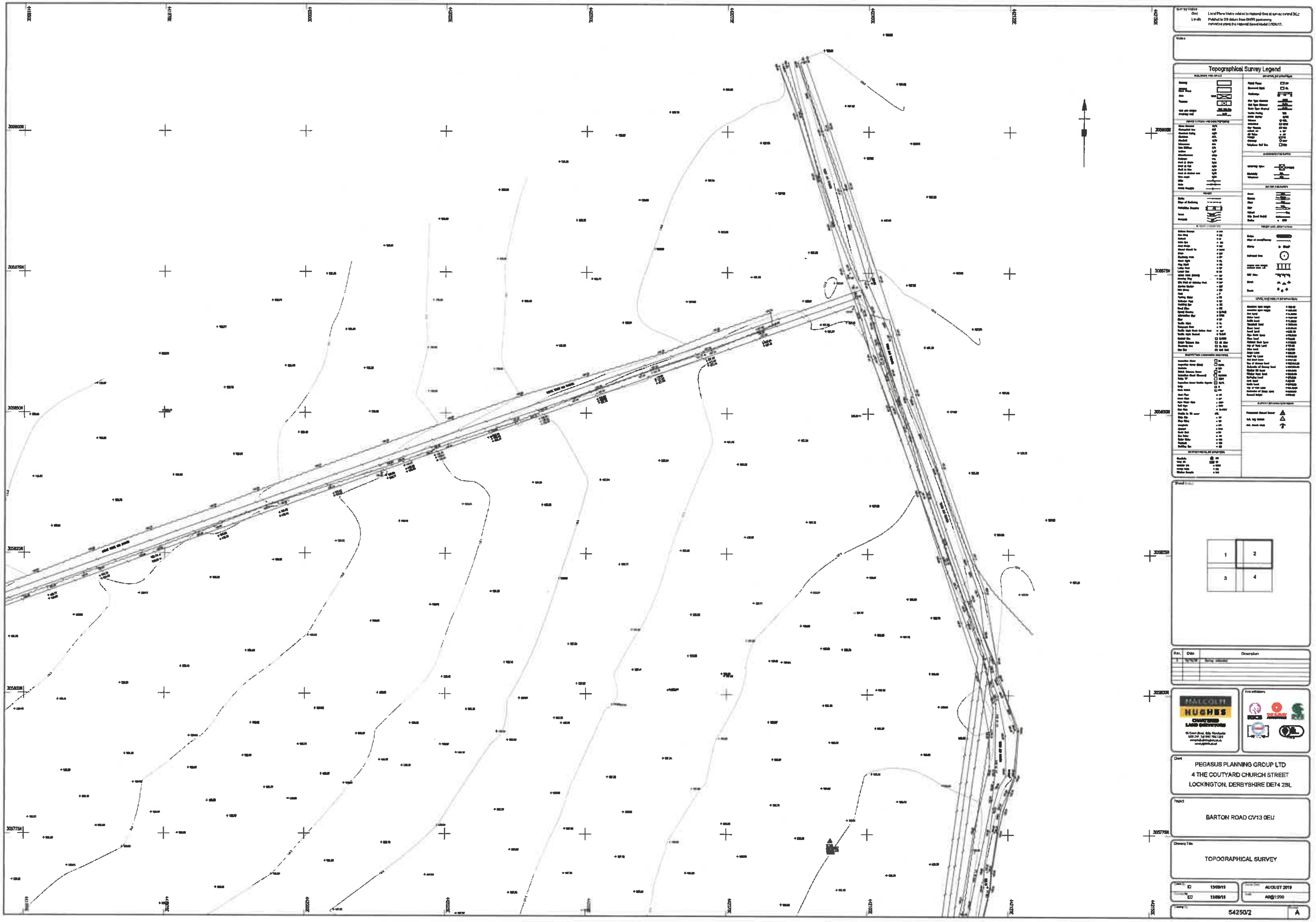
Flood Source	Risk & Proposed Mitigation Measures
Pluvial runoff	The proposed residential development should be raised a minimum of 150mm above the surrounding ground levels to mitigate any residual risks. Ground levels should be profiled to direct overland flows away from the proposed built development and towards the nearest attenuation point. Buildings should not be located within existing topographical depressions and pluvial flow routes.
Impact of the Development	The proposed development should be arranged so as to not impede the surface water flow route towards the east of the site. Surface water runoff from the development will be controlled appropriately with discharge being restricted to greenfield rates. Attenuation is to be provided to accommodate flows up to and including the 1 in 100 year plus 40% event. The foul water from the development will be discharged to the public combined sewer in Barton Road, which the operator has confirmed has suitable capacity.
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

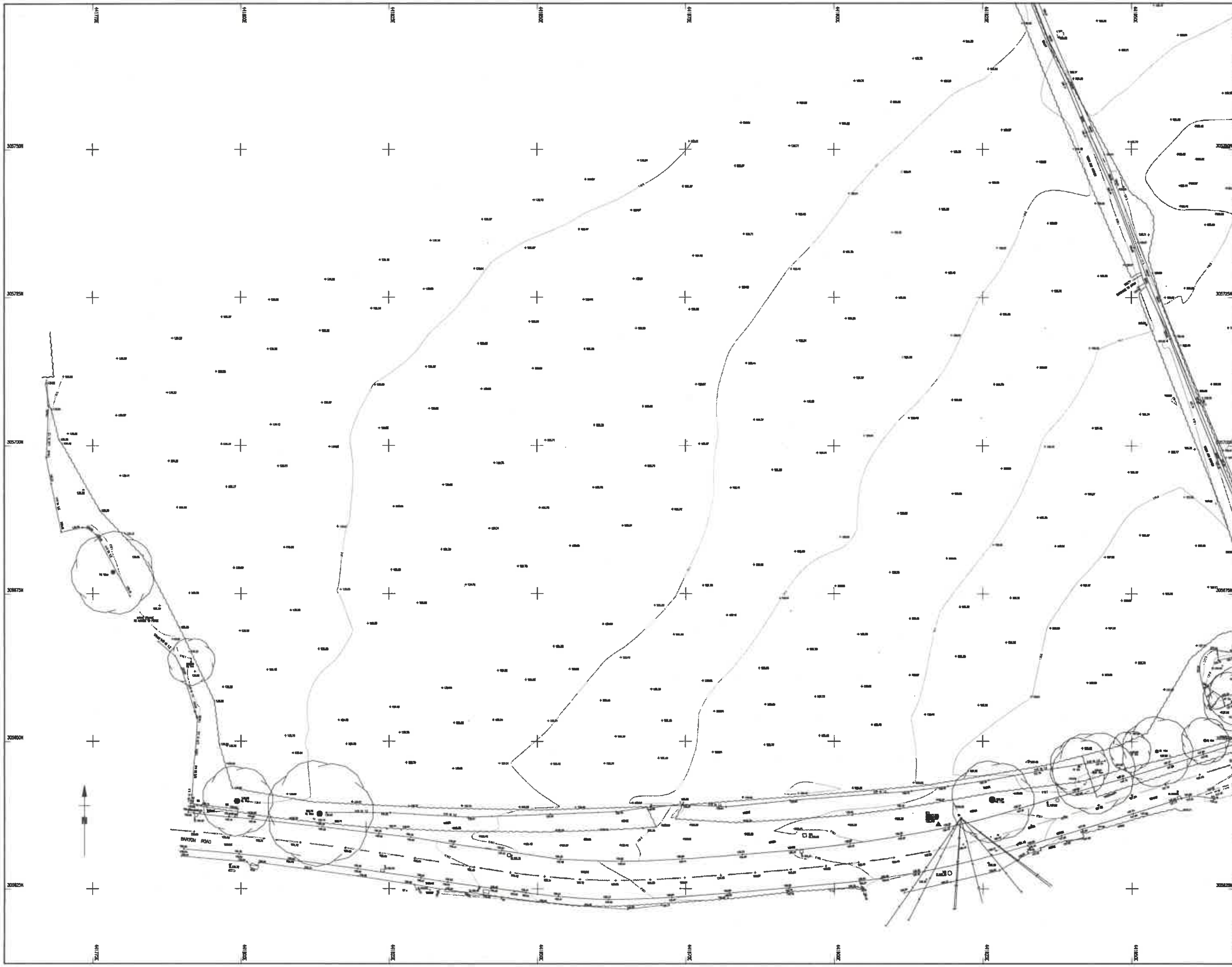
5.4 In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the site.

APPENDICES

APPENDIX 1: Topographical Survey


Topographical Survey Legend
Sheet Index
1
2
3
4
Rev. Date Description
TALCOTT HUGHES CHARTERED LAND SURVEYORS
Client
PEGASUS PLANNING GROUP LTD
4 THE COUTYARD CHURCH STREET
LOCKINGTON, DERBYSHIRE DE74 2SL
Project
BARTON ROAD CV13 0EU
Drawing Title
TOPOGRAPHICAL SURVEY
ID 13/09/19
ED 13/09/19
AUGUST 2019
A0@1:200
54250/1
A


Topographical Survey Legend
Rev.
Date
Description
MALCOLM HUGHES
Client
PEGASUS PLANNING GROUP LTD
4 THE COUTYARD CHURCH STREET
LOCKINGTON, DERBYSHIRE DE74 2SL
Project
BARTON ROAD CV13 0EU
Drawing Title
TOPOGRAPHICAL SURVEY
IC 13/08/19
ED 13/08/19
AUGUST 2019
A0@1:200
54250/2
A



Survey Notes
Grid: Local Plane Metric related to National Grid at survey control SC2
Levels: Related to OS datum from GNSS positioning converted using the National Geoid Model OSGM15.

Notes

Topographical Survey Legend

Rev.	Date	Description

MALCOLM HUGHES CHARTERED LAND SURVEYORS

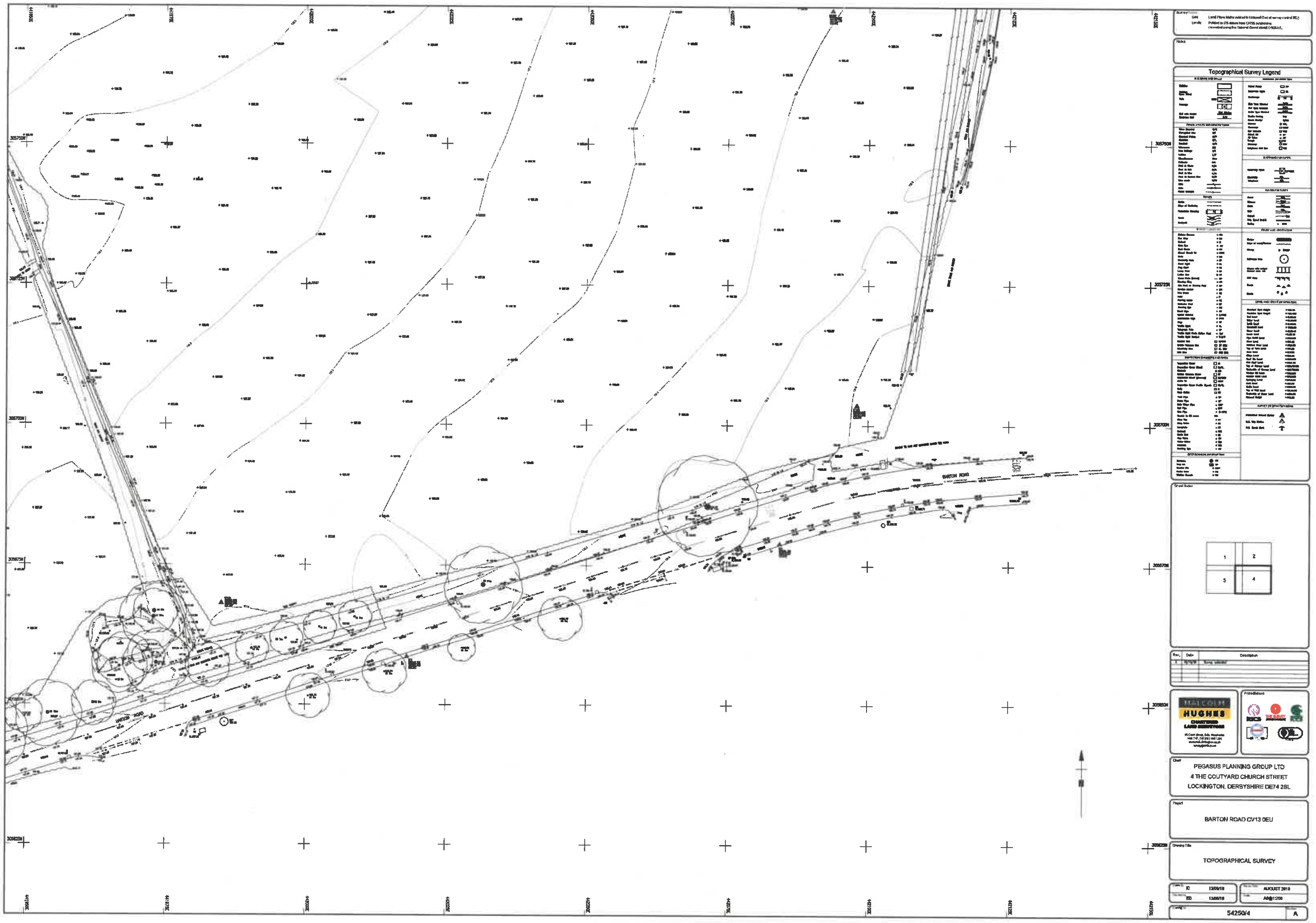
Client: PEGASUS PLANNING GROUP LTD
4 THE COUTYARD CHURCH STREET
LOCKINGTON, DERBYSHIRE DE74 2SL

Project: BARTON ROAD CV13 0EU

Drawing Title: TOPOGRAPHICAL SURVEY

IC 13/08/19 | AUGUST 2019
ED 13/08/19 | A0@1:200

54250/3 | A



Topographical Survey Legend
BARTON ROAD
PEGASUS PLANNING GROUP LTD
4 THE COUTYARD CHURCH STREET
LOCKINGTON, DERBYSHIRE DE74 2SL
BARTON ROAD CV13 0EU
TOPOGRAPHICAL SURVEY
AUGUST 2019
54250/4
A

BWB

APPENDIX 2: Illustrative Masterplan

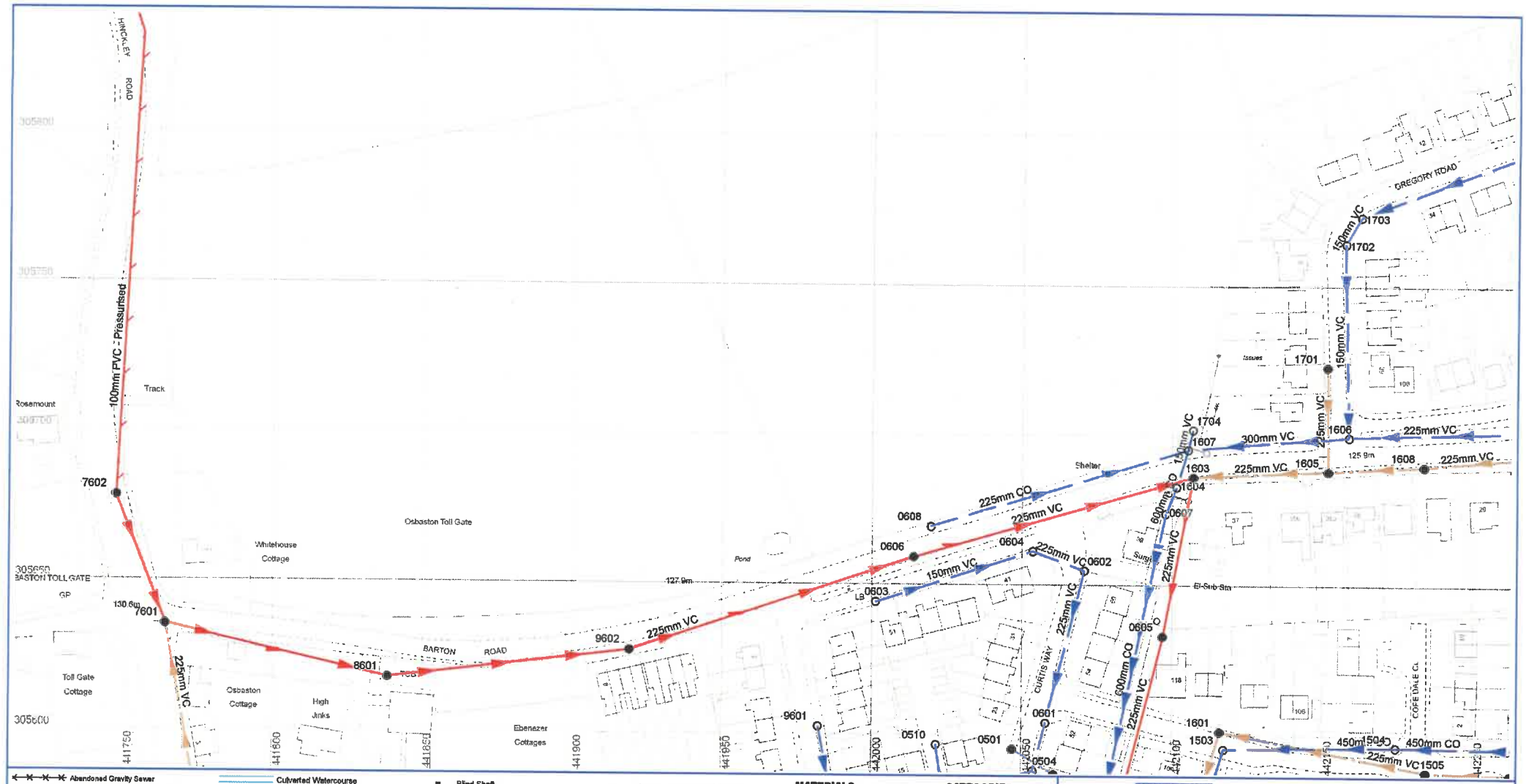
Barton Road, Barlestone - **Illustrative Masterplan**

| Drawn by: LJE | Approved by: GLO | Date: 04/12/20 | Scale: 1:1000 @ A2 | DRG: P19-1647 001 Sheet No: 1 Rev: B | Client: Leicestershire County Council |

Pegasus Group

BWB

APPENDIX 3: Severn Trent Water Records



- Abandoned Gravity Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
- Private Surface Water Gravity Sewer
- Public Combined Gravity Sewer
- Public Foul Gravity Sewer
- Public Surface Water Gravity Sewer
- Trunk Combined Gravity Sewer
- Trunk Foul Use Gravity Sewer
- Trunk Surface Water Gravity Sewer
- Combined Use Pressurised Sewer
- Foul Use Pressurised Sewer
- Surface Water Pressurised Sewer
- Highway Drain
- Combined Lateral Drain (SS)
- Foul Lateral Drain (SS)
- Surface Water Lateral Drain (SS)

All Private Sewers are shown in magenta
All section 104 sewers are shown in green
All sewers that have been constructed on Severn Trent Water after the 1st October 2011, but have not been adopted and confirmed by Severn Trent Water are shown in orange

- Culverted Watercourse
- Cable, Earthing
- Cable Junction
- Cable, Optical Fibre/Instrumentation
- Cable, Low Voltage
- Cable, High Voltage
- Cable, Other
- Housing, Building
- Housing, Kiosk
- Disposal Site
- Sewage Treatment Works
- Housing, Other
- Pipe Support Structure
- Sewage Pumping Facility
- Sewer Facility Connection Inlet / Outlet

- Blind Shaft
- Combined Use Manhole
- Flushing Chamber
- Foul Use Manhole
- Grease Trap
- Head Node
- Hydrobrake
- Lamphole
- Outfall
- Overflow
- Penstock
- Petrol Interceptor

- Sewer Chemical Injection Point
- Sewer Junction
- Sewerage Air Valve
- Sewerage Hatch Box Point
- Sewerage Isolation Valve
- Soakaway
- Surface Water Manhole
- Vent Column
- Waste Water Storage
- Pre-1937 Properties

MATERIALS

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

SHAPE

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

PURPOSE

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

CATEGORIES

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

N
W E
S

SEVERN TRENT WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0845 601 6616

SEWER RECORD

O/S Map scale:	1:1250	**This map is centred upon:**	
Date of issue:	18.09.19	**O / S Grid reference:**	
		x :	441963
		y :	305712

Sewer Node / Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK41057501	130.08	128.56	nil	F	VC	C	225	nil	0.00	nill
SK41057601	130.70	nil	nil	C	nil	nil	nil	nil	0.00	nill
SK41057602	nil	nil	nil	C	nil	nil	nil	nil	0.00	nill
SK41058601	nil	nil	126.00	C	nil	nil	nil	nil	0.00	nill
SK41059501	125.00	124.06	nil	S	VC	C	150	nil	0.00	nill
SK41059502	125.40	124.25	124.11	S	VC	C	150	nil	47.93	nill
SK41059601	126.14	124.69	124.23	S	VC	C	150	nil	57.57	nill
SK41059602	128.32	125.98	125.30	C	VC	C	225	nil	146.50	nill
SK42050500	nil	122.68	122.60	F	VC	C	nil	nil	0.00	nill
SK42050501	124.16	122.98	122.78	F	VC	C	nil	nil	76.30	nill
SK42050502	124.15	122.77	122.68	F	VC	C	nil	nil	0.00	nill
SK42050503	124.28	123.14	123.06	S	VC	C	300	nil	135.25	nill
SK42050504	124.01	123.32	123.15	S	VC	C	300	nil	97.88	nill
SK42050505	124.22	122.91	122.74	S	CO	C	600	nil	67.06	nill
SK42050506	124.17	122.59	122.57	C	VC	C	nil	nil	412.50	nill
SK42050507	123.99	122.52	122.44	C	VC	C	225	nil	300.50	nill
SK42050509	124.33	122.74	122.70	S	CO	C	600	nil	125.00	nill
SK42050510	124.71	123.96	123.93	S	VC	C	150	nil	438.33	nill
SK42050511	124.43	123.91	nil	S	VC	C	150	nil	0.00	nill
SK42050512	123.77	122.05	121.66	C	VC	C	225	nil	159.41	nill
SK42050601	124.32	123.39	123.35	S	VC	C	225	nil	419.00	nill
SK42050602	125.30	123.81	123.41	S	VC	C	225	nil	129.15	nill
SK42050603	126.76	125.39	124.58	S	VC	C	150	nil	68.72	nill
SK42050604	125.88	124.52	123.81	S	VC	C	225	nil	26.46	nill
SK42050605	124.80	123.13	122.63	C	VC	C	nil	nil	126.12	nill
SK42050606	126.93	125.27	123.70	C	VC	C	nil	nil	61.68	nill
SK42050607	125.23	124.13	122.93	S	CO	C	600	nil	85.97	nill
SK42050608	126.95	125.92	124.65	S	CO	C	225	nil	69.99	nill
SK42051501	124.62	122.28	122.06	C	VC	C	225	nil	255.55	nill
SK42051502	124.52	122.86	122.79	S	CO	C	450	nil	457.43	nill
SK42051503	124.43	123.20	123.06	S	CO	C	450	nil	307.21	nill
SK42051504	125.03	123.37	123.26	S	CO	C	450	nil	518.27	nill
SK42051505	125.25	122.75	122.55	F	VC	C	225	nil	347.15	nill
SK42051601	124.49	122.50	122.37	F	VC	C	225	nil	355.15	nill
SK42051603	125.71	123.66	123.17	C	VC	C	225	nil	110.08	nill
SK42051604	125.72	124.28	124.13	S	CO	C	600	nil	65.67	nill
SK42051605	125.79	124.14	123.71	F	VC	C	225	nil	102.44	nill
SK42051606	125.72	124.79	124.53	S	VC	C	300	nil	204.42	nill
SK42051607	125.95	124.61	124.34	S	CO	C	225	nil	45.81	nill
SK42051608	126.63	125.04	124.17	F	VC	C	225	nil	36.85	nill
SK42051701	126.00	124.40	124.16	F	VC	C	225	nil	145.88	nill
SK42051702	126.39	125.30	124.84	S	VC	C	150	nil	143.50	nill
SK42051703	126.61	125.36	125.31	S	VC	C	150	nil	206.00	nill
SK42051704	124.64	124.63	124.59	S	VC	C	150	nil	176.75	nill

MATERIALS

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

SHAPE

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

PURPOSE

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

TABULAR KEY

A. Sewer pipe data refers to downstream sewer pipe.

B. Where the node bifurcates (splits) X and Y indicates downstream sewer pipe.

C. Gradient is stated a 1 in...

SEVERN TRENT WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0845 601 6616

SEWER RECORD DATA TABLE

O/S Map scale:	1:2500	This map is centred upon: O / S Grid reference:	
Date of issue:	18.09.19	x:	441963
Sheet No.	2 of 2	y:	305712

BWB

APPENDIX 4: Severn Trent Water Pre-Development Enquiry

WONDERFUL ON TAP

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

Tel: 02477716843
www.stwater.co.uk

Email: [redacted]

Our ref: 8376447

BWB Consulting Ltd,
11 Borough High Street,
London,
SE1 9SE.

FAO: Thirushan Moodley

3rd October 2019

Dear Thirushan,

Proposed Residential Development 64 New Dwellings) at:
Land off Barton Road, Barlestone, Nuneaton, CV13 0HF.

X: 442217 / Y: 305744

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

Public Sewers in Site – Required Protection

There are no public sewers crossing the proposed development site.

On 1st October 2011 many private sewers were transferred into the ownership of Severn Trent Water as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.

Foul Water Drainage

The enclosed sewer record extract shows a 225mm combined water sewer south of the site on Barton Road. According to our calculations, a foul discharge for 64 new dwellings would be approximately 1 l/s. A foul connection for this can be accommodated in this sewer. Please be advised that a new connection to this sewer could be made to a new or existing manhole (MH0606) and that this

contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the [redacted] email inbox address, a response will be made within 15 days.

If you require a VAT receipt for the application fee please email MISCINCOME.NC@SEVERNTRENT.CO.UK quoting the above Reference Number.

Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely,

Emma Nowak.
Asset Protection East.
Asset Management.
Wholesale Operations.

would be ok subject to a formal S106 connection approval (see later).

Surface Water Drainage

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

If these are found to be unsuitable, satisfactory evidence will need to be submitted. The evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter).

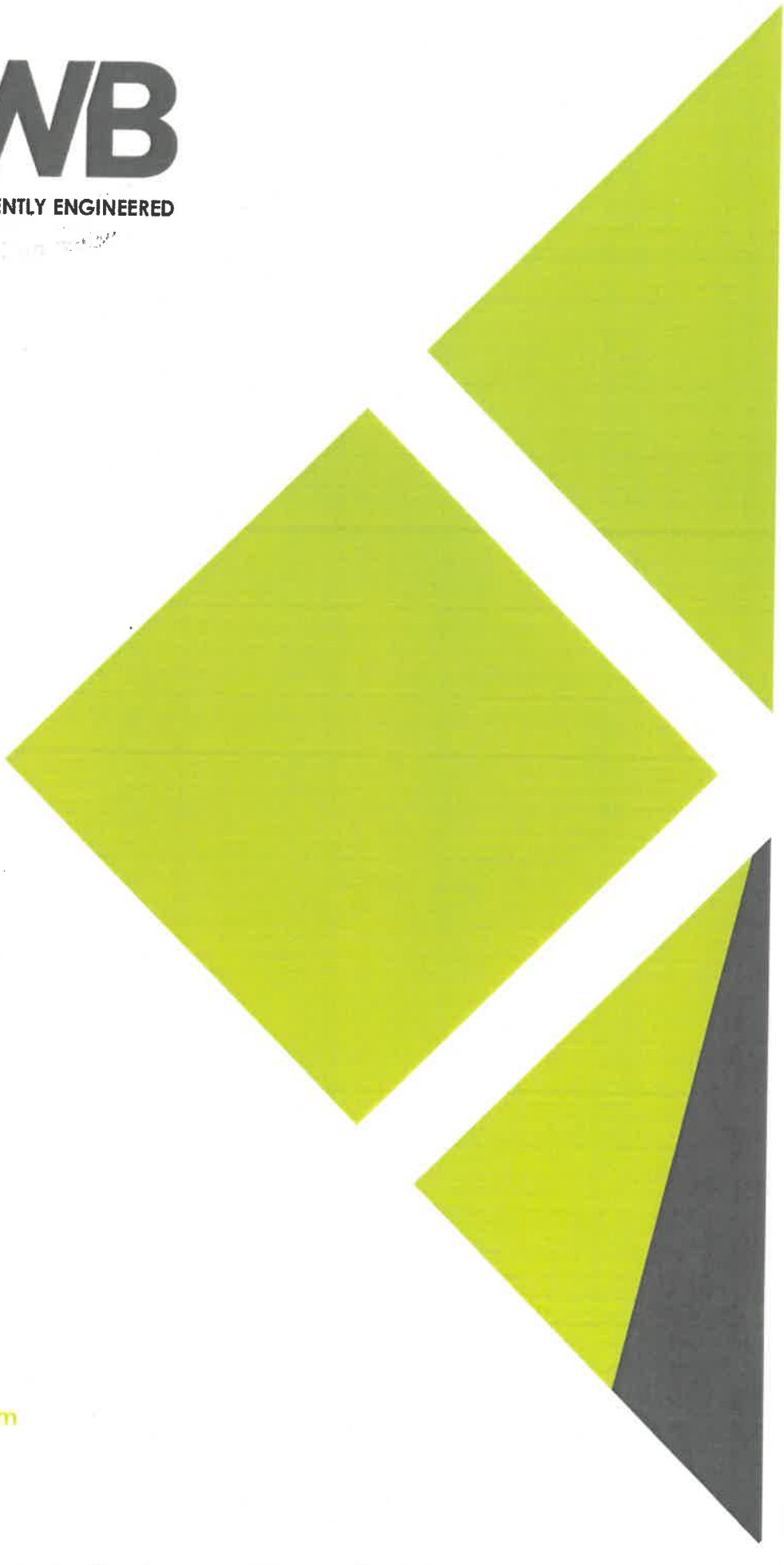
Subject to the above, sewer records show a 225mm surface water sewer south of the site off Barton Road. This sewer travels a short distance eastwards before joining with a 300mm sewer to become a 600mm sewer which flows southwards before out-falling at an existing drainage ditch. Subject to LLFA approval, we would accept green-field runoff rate flows of 5 l/sec/ha to a new or existing manhole (MH0608). Severn Trent would advise that all surface water drainage for the proposed development should be discussed with the LLFA, who are the lead flood and surface water authority, in addition to our requirements. This is particularly the case, as with this enquiry, where discharges to a watercourse, culverted watercourse, drainage ditches or to a public sewer close to a river outfall are being considered. Please refer to "Severn Trent Surface Water Guidance Notes" submitted with this response for further information.

Any flows exceeding the proposed rates would need to be appropriately attenuated on site and discharged at a controlled rate. Please submit surface water drainage proposals based on these comments for review when available.

New Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED



www.bwbconsulting.com