Pre-Planning Engineering

Flood Risk Assessment

Proposed Residential Development
Land at Ilkeston Road/Sowbrook Lane
Ilkeston

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Revision Record

Revision	Date	Description	Written	Approved
0	26/11/21	Draft Issue	AN	MJA
0	29/04/22	Planning Issue	AN	MJA

Contents

Appendices

Appendices

1.0 Introduction

1.1 Instructions

1.1.1 This Flood Risk Assessment has been prepared for Wulff Asset Management Limited.

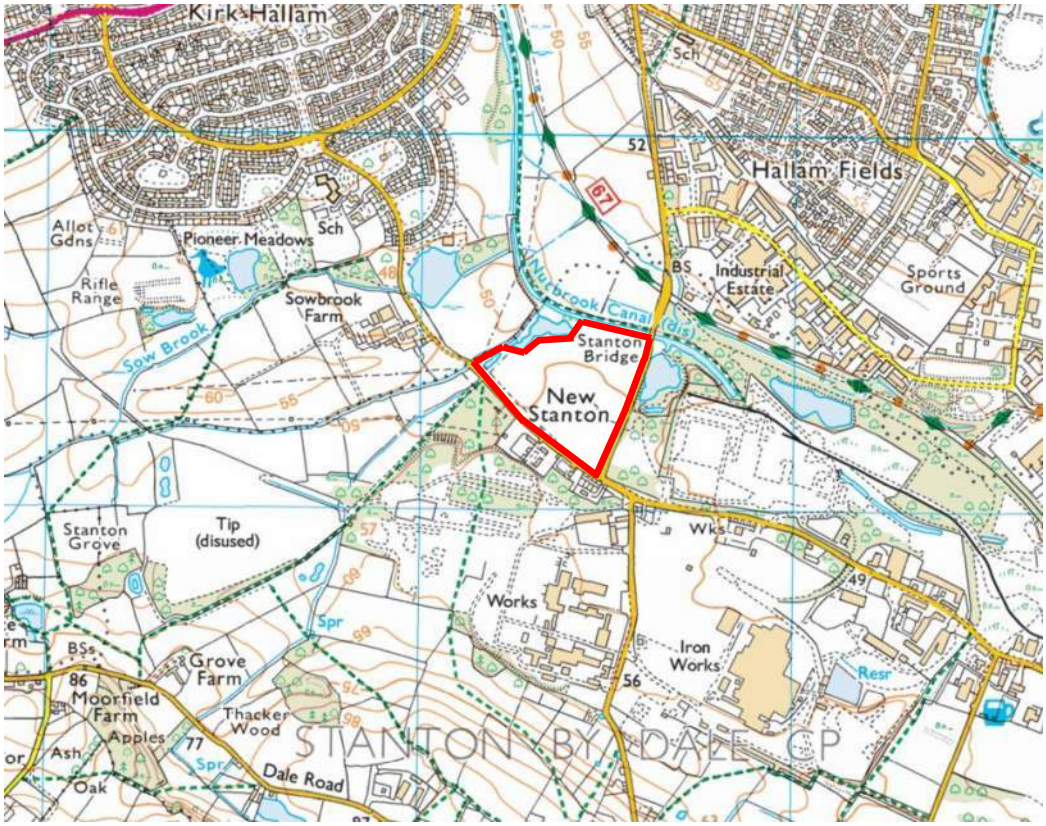
1.1.2 The report has been prepared to support the submission of an outline application.

1.1.3 The benefit of this report is to our instructing Client.

1.2 Site Location

1.2.1 The proposed residential development is located at Land at Ilkeston Road/Sowbrook Lane, Ilkeston , as shown in **Inset 1.1** below and enclosed in **Appendix A**. The approximate National Grid Reference for the site is E446400, N339335.

Inset 1.1: Site Location Plan



1.3 Current Use and Description

1.3.1 There has been no previous development on the site. The existing site is shown on the topographical survey enclosed in **0**.

1.3.2 The nearest watercourses to the development site are the Nutbrook Canal which runs along the northern perimeter, and an unnamed open channel watercourse which runs along the western site boundary, prior to discharging into Nutbrook Canal.

1.3.3 In addition to the above-named watercourses, there is an existing pond located within the application red line situated adjacent to Sowbrook Lane and the open channel watercourse running along the western boundary. This pond is not permanently wet, and only contains water during periods of heavy rainfall.

1.3.4 Outside of the red line planning application boundary, adjacent to the northwestern corner of the application site, is a large pond known as 'Roughs Open Hole'. This pond is used by the Stanton Fishing Club and is home to fish species such as Pike, Carp, Ide and Roach, among others. The fishing club's website notes the average depth of this pond to be 8ft (2.4m). Based on topographical survey evidence, the base level of this pond is expected to be around 43.9m above ordnance datum. (AOD).

1.3.5 A review of OS mapping and Topographical Survey, suggests 'Roughs Open Hole' is fed by site runoff generated from land within the red line boundary which sits at higher ground; in addition to the above-mentioned watercourses running parallel to the application site boundaries.

1.3.6 The site falls in a south to north/northwest direction, where the elevation difference between the high point and low point is circa 7.32m. In the northern direction, this fall provides an average gradient across the site of approximately 1 in 48, between the Sowbrook Lane/Ilkeston Road junction and Nutbrook Canal. In the northwestern direction, a shallower gradient of 1 in 68 has been recorded within the site extent, for the land running parallel to and directly adjacent Sowbrook Lane.

1.3.7 Like the application site, most of the surrounding land parcels located within the immediate vicinity are greenfield and have remained undeveloped. There is a power station and a small cul-de-sac of residential properties located on the opposite side of Sowbrook Lane.

1.4 Proposed Development

1.4.1 The proposed development will comprise up to 196 residential properties, alongside associated infrastructure and areas of public open space. The proposed development layout is shown on the plan enclosed in **0**.

1.4.2 In line with paragraph 26 of the Planning Practice Guidance for 'Flood risk and climate change' the lifetime of a residential development is considered to be at least 100 years.

1.4.3 The 'Flood Risk Vulnerability Classification' of various development types is defined within Annex 3 of the National Planning Policy Framework (NPPF) – July 2021. A residential development is classified as a More Vulnerable development. The relevant extract from Annex 3 of the NPPF is set out below.

More Vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

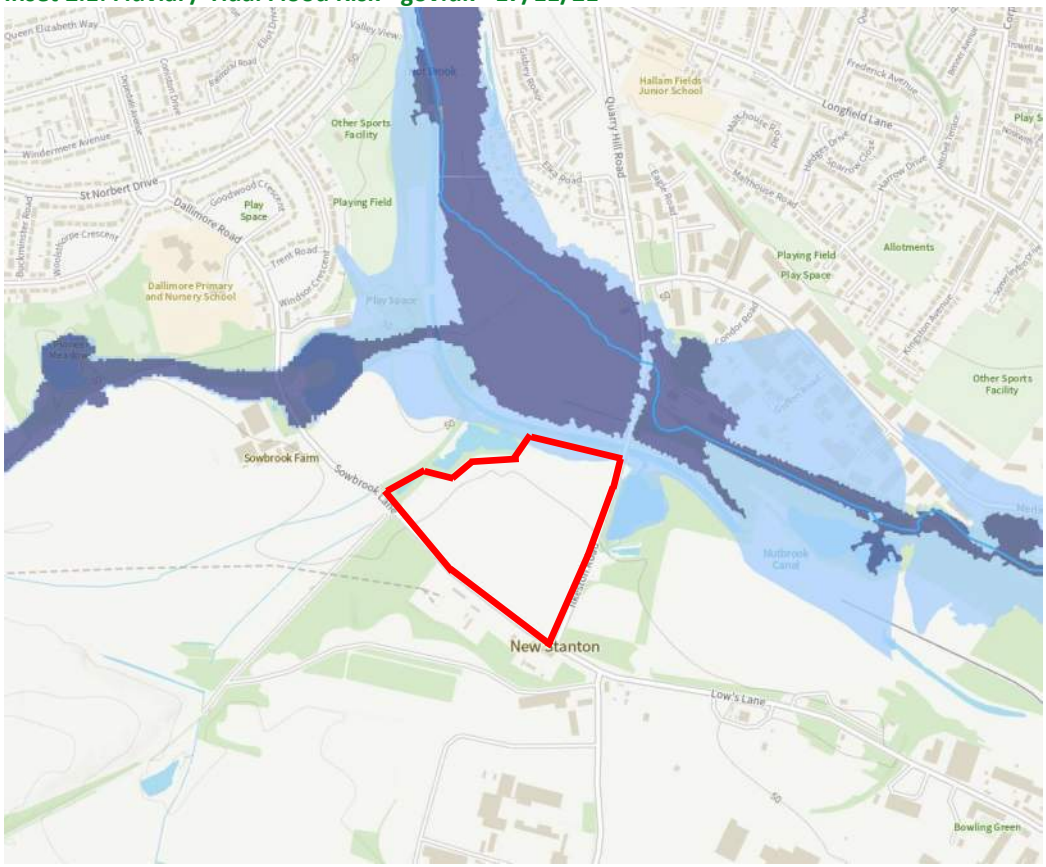
2.0 Site Specific Flood Risk

2.1 Risk of Fluvial / Tidal Flooding

2.1.1 The likelihood of fluvial and tidal flooding is defined on the Environment Agency's map 'Flood Map for Planning'. This flood map is published on the gov.uk website.

2.1.2 An extract of this flood map is provided below in **Inset 2.1**. The approximate site boundary is shown in red.

Inset 2.1: Fluvial / Tidal Flood Risk - gov.uk - 17/11/21



2.1.3 The Environment Agency's flood map shows that the proposed development site predominantly located within Flood Zone 1 (Low Probability) and as such, the development is at a low (less than 1 in 1000 years) risk of flooding from rivers or the sea.

2.1.4 Notwithstanding the above, there is a small area to the north adjacent to Nutbrook Canal, which is shown as falling under Flood Zone 2. It should be noted that the developable extent of the site comprising buildings and transport infrastructure, will be designed so that they sit outside of the Flood Zone 2 extent.

2.1.5 As the site is located partially within Flood Zone 2, flood level information has been obtained from the Environment Agency. A copy of the flood level information is enclosed in **Appendix K**. The nearest modelled flood node to the development site is Nut_2181. Flood level information as provided by the Environment Agency for this flood node is shown in **Table 2.1** below.

Table 2.1: Flood Level Data

Annual Exceedance Probability Maximum Water Level (mODN)				
Node	**5% (1 in 20)**	**2% (1 in 50)**	**1% (1 in 100)**	**0.1% (1 in 1000)**
Nut_2181	45.34	45.49	45.61	46.15

2.1.6 New Climate Change allowances were published by the Environment Agency in July 2021. The new data included changes to peak river flow climate change requirements which are set on a basin and catchment basis.

2.1.7 The proposed development is located within the Humber river basin district and Lower Trent and Erewash Management Catchment. The proposed development is classified as More Vulnerable as such the central climate change allowance is applicable. For this river basin district and management catchment, the applicable central climate change allowance is 29%.

2.1.8 An appropriate method of applying the new climate change allowances to the data received from the Environment Agency is the Stage-Discharge method. This involves plotting the predicted flood level against the predicted discharge volume on a graph and interpolating to calculate new flood levels for the new climate change allowances. Using this method new 1% (1 in 100) and 0.1% (1 in 1000) predicted flood levels have been calculated. The results are summarised in **Table 2.2** and the full results are set out in **Appendix L**.

Table 2.2: New Climate Change Flood Levels

Annual Exceedance Probability Maximum Water Level (mODN)				
Node	**5% (1 in 20)**	**2% (1 in 50)**	**1%+29%CC (1 in 100 +CC)**	**0.1% (1 in 1000)**
Nut_2181	45.34	45.49	45.77	46.15

2.1.9 The predicated flood levels shown in **Table 2.2** have been plotted onto the topographical and development layout, in **Appendix M** and **Appendix N** respectively. These plans show the extent of Flood Zones 2 across the site.

2.1.10 The developable extent of the site proposal is located within Flood Zone 1 and is defined as having a less than 1 in 1000 annual probability of flooding.

Flood Resilience Measures and Warnings

2.1.11 Finished floor levels on the site will be located some 300mm above the predicted 1% (1 in 100) plus climate change flood event. This means dwellings on the site should have a minimum finished floor level of 46.07m.

Access and Egress

2.1.12 Should an extreme flood event occur residents of the site will be able to access higher ground by using the development's highway infrastructure to access higher ground located beyond the development site.

2.2 Risk of Surface Water Flooding

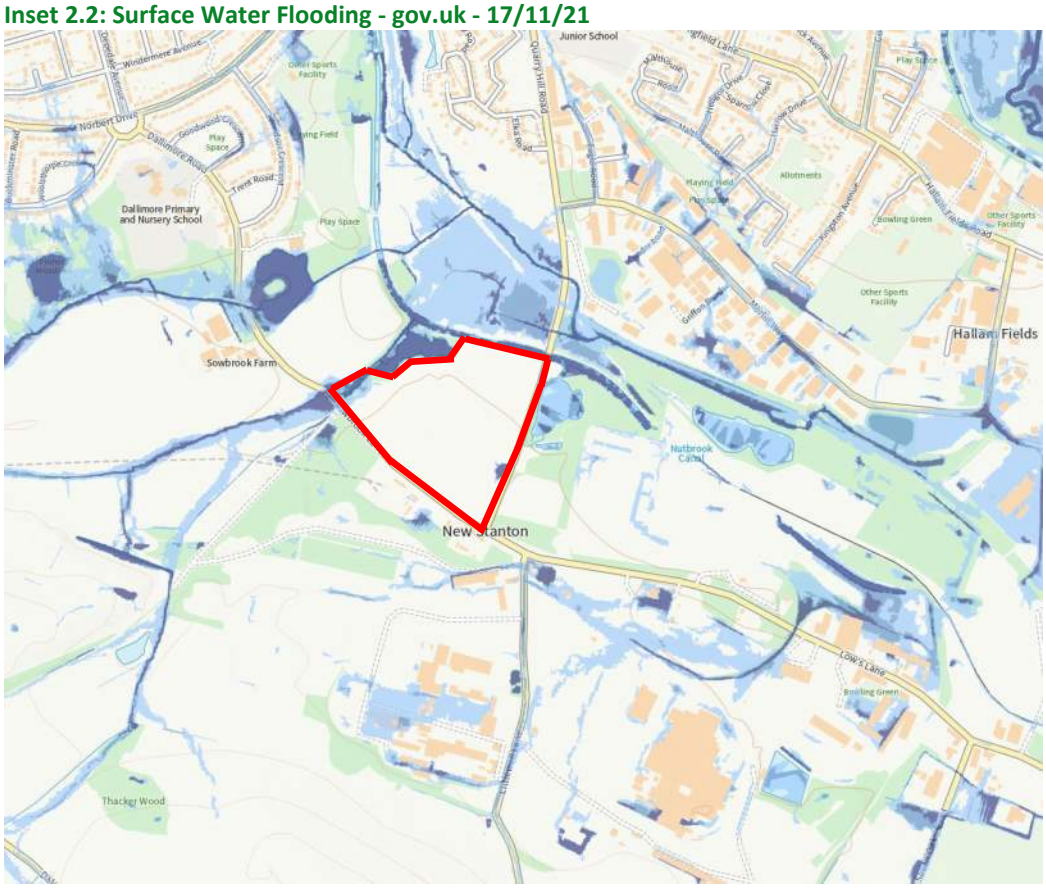
2.2.1 The likelihood of surface water flooding is defined on the Environment Agency's map 'Flood risk from surface water'. This flood map is published on the gov.uk website.

2.2.2 An extract of this flood map is provided below in **Inset 2.2**. The approximate site boundary is shown in red.

2.2.3 Regarding the accuracy of this map the EA state that:

"Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. Because of this, we report the highest risk within 20m of a specific location, such as an individual property. This means reports for neighbouring properties may show different levels of risk."

Inset 2.2: Surface Water Flooding - gov.uk - 17/11/21



2.2.4 Most of the site is located in an area of very low surface water flood risk. Instances of high, medium and low surface water flood risk are evident towards the northwestern extent of the site; however, these areas sit outside of the developable extent of the development site and represent features such as existing ponds and open channel watercourses.

2.2.5 In terms of surface water flooding, the EA website defines the various levels of flood risk as follows:

*"**Very low risk** means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding."*

***Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.*

***Medium risk** means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.*

***High risk** means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding."*

2.3 Risk of Reservoirs, Canals and Other Artificial Sources Flooding

2.3.1 The likelihood of reservoir water flooding is defined on the Environment Agency's map 'Flood Risk from Reservoirs'. This flood map is published on the gov.uk website.

2.3.2 An extract of this flood map is provided below in **Inset 2.3**. The approximate site boundary is shown in red.

Inset 2.3: Reservoir Flooding - gov.uk - 17/11/21

2.3.3 It is shown that the northernmost extent of the site adjacent to the Nutbrook Canal is at a risk of reservoir flooding. This extent is negligible. Furthermore, the Environment Agency states that:

The outline reservoir flood maps do not give any information about the likelihood of reservoir failure, the depth and speed of the flood waters, or the length of time it would take for the flood waters to reach any location. Even in a worst case scenario many areas shown as possibly being at risk of reservoir flooding would be expected to receive no more than a few centimetres of flood water.

In England and Wales, the Environment Agency has a regulatory role for reservoir safety, under the Reservoirs Act 1975. It ensures that reservoirs are regularly inspected and essential safety works are carried out. The Environment Agency has the power to prosecute reservoir owners for failure to carry out essential safety works, and where emergency works are required, it has the power to carry out these works itself.

2.3.4 We therefore consider the risk of reservoir flooding to be very low.

2.4 Risk of Ground Water Flooding

2.4.1 We do not have any records of ground water flooding within the vicinity of the site. We therefore consider the risk of ground water sewer flooding to be low.

2.5 Risk of Sewer Flooding

2.5.1 We do not have any records of sewer flooding within the vicinity of the site. We therefore consider the risk of sewer flooding to be low.

2.6 Previous Flood Events

2.6.1 The Environment Agency's Historic Flood Map shows the extent of flooding within the site which aligns with the Flood Zone 2 extent within the boundary of the site, shown in **Inset 2.1** above. As noted above, this flood extent sits outside of the developable area of the residential proposal; therefore, will have a negligible impact on the proposed site layout.

2.6.2 The Environment Agency's "Historic Flood Map is a GIS layer showing the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set criteria. It shows areas of land that have previously been subject to flooding in England. Records began in 1946 when predecessor bodies to the Environment Agency started collecting detailed information about flooding incidents".

2.6.3 The Environment Agency flood map, extract in **Inset 2.4** below.

Inset 2.4: Historical Flood Map - gov.uk - 24/11/21

2.7 Summary of Flood Risk

2.7.1 The developable extent of the proposed development site is located within Flood Zone 1 and is at a low risk of flooding from all other sources.

2.8 Flood Risk Vulnerability and Flood Zone 'Compatibility'

2.8.1 The suitability of different development types to be built and occupied within a particular Flood Zone is defined within Table 3 of the Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework. Table 3 is replicated below in **Table 2.3** below. This table maps vulnerability classes against the flood zones to indicate where development is 'appropriate' and where it should not be permitted.

2.8.2 The developable extent of the proposed residential development is located within Flood Zone 1 and is classified as a More Vulnerable development. Based on this categorisation of the proposed scheme it is considered 'appropriate'.

Table 2.3: Flood risk vulnerability and flood zone 'compatibility'

Flood Zone	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	×	Exception Test required	✓	
Zone 3b *	Exception Test required *	×	×	×	×

✓ Development is appropriate
✗ Development should not be permitted.
† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

2.9 Sequential Test

2.9.1 A Sequential Test is required for all development sites not located within Flood Zone 1. The proposed developable extent of the residential proposal is located within Flood Zone 1; therefore, a Sequential Test is not required.

2.10 Exception Test

2.10.1 The proposed development vulnerability classification and Flood Zone are compatible therefore an Exception Test is not required.

3.0 Surface Water Management

3.1 Existing Drainage

3.1.1 The site is currently undeveloped with no positive drainage.

3.2 Existing Discharge Rate

3.2.1 The existing discharge rate for the site has been calculated using the IH124 method. Full calculations are enclosed in **0** whilst the input parameters and results are summarised in **Table 3.1** below.

Table 3.1: Existing Run-off Rate Calculation Parameters and Results

Parameter	Value
Proposed Drained Area (ha)	3.587, see **0**
SAAR (mm)	673
Soil Index / SPR	4 / 0.47
Region	4
Results	**Value**
Q_{Bar} (l/s)	16.5
Q1 (l/s)	14.1
Q30 (l/s)	32.3
Q100 (l/s)	41.0

3.2.2 The allowable discharge rate for the site is the Q_{Bar} rate of 16.5 l/s. Surface water from the site post development will be restricted to a discharge rate of 16.5 l/s via a hydrobrake flow control device.

3.3 Proposed Method of Discharge

3.3.1 Paragraph 80 of the Planning Practice Guidance for 'Flood Risk and Coastal Change' defines the hierarchy of drainage options. Where reasonably practicable the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable:

1. into the ground (infiltration)
2. to a surface water body
3. to a surface water sewer, highway drain, or another drainage system
4. to a combined sewer

3.3.2 Each of these is considered separately below:

Into the ground

3.3.3 Inspection of the British Geological Survey's maps show that the bedrock geology which underlies the site is 'Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone' for the central and northern portions of the site; and 'Wingfield Flags – Sandstone' for the southern portion of the site adjacent to Sowbrook Lane.

3.3.4 The British Geological Survey mapping does not have any superficial deposits recorded for the majority of development site, which includes the proposed developable extent. However, 'Alluvium - Clay, Silt, Sand And Gravel' is recorded as the superficial deposit for the land within the immediate vicinity of the existing surface water features (open channel ditch/ watercourse and ponds); located adjacent to the development's northwestern boundary.

3.3.5 Based on the above geology description we would anticipate that infiltration techniques across the site would be unviable. Infiltration testing will be undertaken at the detailed design stage to confirm this assumption. Should infiltration be found to be viable, the drainage strategy proposed for the development will be altered to take this into account.

3.3.6 As infiltration is unviable, the use of alternative drainage methods will be considered further in this report.

To a surface water body

3.3.7 An open channel ditch/ watercourse (unnamed) runs parallel to and adjacent to the development's northwestern site boundary, prior to discharging into the Nutbrook Canal. This watercourse also has direct connections to both an existing unnamed pond located within the application red line, as well as 'Roughs Open Hole', which sits just outside of the redline.

3.3.8 A 3-dimensional review of the Topographical Survey confirms that the existing overland flow paths typically head in the direction of the unnamed ditch/ watercourse; therefore, it is considered to represent the natural catchment for the development site. As such, this watercourse is expected to be receiving runoff from the greenfield parcel at the greenfield runoff rates.

3.3.9 A copy of the Overland Flow Plan is included as **0**, which includes arrows, indicating the direction of flow for existing surface water runoff.

3.3.10 The unnamed ditch/ watercourse will be used as the outfall for the proposed development site. It should be noted that the applicant's land title abuts the open channel surface water feature; therefore, permits the applicant the right to designate this feature as a surface water outfall for the development proposal, in accordance with their riparian responsibilities.

3.3.11 As a surface water body is viable the use of alternative drainage methods will not be considered further in this report.

3.4 Proposed Drainage Strategy

3.4.1 Surface water discharge from the proposed development will outfall to the unnamed ditch/ watercourse which runs parallel and adjacent to the northwestern development boundary. The surface water discharge rate from the site will be restricted to the greenfield equivalent run-off rate to ensure that the rate of surface water run-off from the site does not increase as a result of the proposed development.

3.4.2 The proposed drainage strategy will comprise a:

- A piped network
- Hydrobrake flow control
- Detention Basins – online
- Permeable paving to private drives – tanked (TBC at the detailed design stage)
- Swales (TBC at the detailed design stage)

3.4.3 The proposed surface water drainage strategy is shown on the drawing enclosed in **Appendix D**.

Design Parameters

3.4.4 Surface water drainage will be designed using the rainfall parameters from the Flood Estimation Handbook (FEH).

3.4.5 Climate change allowances are defined by the Environment Agency in their document 'Flood risk assessments: climate change allowances' first published in February 2016. Table 2 of this document shows anticipated changes in extreme rainfall intensity in small and urban catchments. The Environment Agency advise that flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact. Table 2 of the Environment Agency's guidance is replicated below in **Table 3.2**.

Table 3.2: Table 2 Peak rainfall intensity allowance in small and urban catchments

Applies across all of England	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)
Upper end	10%	20%	40%
Central	5%	10%	20%

3.4.6 To ensure a worst-case assessment is undertaken a 40% climate change allowance will be used throughout.

3.5 Attenuation Design

3.5.1 Surface water attenuation is required to store excess water during an extreme event whilst maintaining a greenfield discharge rate of 16.5 l/s. Surface water will be attenuated within two separate detention basins, which convey flows to the same outfall. Full calculations are enclosed in **0** whilst design parameters are set out below.

Table 3.3: Attenuation Calculation Parameters and Results

Parameter	Value
Return Period (years)	100 + 40% Climate Change
Rainfall Parameters	FEH13
Drained Area (ha)	3.946, see **0** includes 10% urban creep
Discharge Rate (l/s)	16.5
Results	**Value**
Storage Requirement (m^3)	4,356

3.6 Overland Flows

3.6.1 In the case of an extreme rainfall event, where the thresholds of the design parameters noted in **Table 3.3** above are exceeded, overland flows will be directed to follow the natural topography of the land. In this site-specific instance, the proposed ground levels will be designed to ensure that surface water flows continue to be directed in a northbound direction toward the proposed detention basins. This will ensure that exceedance flow can re-enter the drainage network at a point located downstream of the built development.

3.6.2 Irrespective of the above, the proposed drainage strategy has been designed to accommodate runoff up to and including the design storm event (100 year +40% Climate Change). Therefore, an instance which will require the use of overland flow paths is considered rare.

3.6.3 See **0** for a copy of the Overland Flow Plan.

3.7 Maintenance Requirements

3.7.1 The drainage will be designed in line with Building Regulations, Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code"); as well as local SUDS guidance to ensure compliance with best practice guidance, thus minimising the maintenance requirements. A full maintenance plan for the site will be developed at the detailed design stage.

3.7.2 The person / authority responsible for maintenance of the drainage will depend on ownership which will vary across the site as detailed design and adoption progresses the exact body responsible for adoption of the various surface water aspects will become clear. Typical responsibilities are set out below in **Table 3.4**.

Table 3.4: Surface Water Maintenance

Drainage	Maintainer
Drains	Home owner
Private Sewers	Home owner / management company
Household SUDS	Home owner
Communal SUDS - private	Management company / home owner.
Adopted SUDS	SUDS Body: Local Authority / water company / other SUDS adopting body.
Adopted sewers	Water company

3.7.3 A detailed drainage maintenance plan will be prepared by the body responsible for maintenance once detailed design has been undertaken. This will follow the principles set out in the SUDS Manual, which are set out below:

Permeable Paving – taken from the SUDS Manual

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs onto pervious pavement from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contribution and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly to the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements.
Remedial Actions	Remedial any landscaping which through vegetation maintenance or soil slip has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked of broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitate of surface and upper structure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly. 48h after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Detention Basin – taken from the SUDS Manual

Maintenance Schedule	Required Action	Typical Frequency
Detention basins would be expected to last as long as the development with appropriate maintenance.		
Regular Maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
Occasional Maintenance	Reseed poor areas of vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years / as required
	Remove sediment from inlets, outlets and main basin when required.	Every 5 years, or as required)
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Repair / rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Swale – taken from the SUDS Manual

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages and clear if required	Monthly
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required, or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required
	Remove and dispose of oils or petrol residues using safe standard practices.	As required

Pipes

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Open any inspection chambers and remove and debris.	Annually
Remedial Actions	Remediate any damaged pipe works.	As required
Monitoring	Monitor inspection chambers	Annually

Hydrobrake

3.7.4 All maintenance should follow manufacturer's current guidance. As hydrobrakes include no moving parts maintenance is limited.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Open any inspection chambers and remove any debris.	Annually
Remedial Actions	Remediate any damaged elements.	As required
Monitoring	Monitor inspection chambers	Annually

4.0 Foul Water Management

4.1 Existing Drainage

4.1.1 The site is currently a field, therefore does not have any existing foul water infrastructure.

4.1.2 Existing adopted sewers within the vicinity of the site are shown on the asset plan enclosed in **Appendix H**.

4.2 Proposed Drainage Strategy

4.2.1 Foul water will discharge to Severn Trent Water's 375mm diameter combined sewer on Littlewell Lane, situated to the south of the application site. Based on the topography of the surrounding land, a pumping station would be required to use this outfall.

4.2.2 As an alternative to a pumped solution, it may be possible to discharge foul flows by gravity, by connecting into the 750mm diameter combined sewer on Quarry Hill Road, which is located downstream of the proposed development. Once the application has progressed beyond the outline planning application stage, a more detailed analysis of a foul water drainage strategy will need to be carried out to determine whether sufficient fall exists to connect to the Quarry Hill Road outfall.

4.2.3 Severn Trent Water have been consulted regarding a discharge into their sewer system and have designated either of the above-mentioned outfalls. Severn Trent Water have confirmed that their combined sewer network should have no adverse impact, subject to a gravity solution have a 2.7 l/s discharge rate @ 2DWF. Alternatively, if an adoptable standard foul pumping station is implemented on site the minimum discharge rate would need to be 3.8 l/s. Acceptability of the pumped discharge rate will be subject to modelling carried out by Severn Trent Water at the detailed design stage. A copy of the pre-development enquiry is enclosed in **Appendix I**.

4.2.4 Severn Trent Water will be consulted again at the detailed design stage to agree a fixed foul water drainage strategy for the development proposal.

4.3 Maintenance Requirements

4.3.1 The drainage will be designed in line with Building Regulations and the Code to ensure compliance with best practice guidance thus minimising the maintenance requirements. A full maintenance plan for the site will be developed at the detailed design stage.

4.3.2 The person / authority responsible for maintenance of the drainage will depend on ownership which will vary across the site as detailed design and adoption progresses the exact body responsible for adoption of the various surface water aspects will become clear. Typical responsibilities are set out below in **Table 4.1**.

Table 4.1: Foul Water Maintenance

Drainage	Maintainer
Drains	Home owner
Private Sewers	Home owner / Management company
Adopted sewers	Water company

5.0 Conclusions

5.1 Site location and proposed development

5.1.1 The proposed residential development is located at Land at Ilkeston Road/Sowbrook Lane, Ilkeston.

5.1.2 The proposed development will comprise up to 196 residential properties, alongside associated infrastructure and areas of public open space.

5.2 Flood Risk

5.2.1 The developable extent of the residential proposal is located within Flood Zone 1 and is considered to be at a low risk of flooding from all sources.

5.2.2 The proposed development's vulnerability classification is compatible with the Flood Zone therefore the development is appropriate.

5.3 Surface Water Management

5.3.1 The key proposed surface water parameters are:

- Discharge rate: 16.5 l/s
- Outfall: watercourse
- Attenuation requirement: 4,356 m^3
- SUDS features
  - Permeable Paving – tanked (TBC at detailed design stage)
  - Detention Basins
  - Swale (TBC at detailed design stage)

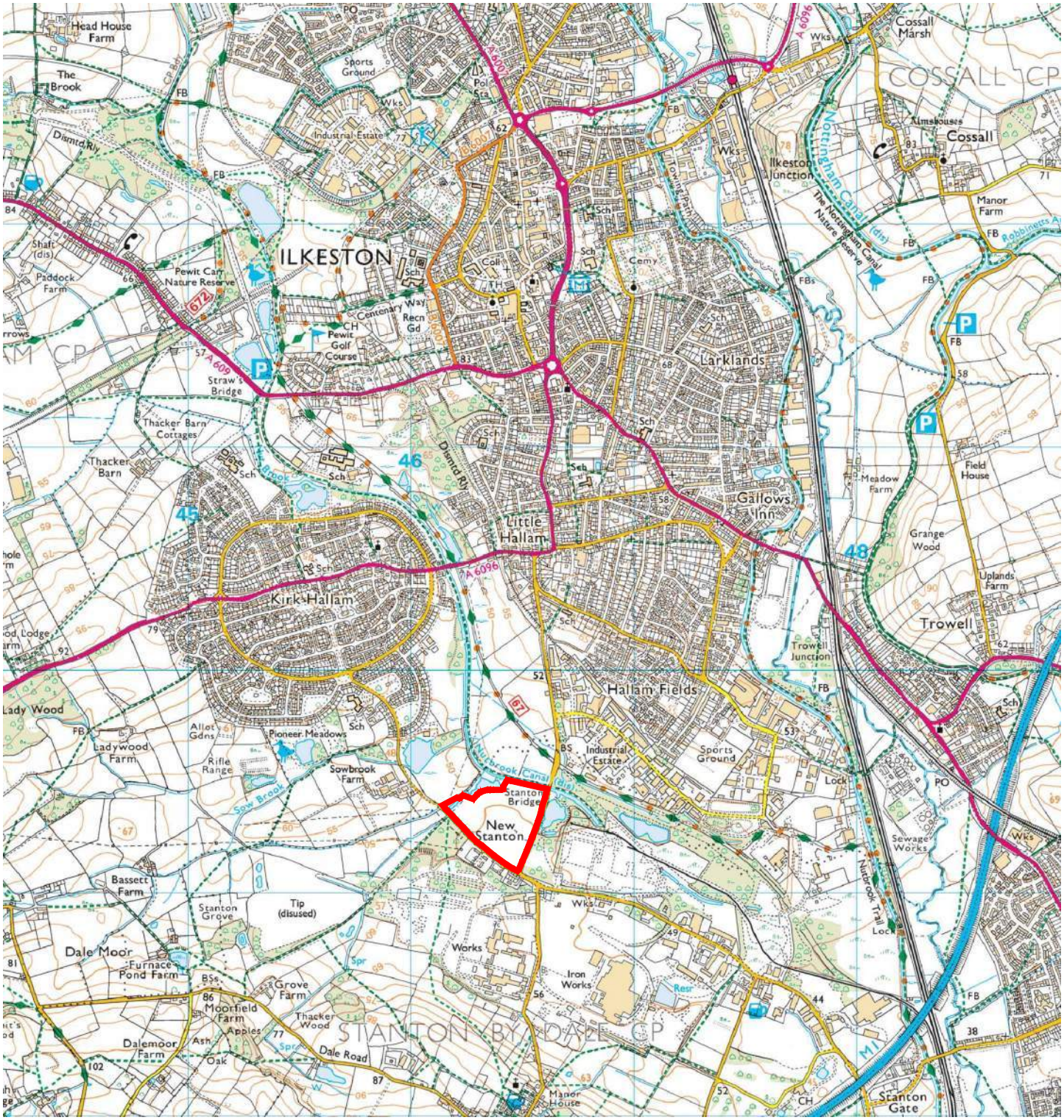
5.4 Foul Water Management

5.4.1 Foul water will discharge to the adopted sewer in Littlewell Lane via a foul pumping station. The precise detail on this strategy will be reviewed at the detailed design stage alongside Severn Trent Water, to determine whether a gravity fed solution to an outfall point located in Quarry Hill Road would be more appropriate. Severn Trent Water has confirmed that their sewer has adequate capacity to accommodate the proposed development site.

Appendix A

Location Plan
MAC drawing no. 450-FRA01

NORTH



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Client: Wulff Asset Management Limited	Project: Sowbrook Lane Ilkeston		Date: 28.04.2022
			Drw: LT
Title: Location Plan			Chk: AN
			Scale: 1:25,000
			Size: A4
Drawing No. 450-FRA01	Revision A	• Transport Assessments • Flood Risk Assessments • Highway Advice • Drainage Strategies	

Appendix B

Topographical Survey
JPP project no. 23775Y drawing no. 01, dated September 2021

General notes

Grid and levels have been aligned with OS National Grid OSGB36 (15). All dimensions and levels are in metres unless noted otherwise.

This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

Survey station information

STATION	EASTING	NORTHING	LEVEL
J1	446815.989	339428.113	46.264
J2	446600.889	339373.613	46.865
J3	446268.087	339241.236	51.812
J4	446331.205	339187.134	53.900
J5	446482.899	339081.924	54.529
J6	446491.822	339076.873	54.311

Key

AV	Air Valve	Fl.	Flood Light	P/R	Post & Rail Fence
Bol	Bollard	FW	Foul Water	P/W	Post & Wire Fence
BH	Borehole	g	Gully	RE	Rodding Eye
BL	Bed Level	GV	Gas Valve	RS	Road Sign
BT	BT Cover	Ht.	Height	rwp	Rainwater Pipe
CATV	Cable TV Cover	IC	Inspection Chamber	SV	Stop Valve
C/B	Close Boarded Fence	IL	Invert Level	svp	Soil & Vent Pipe
C/L	Chain Link Fence	I/R	Iron Railing	SW	Surface Water
CL	Cover Level	ko	Kerb Outlet	TL	Traffic Light
Col	Column	LP	Lamp Post	TP	Telegraph Pole
El	Elec	MH	Manhole	TW	Top of wall
ER	Earth Rod	Mkr	Marker Post	utl	Unable To Lift
EP	Electricity Pole	O/H	Overhead	VP	Vent Pipe
FH	Fire Hydrant	PB	Post Box	WL	Water Level
FL	Floor Level	Po	Post	WM	Water Meter
				wo	Wash Out

Building

Control Station

Tree

Bore Hole

Gate

Bottom of Bank

Top of Bank

Vegetation

Change of surface

Fence

Contours 65.0

OH Telecom

OH Electric

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- Infrastructure Design
- Structural Engineering
- Planning Services
- Geotechnical & Environmental
- Surveying
- Professional Advice

Drawn By:	JG
Chkd By:	TB
Scale @ A0:	1:500
Date:	Sept 2021
Status:	FOR INFORMATION
Project No.:	23775Y

Client Wulff Asset Management Ltd.

Project Sowbrook Road, Ilkeston

Title Topographical Survey

Drawing No: 01 **Rev:**

Appendix C

Proposed Site Layout
RDC Development Consultants drawing no. RDC1146/002, dated February 2022

NOTE: CAD BASE FOR COMMENTS PRIOR TO PRESENTATION DRAWING

RDC development consultants
Tel:01604 500040 Web:www.rdcllc.co.uk

Project: Ilkeston Road, Stanton By Dale

Client: Wulf Asset Management

Drawing: Indicative Masterplan

Scale: 1:1000 @ A1

Drawing No: RDC1146/002

Revision: -

Date: February 2022

Drawn By: SC

Checked By: -

Cad Ref:

Rev. No.	Date.	Amendment.	Initial.
-	-	-	-

Appendix D

Proposed Drainage Strategy
MAC drawing no. 450-FRA03

NORTH

Notes:

1. Based on Topographical Survey by JPP, drawing number 23775Y - 01 dated Sept 2021.
2. Based on Indicative Masterplan by RDC development Consultants, drawing number RDC1146/002 dated February 2022.
3. Based on Ordanance Survey mapping. Ordnance Survey (c) Crown Copyright 2020. All rights reserved. Licence number 100022432

Key

- Site Boundary
- Proposed Surface Water Drainage
- Proposed Surface Water Attenuation
- Gas Main Easement

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Martin Andrews Consulting Ltd

- Transport Assessments
- Flood Risk Assessments
- Highway Advice
- Access Design
- Drainage Strategies
- Vehicle tracking

Client: Wulff Asset Management Limited		Project: Sowbrook Lane Ilkeston	
Title: Proposed Drainage Strategy			Date: 29.04.22
			Drw: LT
			Chk: AN
Drawing No: 450-FRA03	Revision: -		Scale: 1:1000
			Size: A1

Appendix E

Proposed Impermeable Area
MAC drawing no. 450-FRA02

Notes:

1. Based on Topographical Survey by JPP, drawing number 23775Y - 01 dated Sept 2021.
2. Based on Indicative Masterplan by RDC development Consultants, drawing number RDC1146/002 dated February 2022.
3. Based on Ordnance Survey mapping. Ordnance Survey (c) Crown Copyright 2020. All rights reserved. Licence number 100022432

Key:

Site Boundary

Developable Area = 59,789m^2 (5.979ha)

Percentage Impermeable Area (PIMP) = 60%
Proposed Impermeable Area = 35,873m^2 (3.587 ha)

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Martin Andrews Consulting Ltd

- Transport Assessments
- Flood Risk Assessments
- Highway Advice
- Access Design
- Drainage Strategies
- Vehicle tracking

Client: Wulff Asset Management Limited		Project: Sowbrook Lane Ilkeston	
Title: Proposed Impermeable Area			Date: 28.04.22
			Drw: AN
			Chk: AN
Drawing No: 450-FRA02	Revision: -		Scale: 1:1000
			Size: A1

Appendix F

Drainage Design Calculations

Design Settings

Rainfall Methodology	FEH-13	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Detention Basin 2	1.973	5.00	48.250	1200	446446.351	339459.274	0.980
SMH2			49.000	1200	446411.179	339448.520	1.880
SMH3			49.000	1200	446368.269	339453.136	2.055
SMH4			49.500	1200	446311.060	339431.248	2.810
SMH5			48.250	1200	446276.193	339415.457	1.720
Detention Basin 1	1.973	5.00	48.250	1200	446247.487	339398.353	1.765
SMH1-Hydrobrake			49.625	1500	446251.172	339414.056	3.200
Outfall 1			47.000	1200	446230.675	339436.350	0.700

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)
S2.000	Detention Basin 2	SMH2	36.779	0.600	47.270	47.120	0.150	245.2	300	5.61	50.0
S2.001	SMH2	SMH3	43.158	0.600	47.120	46.945	0.175	246.6	300	6.34	50.0
S2.002	SMH3	SMH4	61.253	0.600	46.945	46.690	0.255	240.2	300	7.35	50.0
S2.003	SMH4	SMH5	38.276	0.600	46.690	46.530	0.160	239.2	300	7.98	50.0
S2.004	SMH5	SMH1-Hydrobrake	25.060	0.600	46.530	46.425	0.105	238.7	300	8.39	50.0
S1.000	Detention Basin 1	SMH1-Hydrobrake	16.130	0.600	46.485	46.425	0.060	268.8	300	5.28	50.0
S1.001	SMH1-Hydrobrake	Outfall 1	30.284	0.600	46.425	46.300	0.125	242.3	300	8.89	50.0

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)
S2.000	0.999	70.6	267.4	0.680	1.580	1.973	0.0	300	1.012
S2.001	0.996	70.4	267.4	1.580	1.755	1.973	0.0	300	1.009
S2.002	1.010	71.4	267.4	1.755	2.510	1.973	0.0	300	1.023
S2.003	1.012	71.5	267.4	2.510	1.420	1.973	0.0	300	1.025
S2.004	1.013	71.6	267.4	1.420	2.900	1.973	0.0	300	1.026
S1.000	0.954	67.4	267.4	1.465	2.900	1.973	0.0	300	0.966
S1.001	1.005	71.1	534.8	2.900	0.400	3.946	0.0	300	1.018

Pipeline Schedule

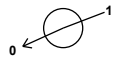
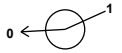
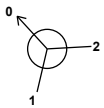
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S2.000	36.779	245.2	300	Circular	48.250	47.270	0.680	49.000	47.120	1.580
S2.001	43.158	246.6	300	Circular	49.000	47.120	1.580	49.000	46.945	1.755
S2.002	61.253	240.2	300	Circular	49.000	46.945	1.755	49.500	46.690	2.510
S2.003	38.276	239.2	300	Circular	49.500	46.690	2.510	48.250	46.530	1.420
S2.004	25.060	238.7	300	Circular	48.250	46.530	1.420	49.625	46.425	2.900
S1.000	16.130	268.8	300	Circular	48.250	46.485	1.465	49.625	46.425	2.900
S1.001	30.284	242.3	300	Circular	49.625	46.425	2.900	47.000	46.300	0.400

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S2.000	Detention Basin 2	1200	Manhole	Adoptable	SMH2	1200	Manhole	Adoptable
S2.001	SMH2	1200	Manhole	Adoptable	SMH3	1200	Manhole	Adoptable
S2.002	SMH3	1200	Manhole	Adoptable	SMH4	1200	Manhole	Adoptable
S2.003	SMH4	1200	Manhole	Adoptable	SMH5	1200	Manhole	Adoptable
S2.004	SMH5	1200	Manhole	Adoptable	SMH1-Hydrobrake	1500	Manhole	Adoptable
S1.000	Detention Basin 1	1200	Manhole	Adoptable	SMH1-Hydrobrake	1500	Manhole	Adoptable
S1.001	SMH1-Hydrobrake	1500	Manhole	Adoptable	Outfall 1	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Detention Basin 2	446446.351	339459.274	48.250	0.980	1200				
						0	S2.000	47.270	300
SMH2	446411.179	339448.520	49.000	1.880	1200	1	S2.000	47.120	300
									
						0	S2.001	47.120	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SMH3	446368.269	339453.136	49.000	2.055	1200	1	S2.001	46.945	300
									
						0	S2.002	46.945	300
SMH4	446311.060	339431.248	49.500	2.810	1200	1	S2.002	46.690	300
									
						0	S2.003	46.690	300
SMH5	446276.193	339415.457	48.250	1.720	1200	1	S2.003	46.530	300
									
						0	S2.004	46.530	300
Detention Basin 1	446247.487	339398.353	48.250	1.765	1200				
						0	S1.000	46.485	300
SMH1-Hydrobrake	446251.172	339414.056	49.625	3.200	1500	1	S1.000	46.425	300
							2	S2.004	46.425	300
						0	S1.001	46.425	300
Outfall 1	446230.675	339436.350	47.000	0.700	1200	1	S1.001	46.300	300
									

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	30 year (l/s)	32.3
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	✓	100 year (l/s)	41.0
Winter CV	0.840	Drain Down Time (mins)	240	1 year (l/s)	14.1	Check Discharge Volume	x

Storm Durations

60	120	180	240	360	480	600	720	960	1440	2160	2880	4320	5760	7200	8640	10080

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Soil Index	4	Growth Factor 30 year	1.95	Q 1 year (l/s)	14.1
Greenfield Method	IH124	SPR	0.47	Growth Factor 100 year	2.48	Q 30 year (l/s)	32.3
Positively Drained Area (ha)	3.587	Region	4	Betterment (%)	0	Q 100 year (l/s)	41.0
SAAR (mm)	673	Growth Factor 1 year	0.85	QBar	16.5		

Node SMH1-Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	46.425	Product Number	CTL-SHE-0175-1650-1525-1650
Design Depth (m)	1.525	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	16.5	Min Node Diameter (mm)	1500

Node Detention Basin 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	46.485
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	733.4	0.0	1.765	1715.9	0.0	1.766	0.0	0.0

Node Detention Basin 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.270
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1956.6	0.0	0.980	2525.7	0.0	0.981	0.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	Detention Basin 2	600	47.933	0.663	125.3	1453.1490	0.0000	SURCHARGED
600 minute winter	SMH2	600	47.932	0.812	45.8	0.9184	0.0000	SURCHARGED
600 minute winter	SMH3	600	47.930	0.985	42.3	1.1146	0.0000	SURCHARGED
600 minute winter	SMH4	600	47.928	1.238	41.7	1.4006	0.0000	SURCHARGED
600 minute winter	SMH5	600	47.927	1.397	41.5	1.5800	0.0000	SURCHARGED
600 minute winter	Detention Basin 1	585	47.928	1.443	138.5	1672.1080	0.0000	SURCHARGED
600 minute winter	SMH1-Hydrobrake	585	47.926	1.501	41.3	2.6525	0.0000	SURCHARGED
720 minute summer	Outfall 1	315	46.397	0.097	16.5	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)
600 minute winter	Detention Basin 2	S2.000	SMH2	45.8	0.973	0.648	2.5900	
600 minute winter	SMH2	S2.001	SMH3	42.3	0.953	0.601	3.0392	
600 minute winter	SMH3	S2.002	SMH4	41.7	0.844	0.584	4.3134	
600 minute winter	SMH4	S2.003	SMH5	41.5	0.589	0.580	2.6954	
600 minute winter	SMH5	S2.004	SMH1-Hydrobrake	41.3	0.586	0.577	1.7647	
600 minute winter	Detention Basin 1	S1.000	SMH1-Hydrobrake	-24.8	-0.352	-0.367	1.1359	
600 minute winter	SMH1-Hydrobrake	S1.001	Outfall 1	16.5	0.815	0.232	0.6118	679.9

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	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)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Detention Basin 2	1.973	5.00	48.250	1200	446446.351	339459.274	0.980
SMH2			49.000	1200	446411.179	339448.520	1.880
SMH3			49.000	1200	446368.269	339453.136	2.055
SMH4			49.500	1200	446311.060	339431.248	2.810
SMH5			48.250	1200	446276.193	339415.457	1.720
Detention Basin 1	1.973	5.00	48.250	1200	446247.487	339398.353	1.765
SMH1-Hydrobrake			49.625	1500	446251.172	339414.056	3.200
Outfall 1			47.000	1200	446230.675	339436.350	0.700

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)
S2.000	Detention Basin 2	SMH2	36.779	0.600	47.270	47.120	0.150	245.2	300	5.61	50.0
S2.001	SMH2	SMH3	43.158	0.600	47.120	46.945	0.175	246.6	300	6.34	50.0
S2.002	SMH3	SMH4	61.253	0.600	46.945	46.690	0.255	240.2	300	7.35	50.0
S2.003	SMH4	SMH5	38.276	0.600	46.690	46.530	0.160	239.2	300	7.98	50.0
S2.004	SMH5	SMH1-Hydrobrake	25.060	0.600	46.530	46.425	0.105	238.7	300	8.39	50.0
S1.000	Detention Basin 1	SMH1-Hydrobrake	16.130	0.600	46.485	46.425	0.060	268.8	300	5.28	50.0
S1.001	SMH1-Hydrobrake	Outfall 1	30.284	0.600	46.425	46.300	0.125	242.3	300	8.89	50.0

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)
S2.000	0.999	70.6	267.4	0.680	1.580	1.973	0.0	300	1.012
S2.001	0.996	70.4	267.4	1.580	1.755	1.973	0.0	300	1.009
S2.002	1.010	71.4	267.4	1.755	2.510	1.973	0.0	300	1.023
S2.003	1.012	71.5	267.4	2.510	1.420	1.973	0.0	300	1.025
S2.004	1.013	71.6	267.4	1.420	2.900	1.973	0.0	300	1.026
S1.000	0.954	67.4	267.4	1.465	2.900	1.973	0.0	300	0.966
S1.001	1.005	71.1	534.8	2.900	0.400	3.946	0.0	300	1.018

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)
S2.000	36.779	245.2	300	Circular	48.250	47.270	0.680	49.000	47.120	1.580
S2.001	43.158	246.6	300	Circular	49.000	47.120	1.580	49.000	46.945	1.755
S2.002	61.253	240.2	300	Circular	49.000	46.945	1.755	49.500	46.690	2.510
S2.003	38.276	239.2	300	Circular	49.500	46.690	2.510	48.250	46.530	1.420
S2.004	25.060	238.7	300	Circular	48.250	46.530	1.420	49.625	46.425	2.900
S1.000	16.130	268.8	300	Circular	48.250	46.485	1.465	49.625	46.425	2.900
S1.001	30.284	242.3	300	Circular	49.625	46.425	2.900	47.000	46.300	0.400

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S2.000	Detention Basin 2	1200	Manhole	Adoptable	SMH2	1200	Manhole	Adoptable
S2.001	SMH2	1200	Manhole	Adoptable	SMH3	1200	Manhole	Adoptable
S2.002	SMH3	1200	Manhole	Adoptable	SMH4	1200	Manhole	Adoptable
S2.003	SMH4	1200	Manhole	Adoptable	SMH5	1200	Manhole	Adoptable
S2.004	SMH5	1200	Manhole	Adoptable	SMH1-Hydrobrake	1500	Manhole	Adoptable
S1.000	Detention Basin 1	1200	Manhole	Adoptable	SMH1-Hydrobrake	1500	Manhole	Adoptable
S1.001	SMH1-Hydrobrake	1500	Manhole	Adoptable	Outfall 1	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Detention Basin 2	446446.351	339459.274	48.250	0.980	1200				
						0	S2.000	47.270	300
SMH2	446411.179	339448.520	49.000	1.880	1200	1	S2.000	47.120	300
									
						0	S2.001	47.120	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SMH3	446368.269	339453.136	49.000	2.055	1200	1	S2.001	46.945	300
						0	S2.002	46.945	300
SMH4	446311.060	339431.248	49.500	2.810	1200	1	S2.002	46.690	300
						0	S2.003	46.690	300
SMH5	446276.193	339415.457	48.250	1.720	1200	1	S2.003	46.530	300
						0	S2.004	46.530	300
Detention Basin 1	446247.487	339398.353	48.250	1.765	1200	0	S1.000	46.485	300
SMH1-Hydrobrake	446251.172	339414.056	49.625	3.200	1500	1	S1.000	46.425	300
						2	S2.004	46.425	300
						0	S1.001	46.425	300
Outfall 1	446230.675	339436.350	47.000	0.700	1200	1	S1.001	46.300	300

Simulation Settings

Rainfall Methodology	FSR	Winter CV	0.840	Check Discharge Rate(s)	✓
FSR Region	England and Wales	Analysis Speed	Normal	1 year (l/s)	14.1
M5-60 (mm)	17.000	Skip Steady State	x	30 year (l/s)	32.3
Ratio-R	0.400	Drain Down Time (mins)	240	100 year (l/s)	41.0
Summer CV	0.750	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x

Storm Durations

15	30

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Soil Index	4	Growth Factor 30 year	1.95	Q 1 year (l/s)	14.1
Greenfield Method	IH124	SPR	0.47	Growth Factor 100 year	2.48	Q 30 year (l/s)	32.3
Positively Drained Area (ha)	3.587	Region	4	Betterment (%)	0	Q 100 year (l/s)	41.0
SAAR (mm)	673	Growth Factor 1 year	0.85	QBar	16.5		

Node SMH1-Hydrobrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	46.425	Product Number	CTL-SHE-0175-1650-1525-1650
Design Depth (m)	1.525	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	16.5	Min Node Diameter (mm)	1500

Node Detention Basin 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	46.485
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	733.4	0.0	1.765	1715.9	0.0	1.766	0.0	0.0

Node Detention Basin 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.270
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1956.6	0.0	0.980	2525.7	0.0	0.981	0.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	Detention Basin 2	33	47.548	0.278	805.5	577.4417	0.0000	OK
30 minute winter	SMH2	23	47.487	0.367	61.5	0.4147	0.0000	SURCHARGED
30 minute winter	SMH3	45	47.406	0.461	58.6	0.5218	0.0000	SURCHARGED
30 minute winter	SMH4	190	47.337	0.647	50.5	0.7316	0.0000	SURCHARGED
30 minute winter	SMH5	241	47.322	0.792	47.6	0.8956	0.0000	SURCHARGED
30 minute winter	Detention Basin 1	257	47.315	0.830	805.5	819.5964	0.0000	SURCHARGED
30 minute winter	SMH1-Hydrobrake	257	47.315	0.890	46.7	1.5720	0.0000	SURCHARGED
15 minute winter	Outfall 1	15	46.397	0.097	16.5	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)
30 minute winter	Detention Basin 2	S2.000	SMH2	61.5	1.084	0.871	2.5473	
30 minute winter	SMH2	S2.001	SMH3	58.6	1.076	0.832	3.0392	
30 minute winter	SMH3	S2.002	SMH4	50.5	0.816	0.707	4.3134	
30 minute winter	SMH4	S2.003	SMH5	47.6	0.676	0.665	2.6954	
30 minute winter	SMH5	S2.004	SMH1-Hydrobrake	46.7	0.664	0.652	1.7647	
30 minute winter	Detention Basin 1	S1.000	SMH1-Hydrobrake	-30.0	0.483	-0.445	1.1359	
30 minute winter	SMH1-Hydrobrake	S1.001	Outfall 1	16.5	0.815	0.232	0.6118	243.5

Appendix G

Exceedance Flow Diagram
MAC drawing no. 450-FRA05

Notes:

1. Based on Topographical Survey by JPP, drawing number 23775Y - 01 dated Sept 2021.
2. Reproduced from Ordnance Survey, ©Crown Copyright and database rights 2021 OS Licence no. 100019980.
3. Based on Indicative Masterplan by RDC development Consultants, drawing number RDC1146/002 dated February 2022.

Key:

Site Boundary

Direction of Fall and Gradient

T: 01604 340544 Northampton Office
E: info@mac-ltd.co.uk W: mac-ltd.co.uk
Martin Andrews Consulting Ltd

- Transport Assessments
- Flood Risk Assessments
- Highway Advice
- Access Design
- Drainage Strategies
- Vehicle tracking

Client: Wulff Asset Management Limited		Project: Sowbrook Lane Ilkeston	
Title: Overland Flow Path			Date: 29.04.22
			Drw: AN
			Chk: AN
Drawing No: 450-FRA05	Revision: -		Scale: 1:1000
			Size: A1

Appendix H

Water Company Asset Plans

Data updated: 14/09/21

Scale: 1:1250 | Date: 22/09/21 | Wastewater Plan A2

Map Centre: 446408,339349 | Our Ref: 655423 - 1 | Powered by digdat

Public Foul Gravity/Lateral Drain		Highway Drain		Manhole Foul	
Public Combined Gravity/Lateral Drain		Overflow Pipe		Manhole Surface	
Public Surface Water Gravity/Lateral Drain		Disposal Pipe		Abandoned Pipe	
Pressure Foul		Culverted Water Course		Section 104 sewers are shown in green	
Pressure Combined		Pumping Station		Private sewers are shown in magenta	
Pressure Surface Water		Fitting			

martin.andrews@mac-ltd.co.uk

450

SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

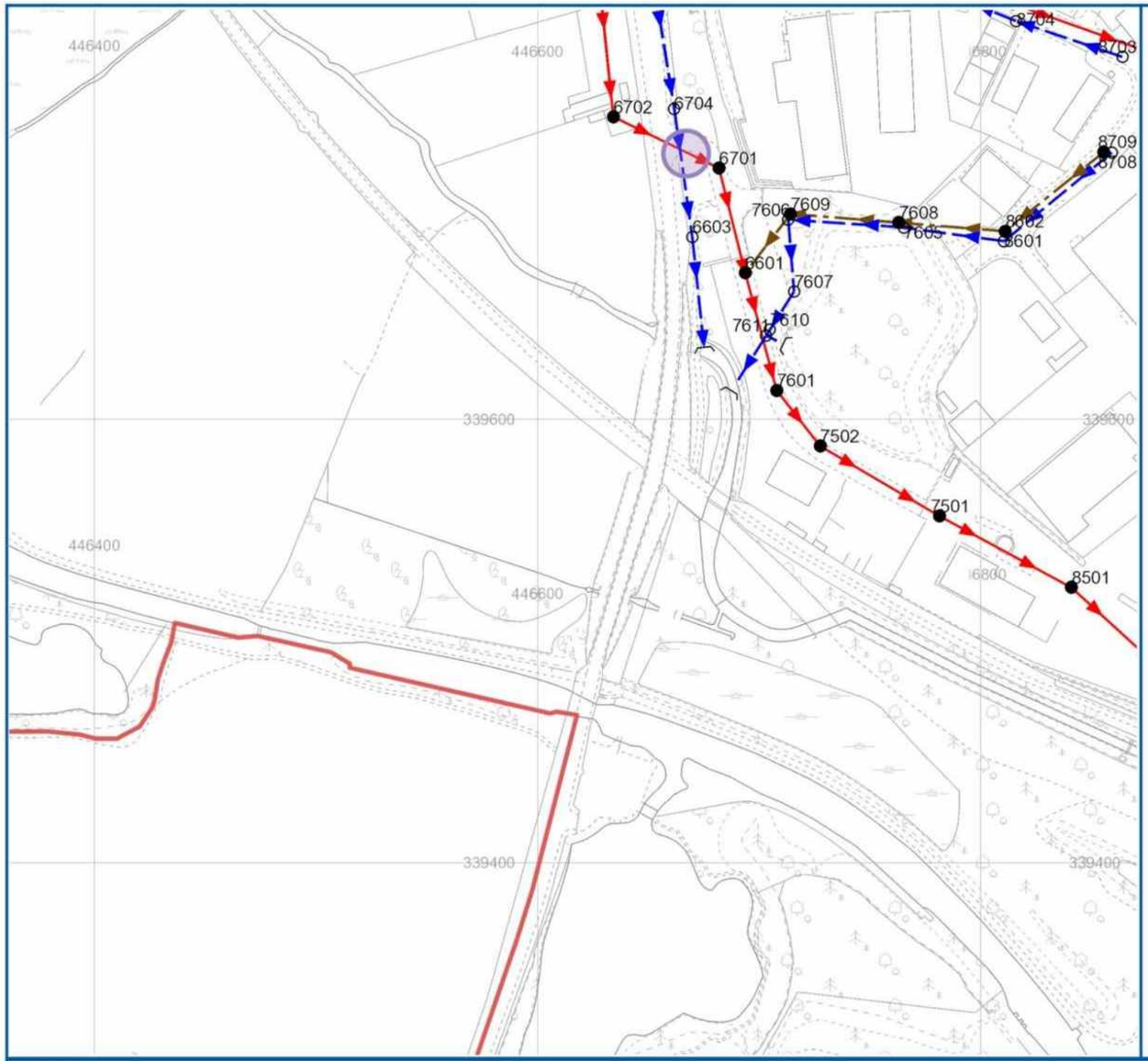
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
4001	C	-	0	0

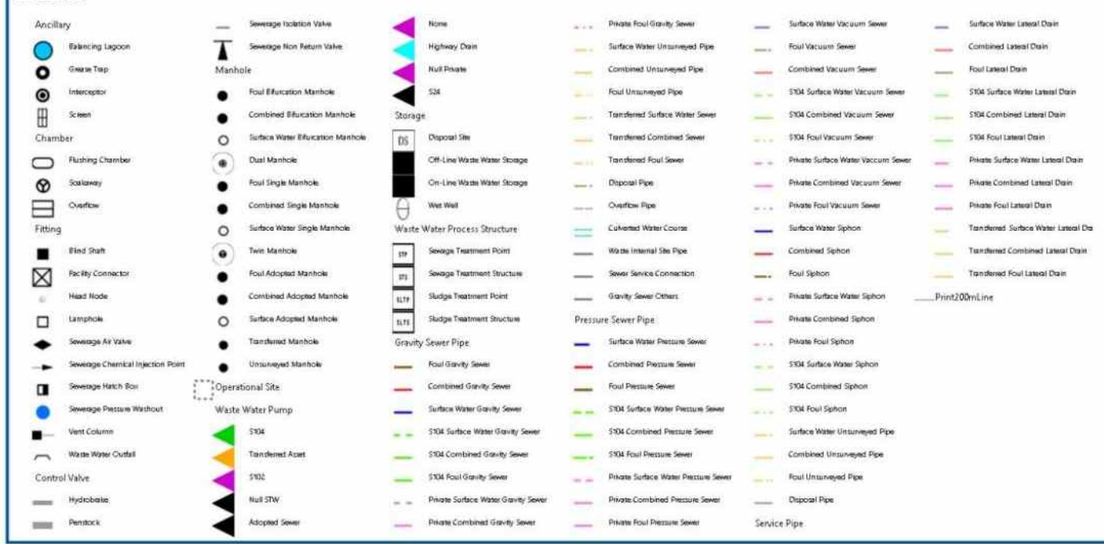
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK46397611	0	0	0	S	U	U	450	0	0	31/12/1899 00:00:00
SK46397611	0	0	0	S	U	U	750	0	0	31/12/1899 00:00:00
SK46397607	0	0	0	S	U	U	300	0	0	31/12/1899 00:00:00
SK46397502	45.736	42.736	42.526	C	CO	C	750	<UNK>	297.52	31/12/1899 00:00:00
SK46397501	45.046	42.526	42.319	C	CO	C	750	<UNK>	322.14	31/12/1899 00:00:00
SK46398703	<UNK>	<UNK>	<UNK>	S	U	U	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK46396701	45.6559	43.236	43.037	C	CO	C	750	<UNK>	243.25	31/12/1899 00:00:00
SK46396601	45.2369	43.037	42.892	C	CO	C	750	<UNK>	378.41	31/12/1899 00:00:00
SK46396702	45.629	43.409	43.236	C	CO	C	750	<UNK>	312	31/12/1899 00:00:00
SK46398704	<UNK>	<UNK>	<UNK>	S	U	U	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK46396603	45.5299	44.11	<UNK>	S	CO	C	750	<UNK>	0	31/12/1899 00:00:00
SK46397601	45.1619	42.892	42.736	C	CO	C	750	<UNK>	199.06	31/12/1899 00:00:00
SK46396704	45.97	44.41	44.11	S	CO	C	750	<UNK>	194.23	31/12/1899 00:00:00
SK46398501	45.0989	42.319	42.018	C	CO	C	750	<UNK>	283.83	31/12/1899 00:00:00
SK46397610	<UNK>	0	<UNK>	S	U	U	600	0	0	31/12/1899 00:00:00
SK46397606	<UNK>	0	<UNK>	S	U	U	600	0	0	31/12/1899 00:00:00
SK46398708	<UNK>	0	<UNK>	S	U	U	375	0	0	31/12/1899 00:00:00
SK46398601	<UNK>	<UNK>	<UNK>	S	U	U	600	0	0	31/12/1899 00:00:00
SK46398709	<UNK>	0	0	F	U	U	150	0	0	31/12/1899 00:00:00
SK46397605	<UNK>	0	<UNK>	S	U	U	600	0	0	31/12/1899 00:00:00
SK46397608	<UNK>	0	0	F	U	U	225	0	0	31/12/1899 00:00:00
SK46397609	<UNK>	0	0	F	U	U	225	0	0	31/12/1899 00:00:00
SK46398602	<UNK>	0	0	F	U	U	225	0	0	31/12/1899 00:00:00

LEGEND



MATERIALS

- - NONE
- AC - ASBESTOS CEME
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- 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

CATEGORIES

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

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

N W E S

SEVERN TRENT

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD (Tabular)

O/S Map Scale: 1:2,500 **This map is centred upon:**

Date of Issue: 24-11-21 **X:** 446615.87 **Y:** 339549.01

Disclaimer Statement:

1 Do not scale off this Map.

2 This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.

3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.

5 Ordnance Survey licence number: **100031673**

6 Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

Appendix I

Water Company Pre-development Enquiry

WONDERFUL ON TAP

Severn Trent Water Ltd
Regis Road
Wolverhampton
WV6 8RU

Tel: 07976 449091
www.stwater.co.uk
network.solutions@severntrent.co.uk

Contact: Pierce Meguer

Your ref:
Our ref: 1021621

24th November 2021

Martin Andrews Consulting Limited
Regents Pavilion
4 Summerhouse Road
Northampton
NN3 6BJ

FAO: martin.andrews@mac-ltd.uk

Dear Martin,

Proposed development for 200 residential properties at the land off Sowbrook lane, Stanton by Dale, Ilkeston.

I refer to your 'Development Enquiry Request' in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes which refer to surface water disposal from development sites.

Public Sewers in Site – Required Protection

No STW sewers in this location.

Due to a change in legislation on 1 October 2011 there may be former private sewers on the site which have transferred to the responsibility of Severn Trent Water Ltd, which are not shown on the statutory sewer records, but are located in your client's land. These sewers would require protective strips of 3 metres either side of the sewer's centreline that we will not allow to be built over. If such sewers are identified to be present on the site, please contact us for further guidance.

Foul Water Drainage

The sewer records indicate that the nearest Foul Sewer connection point is the 375mm Combined Water Sewer on Littlewell Lane, at manhole SK46385901 (circled orange). The topography of the surround land suggests that a pumping station arrangement may be required to discharge into this network. The network travels downstream, following the route of the Nutbrook canal, before out falling into a CSO chamber and finally into the Church Farm - Sandacre foul pumping station.

Anticipated foul flows from the proposed development (Minimum flow for an adoptable pumping station is 3.8 l/s) may have a negative impact on the receiving pumping station, therefore is it important modelling is carried out to fully understand the impact on the network.

Another option would be to connect to the 750mm Combined Water Sewer on Quarry Hill Road, upstream of manhole SK46396701 (circled orange). Sufficient fall may be available to connect to the network via a gravity connection, but this will have to be checked during your site investigation surveys.

Should a gravity connection be available the anticipated foul flows from the proposed development (Approx 2.7 l/s @ 2DWF) should have no adverse impact on the receiving network and connection. The flows discharge into the Hallam Fields treatment works which should have sufficient capacity to treat the additional flows. As such a gravity connection (direct or indirect) to the sewer at any convenient point is acceptable subject to a formal S.106 sewer connection approval (see later).

Should Modelling be required: In a change to our previous process, we no longer charge developers for the hydraulic modelling service. We will liaise with you over time with regards to the outcome of our investigations and any impact that may have on the planning status, occupation, or phasing of the site. However, while we can provide a brief summary of our findings if you need us to, we will no longer provide the full external capacity assessment report.

From the application you have submitted, I am assuming that the development has not been granted planning approval. Please inform us as and when planning has progressed as this will help determine how quick we carry out the modelling exercise. In the meantime, the site will be added to our modelling tracker and reviewed regularly until the site can be progressed for sewer modelling. I would therefore be grateful if you would forward as soon as possible the following details:

- Proposed submission of your Planning Application
- Confirmation whether a pumped solution is required (please provide pump rate and frequency, if available)
- Proposed planned start and completion date
- Any phasing details of the proposed development
- Planned occupation date

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soakaways should be considered as the primary method. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is pursued.

If, following the testing, it is demonstrated that soakaways would not be possible on the site, then satisfactory evidence will need to be submitted. The evidence should be either percolation test results or a statement from the SI consultant (extract or a supplementary letter).

Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA / EA.

Given the proximity of the Nutbrook Canal and other watercourses around the site STW would expect that the LLFA will propose a connection into one of these. Please note, a connection into the combined sewers should not be considered.

New Connections

For any new connections (including the re-use of existing connections) to the public sewerage system, the developer will need to submit Section 106 application forms. Our New Connections department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk.

Please quote is 1021621 in any future correspondence (including e-mails) with STW Limited. Please note that 'Development Enquiry' responses are only valid for 6 months from the date of this letter.

Yours sincerely,

Pierce Meguer
Network Solutions

WONDERFUL ON TAP

SEVERN TRENT

Developer Services

Appendix J

Geotechnical Information

Appendix K

Environment Agency Flood Level Information

Martin Andrews

Our Ref: EMD-235825

Your Ref:

Date: 30/11/2021

Dear Martin,

Enquiry regarding Product 4 - Sowbrook Lane, Ilkeston

Thank you for your enquiry which was received on 22/09/2021, apologies for the delay.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

Product 4

Detailed Flood Risk Assessment Map/data for the above site.

The Flood Map for Planning is now classed as Open Data. As such it can be downloaded free of charge under an open data licence from the following address: https://data.gov.uk/publisher/environment-agency

Please refer to Open Government Licence which explains the permitted use of this information.

Information Warning - OS background mapping

The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.

Attribution

Contains Environment Agency information © Environment Agency and/or database rights.

Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Luke Radford
Customers & Engagement Officer
East Midlands

For further information please contact the Customers & Engagement Team on 02084 747770

Direct e-mail:- EMDenquiries@environment-agency.gov.uk

ENC – FRA Advisory Text

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice
http://planningguidance.planningportal.gov.uk/

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

EMD235825

Flood Map for Planning

The Flood Map for Planning is now classed as Open Data. As such it can be downloaded free of charge under an open data licence from the following address: https://data.gov.uk/publisher/environment-agency

Alternatively it can be viewed at the following address: https://flood-map-for-planning.service.gov.uk/

Modelled Information

Node point reference	Location	20% (1 in 5 year) modelled level (mAOD)	20% (1 in 5 year) modelled flow (m^3/s)	10% (1 in 10 year) modelled level (mAOD)
Nut_2181	SK 46542 39729	45.07	8.50	45.22
Nut_2033d	SK 46673 39632	44.78	11.12	44.97
Nut_1886d	SK 46683 39516	44.46	10.31	44.82

Source: River Erewash SFRM2 Study, Hyder, 2013

Node point reference	Location	10% (1 in 10 year) modelled flow (m^3/s)	5% (1 in 20 year) modelled level (mAOD)	5% (1 in 20 year) modelled flow (m^3/s)
Nut_2181	SK 46542 39729	9.15	45.34	9.94
Nut_2033d	SK 46673 39632	12.55	45.13	13.41
Nut_1886d	SK 46683 39516	10.94	45.03	11.13

Source: River Erewash SFRM2 Study, Hyder, 2013

Node point reference	Location	2% (1 in 50 year) modelled level (mAOD)	2% (1 in 50 year) modelled flow (m^3/s)	1.33% (1 in 75 year) modelled level (mAOD)
Nut_2181	SK 46542 39729	45.49	10.51	45.56
Nut_2033d	SK 46673 39632	45.30	15.22	45.39
Nut_1886d	SK 46683 39516	45.21	11.57	45.33

Source: River Erewash SFRM2 Study, Hyder, 2013

Node point reference	Location	1.33% (1 in 75 year) modelled flow (m^3/s)	1% (1 in 100 year) modelled level (mAOD)	1% (1 in 100 year) modelled flow (m^3/s)
Nut_2181	SK 46542 39729	10.69	45.61	10.90
Nut_2033d	SK 46673 39632	15.90	45.47	16.77
Nut_1886d	SK 46683 39516	12.10	45.43	12.40

Source: River Erewash SFRM2 Study, Hyder, 2013

Node point reference	Location	0.5% (1 in 200 year) modelled level (mAOD)	0.5% (1 in 200 year) modelled flow (m^3/s)	0.1% (1 in 1000 year) modelled level (mAOD)
Nut_2181	SK 46542 39729	45.78	11.35	46.15
Nut_2033d	SK 46673 39632	45.65	19.26	46.05
Nut_1886d	SK 46683 39516	45.63	12.98	46.02

Source: River Erewash SFRM2 Study, Hyder, 2013

Node point reference	Location	0.1% (1 in 1000 year) modelled flow (m^3/s)	1% + 20% flow (1 in 100 year plus climate change) modelled level (mAOD)	1% + 20% flow (1 in 100 year plus climate change) modelled flow (m^3/s)
Nut_2181	SK 46542 39729	12.80	45.78	11.26
Nut_2033d	SK 46673 39632	23.00	45.65	19.21
Nut_1886d	SK 46683 39516	14.49	45.62	12.92

Source: River Erewash SFRM2 Study, Hyder, 2013

Please note: The flows provided represent **in channel flow only** and do not take into account flow on the floodplain.

Updated Climate Change Guidance

On 19th February 2016, the Flood risk assessments: climate change allowances' was published on www.gov.uk website. It has replaced previous guidance Climate Change Allowances for Planners.

The climate change guidance can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
If your RFI is to assist with a Flood Risk Assessment (FRA) for a future planning application, please review this guidance to consider which allowances should be used for your site.

The climate change allowance provided with this RFI is a 20% increase in the peak river flow for the 1% Annual Exceedance Probability (1 in 100 year) scenario.

Defence Information

There are no Environment Agency maintained raised defences in this area.

Historic Information

We have records of historic fluvial flooding at this location in 1932. Please note that we may or may not hold the original records in question. We do not make any claim as to the reliability of recorded flood extents or that all flood events in the area have been recorded. Please also be aware that flood defences may have been built subsequent to these historic flood events. Note - This information relates to the area the above named property is in, and is not specific to the property itself - it ***does not*** provide an indicator of flood risk ***at individual property level***.

Open Data Information

The below datasets are now classed as Open Data and as such can be downloaded free of charge under an open data licence from the following address: https://data.gov.uk/publisher/environment-agency

- Risk of Flooding from Rivers and Sea (RoFRS) data
- LiDAR Data
- Flood Map for Planning (Rivers and Sea)
- Historic Flooding Data

Permitting Information

Under the Environmental Permitting (England and Wales) Regulations 2016, any permanent or temporary works in, over or under a designated main river will require an Environmental Permit for Flood Risk Activities from the Environment Agency.

Any permanent or temporary works within 8 metres of the top of bank of a designated main river, or landward toe of a flood defence may require an Environmental Permit for Flood Risk Activities from the Environment Agency. In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities.

To find out whether your activity requires a permit or falls under a relevant exclusion, exemption or standard rule please follow the link below:
https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

Please note that a permit is separate to and in addition to any planning permission granted.

Product Information

Below is a brief overview of which Product is likely to be most appropriate for your needs. This information will only be provided where it is available as we do not hold detailed information on all watercourses.

Product 4 – Producing a Flood Risk Assessment (FRA) where you:

- Require mapped and tabulated outputs from an Environment Agency model *e.g flood levels for a range of events*
- Require information on local defences and historic flooding events
- Do not need to undertake additional hydraulic modelling

Product 6 – Producing a Flood Risk Assessment (FRA) where you:

- Require raw modelling results files
- Require modelling results in GIS format

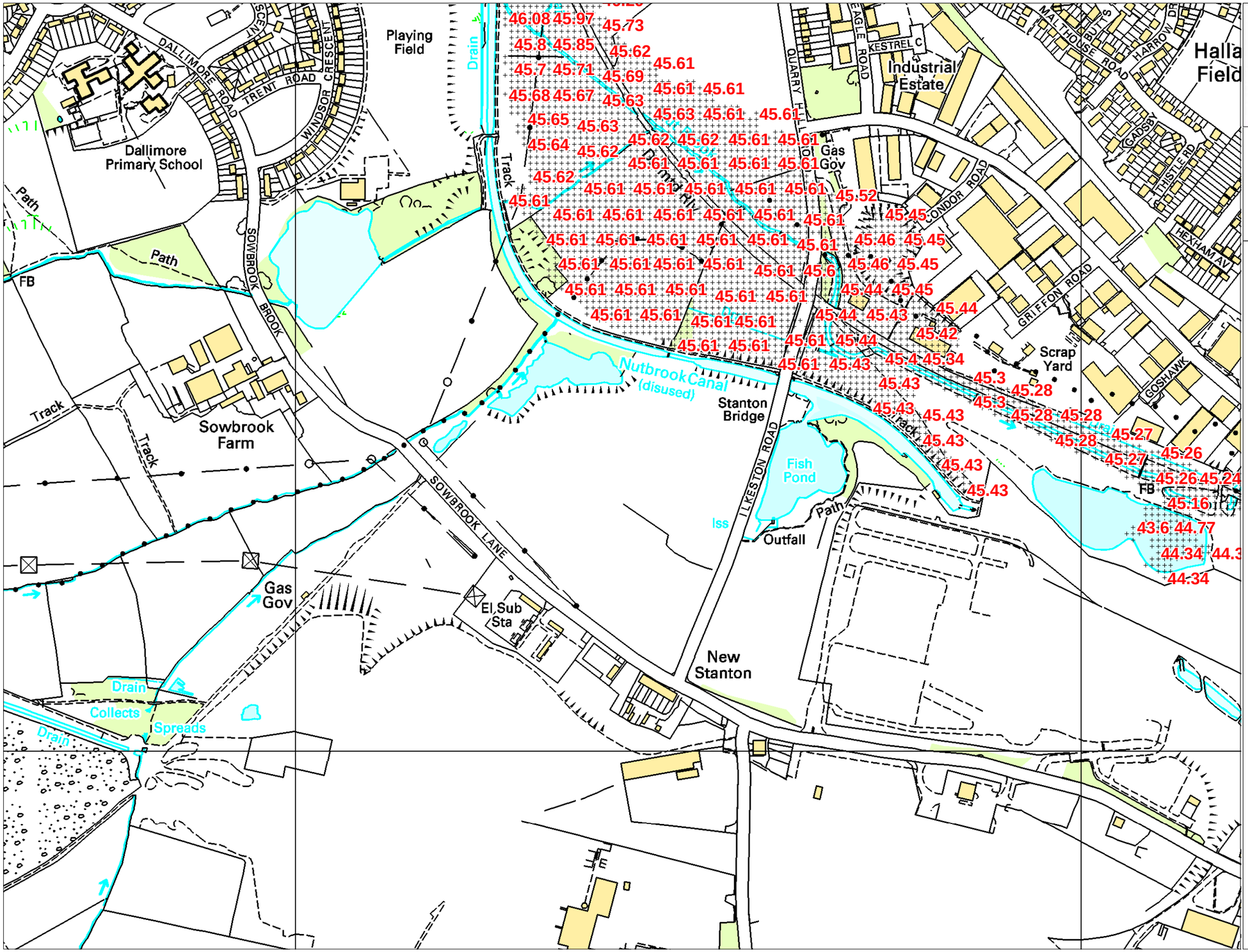
Product 7 - Producing a Flood Risk Assessment (FRA) where you:

- Do need to undertake additional hydraulic modelling using an existing Environment Agency model

In most instances to supply Product 6 and Product 7 data a hard drive will need to be supplied due to the large file sizes associated with this information. Please note that this information will require specialist modelling software to view and run.

A Product 5 (Model Report) will be supplied with all Product 6 and 7 requests and can also be requested separately.

Floodplain Heights Map centred on Sowbrook Lane, Ilkeston - created 20 October 2021 Ref: [EMD235825]



Environment Agency

Scale 1:5,000

N W E S

Legend

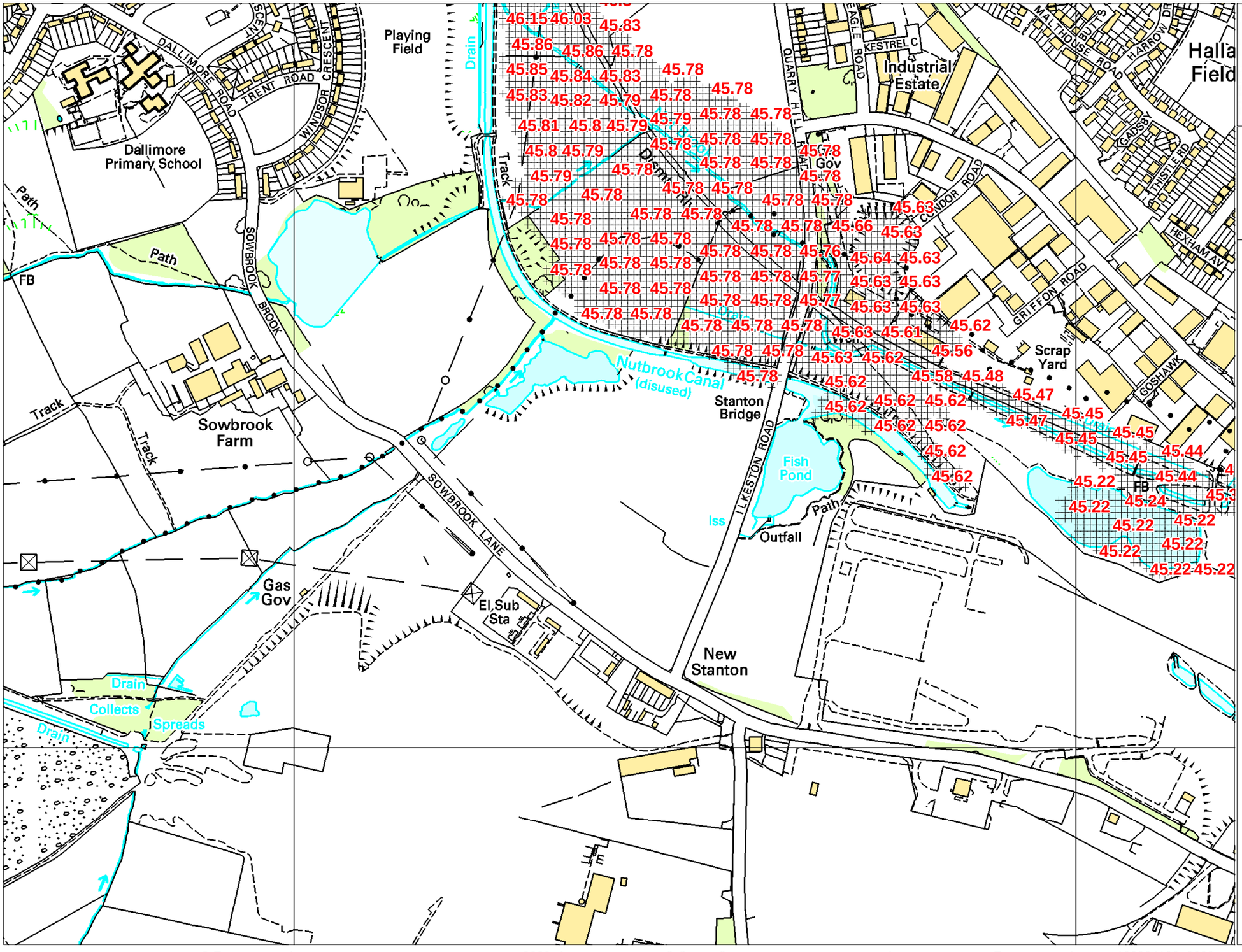
x.xx — 1 in 100 year Floodplain Level (mAOD)

Source: River Erewash SFRM2 Study, Hyder, 2013

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Floodplain Heights Map centred on Sowbrook Lane, Ilkeston - created 20 October 2021 Ref: [EMD235825]



Environment Agency

Scale 1:5,000

N W E S

Legend

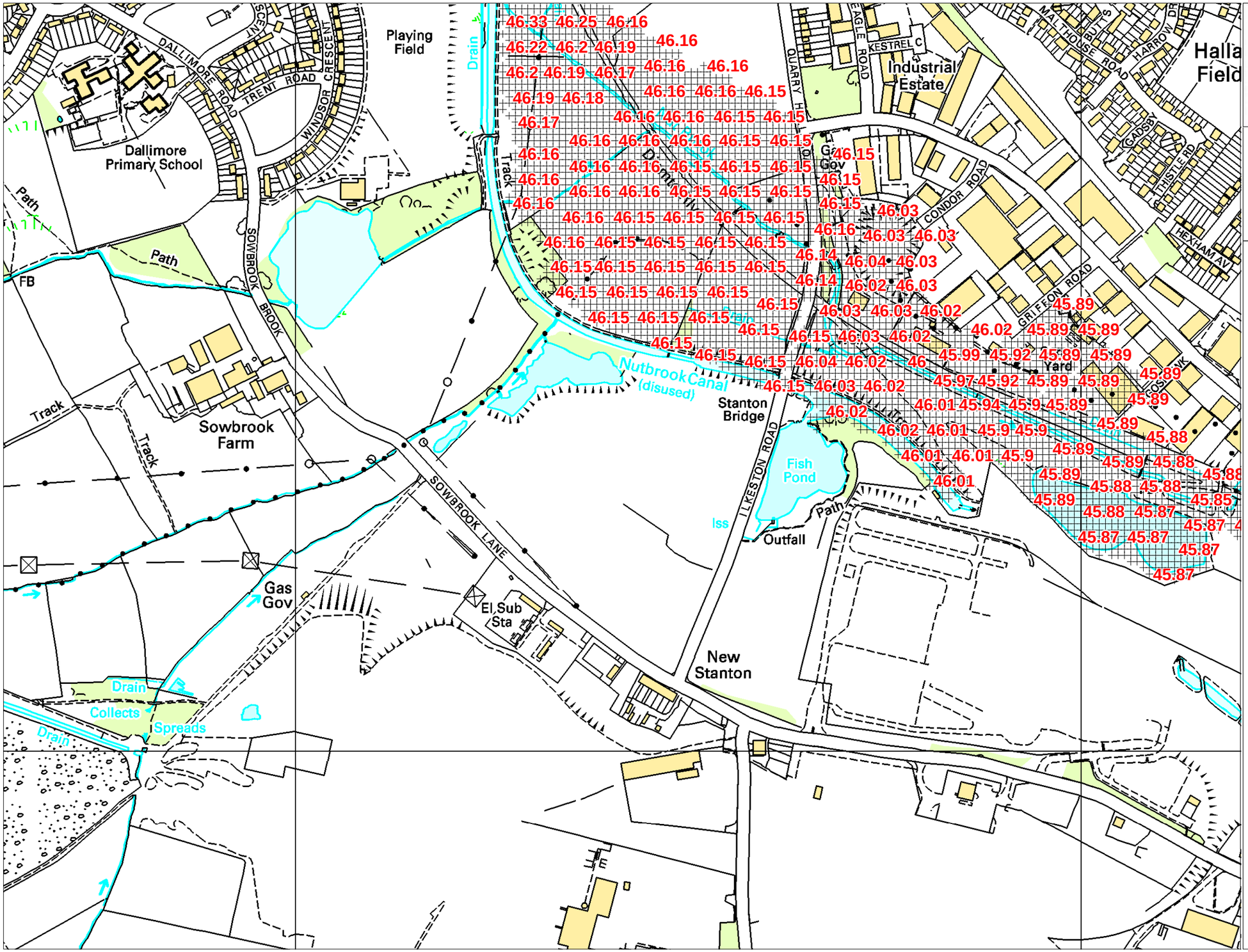
x.xx — 1 in 100 year (including climate change forecast) Floodplain Level (mAOD)

Source: River Erewash SFRM2 Study, Hyder, 2013

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Floodplain Heights Map centred on Sowbrook Lane, Ilkeston - created 20 October 2021 Ref: [EMD235825]



Environment Agency

Scale 1:5,000

N W E S

Legend

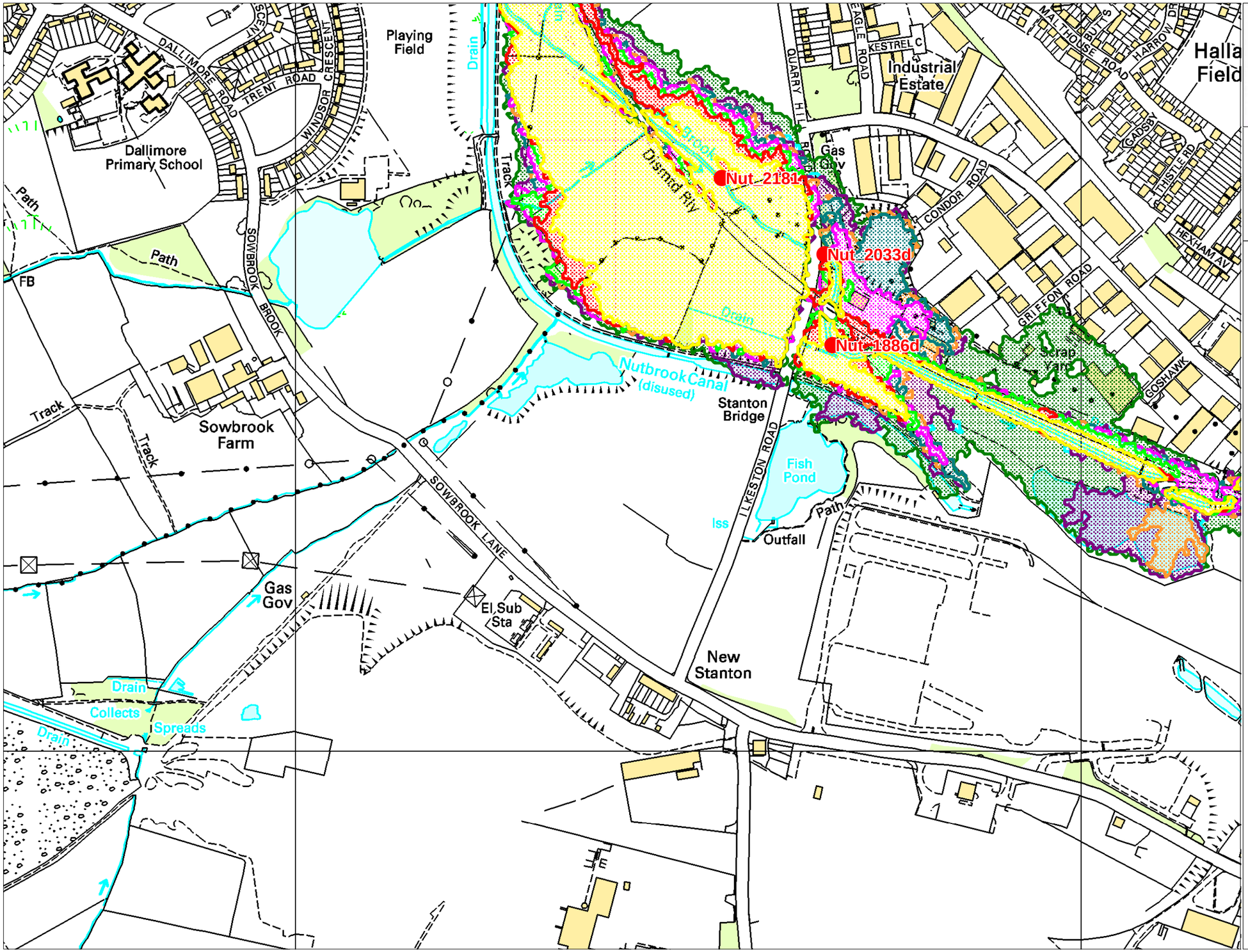
x.xx — 1 in 1000 year Floodplain Level (mAOD)

Source: River Erewash SFRM2 Study, Hyder, 2013

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled Extents Map centred on Sowbrook Lane, Ilkeston - created 20 October 2021 Ref: [EMD235825]



Environment Agency

Scale 1:5,000

N
W E
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Legend

- 1 in 5 year Modelled Extent
- 1 in 10 year Modelled Extent
- 1 in 20 year Modelled Extent
- 1 in 50 year Modelled Extent
- 1 in 75 year Modelled Extent
- 1 in 100 year Modelled Extent
- 1 in 100 year Modelled Extent (including climate change forecast)
- 1 in 200 year Modelled Extent
- 1 in 1000 year Modelled Extent
- Modelled Node Location and Reference

Source:
River Erewash SFRM2 Study, Hyder, 2013

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Appendix L

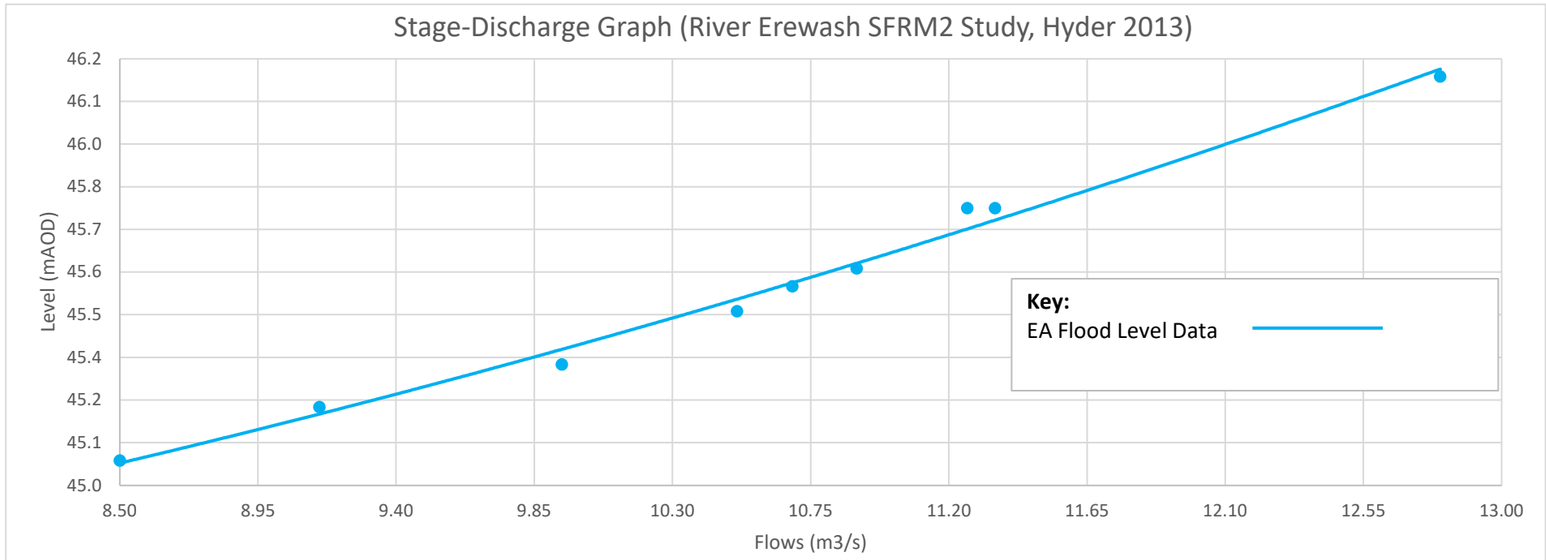
Flood Level Stage Discharge Calculations

Existing Stage Discharge Graph

Data model - River Erewash SFRM2 Study, Hyder 2013

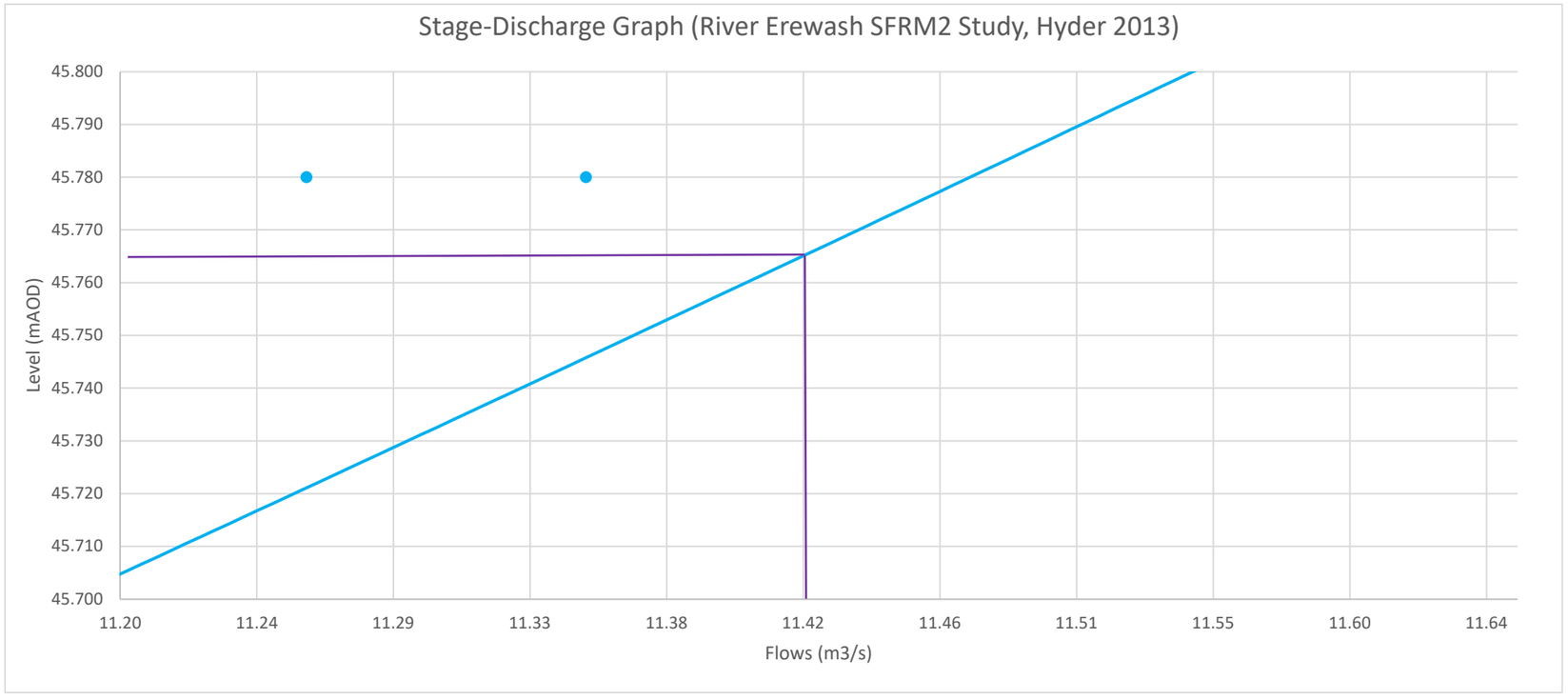
Node Nut_2181

AEP		Flow (m3/s)	Level (mODN)
50.0%	1 in 2	n/a	n/a
20.0%	1 in 5	8.50	45.07
10.0%	1 in 10	9.15	45.22
5.0%	1 in 20	9.94	45.34
2.0%	1 in 50	10.51	45.49
1.33%	1 in 75	10.69	45.56
1.0%	1 in 100	10.90	45.61
0.5%	1 in 200	11.35	45.78
1%+20CC	1 in 100 + CC	11.26	45.78
0.1%	1 in 1000	12.80	46.15
0.1%+20CC	1 in 1000 + CC	n/a	n/a



Interpolation for New Climate Change Allowances

AEP		Flow (m3/s)	Level (mODN)
1% + 29% CC	1 in 100 + CC	11.42	**45.77**



Appendix M

Flood Zones Existing Site
MAC drawing no. 450-FRA06

NORTH

Notes:

1. Based on Topographical Survey by JPP, drawing number 23775Y - 01 dated Sept 2021.
2. Based on Indicative Masterplan by RDC development Consultants, drawing number RDC1146/002 dated February 2022.
3. Based on Ordanance Survey mapping. Ordnance Survey (c) Crown Copyright 2020. All rights reserved. Licence number 100022432

Key:

- Site Boundary
- Flood Zone 2 Extent = 45.77 (1 in 100 + 29% Climate Change year event)
- Flood Zone 3 Extent = 46.15 (1 in 1000 year event)

MAC

- Transport Assessments
- Flood Risk Assessments
- Highway Advice
- Access Design
- Drainage Strategies
- Vehicle tracking

T: 01604 340544 Northampton Office
E: info@mac-ltd.co.uk W: mac-ltd.co.uk
Martin Andrews Consulting Ltd

Client: Wulff Asset Management Limited		Project: Sowbrook Lane Ilkeston	
Title: Flood Zone Extent Existing Site Layout		Date:	29.04.22
		Drw:	LT
		Chk:	AN
		Scale:	1:1000
Drawing No: 450-FRA06	Revision: -	Size:	A1

Appendix N

Flood Zones Proposed Development
MAC drawing no. 450-FRA-07

Notes:

1. Based on Topographical Survey by JPP, drawing number 23775Y - 01 dated Sept 2021.
2. Based on Indicative Masterplan by RDC development Consultants, drawing number RDC1146/002 dated February 2022.
3. Based on Ordanance Survey mapping. Ordnance Survey (c) Crown Copyright 2020. All rights reserved. Licence number 100022432

Key

- Site Boundary
- Flood Zone 2 Extent = 45.77 (1 in 100 + 29% Climate Change year event)
- Flood Zone 3 Extent = 46.15 (1 in 1000 year event)

T: 01604 340544 Northampton Office
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Martin Andrews Consulting Ltd

- Transport Assessments
- Flood Risk Assessments
- Highway Advice
- Access Design
- Drainage Strategies
- Vehicle tracking

Client: Wulff Asset Management Limited		Project: Sowbrook Lane Ilkeston	
Title: Flood Zone Extent Proposed Site Layout			Date: 29.04.22
			Drw: LT
			Chk: AN
Drawing No: 450-FRA07	Revision: -		Scale: 1:1000
			Size: A1