MUCKLOW & HARRIS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Studio 313 Scott House, Custard Factory, Gibb Street, Digbeth, Birmingham, B9 4AA

Flood Risk Assessment and Drainage Strategy

Land Adjacent to Boleyn Road, Rubery

for

Capita

Job No: 20131	**Flood Risk Assessment and Drainage Strategy** **Land Adjacent to Boleyn Road**

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Contents

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1.0 Introduction

1.1 Mucklow & Harris Limited have been commissioned by Capita to prepare a Flood Risk Assessment and Drainage Strategy for a residential development on land adjacent to Boleyn Road, in order to submit an outline planning application to Birmingham City Council.

1.2 The Flood Risk Assessment will address the requirements of the National Planning Policy Framework (NPPF) by looking at the risks from all possible sources of flooding. This report follows government and local guidance on development and flood risk and is undertaken in consultation with the relevant bodies.

1.3 It is a requirement for development applications to consider the potential risk of flooding to the proposed development over its expected lifetime and any possible impacts on flood risk elsewhere in terms of its effects on flood flows and run off.

The following aspects of flood risk should be addressed in all planning applications in flood risk areas:

a. The area liable to flooding.
b. The probability of flooding occurring now and over time.
c. The extent and standard of existing flood defences and their effectiveness over time.
d. The rates of flow likely to be involved.
e. The likelihood of impacts to other areas, properties and habitats.
f. The effects of climate change which currently requires designs to include 1 in 100-year rainfall events including an allowance for 30% climate change allowance.
g. The nature and current expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

1.4 The Drainage Strategy will establish the hydrological context of the existing site and provide an approximate assessment of permeable and impermeable areas within the current site and associated greenfield run off rates. It will also describe how the development will be drained to address the requirements of a full planning application.

1.5 The Proposed development is for 70 no. two, three and four bed units with new adoptable access roads, associated parking bays and landscaped areas.

1.6. From April 2015, Lead Local Flood Authority (LLFA) is a statutory consultee for planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures including sustainable drainage system (SuDS) to provide surface water runoff reduction and treatment.

1.7 Once submitted for planning and subject to the approval of this strategy by Birmingham City Council and their respective consultants including the Local Lead Flood Engineer (LLFE), this strategy will set the design parameters for future detailed design and construction of all the surface and foul water drainage including sustainable drainage facilities and infrastructure.

2.0 Site Location and Description

2.1 The site comprises of a parcel of land that is located south of Boleyn Road in Rubery, South West of Birmingham city centre, approximately 12km. The Ordnance Survey National Grid reference for the site is E398633, N278723. The nearest postcode is B45 0NL. The location plan can be found in Appendix 1.

2.2 The site is irregular in shape and covers an area of approximately 2.3Ha.

2.3 The site comprises an open, unoccupied field, which was once part of the playing fields of Holly Hill Church School and Balaam Wood School. The land has now been fenced off from the school playing fields. There is one dominant tree to the centre of the field, with small trees and shrubs along the Northern, Southern and Western Boundary.

2.4 The sites neighbouring land uses are summarised below:

- To the North: Boleyn Road, beyond this, further fields
- To the South: Residential properties
- To the East: Playing fields of Holly Hill Church School and Balaam Wood School
- To the West: Boleyn Road, beyond this, further fields

2.5 The site can be accessed immediately off Boleyn Road to the west.

2.6 The site generally falls from the north to the south by approximately 3.5m. A copy of the topographical survey can be found in Appendix A2.

3.0 Site Development Proposals

3.1 At the time of preparing this report, the proposals are for a residential development with the potential for 58 No. two, three and four bed houses and 12 No. two bed apartments. The site will also comprise associated adoptable access road, driveways and soft landscaping including private garden areas.

3.2 A site development plan can be found in Appendix A3.

4.0 Existing Drainage

4.1 Severn Trent Water Limited has been contacted and a copy of the Development Enquiry and response can be found in Appendix A4.

4.2 **Private Drainage**

4.2.1 The site has never been developed; therefore, we do not anticipate any existing private drainage within the site.

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

4.3 **Foul Water Drainage**

4.3.1 There is an existing 225mmØ public foul water sewer, south of the site within Dorset Close, approximate depth 3.0 to 5.0m.

4.4 **Surface Water Drainage**

4.4.1 There is an existing 450mmØ public surface water sewer, south of the site within Dorset Close, approximate depth 3.0 to 5.0m.

5.0 Planning Policy and Flood Risk

5.1 The National Planning Policy Framework (NPPF) sets out the legislative process for how planning applications are assessed for suitability and the policies to be followed by all sites being brought forward for development. Any development application that lies in Flood Zone 1 that is larger than 1 hectare in size, must be accompanied by a site-specific Flood Risk Assessment.

5.2 A Flood Risk Assessment is required for all new developments in Flood Zone 2 and 3 or in an area within Flood Zone 1, which has critical drainage problems and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding. The Environment Agency and Local Authority flood map shows the site to be within Flood Risk Zone 1 with the site of having less than 0.1% or 1 in 1000 chance of flooding – This means that the proposed development has a low probability of flooding. The design of the development layout should incorporate sustainable drainage measures.

5.3 Applicable Planning Policy

5.3.1 Technical Guidance to the National Planning Policy Framework (NPPF) deals specifically with development planning zones. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed residential development, based upon an assessment of current and future conditions.

5.4 Planning Zones

5.4.1 The overall aim should be to steer new developments to Flood Zone 1. Where there is no reasonably available site in Flood Zone 1, local planning authorities allowing land in local plans or in determining planning applications for development at any location should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the Exception Test if required.

Table 5.1 – NPPF/Flood Zones

The table below shows how flood zones relate to a sequential planning response. There are advisory notes placed upon the type of development.

Zone 1: Low Probability	
Definition This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).	**Appropriate Uses** All uses of land are appropriate in this zone. **FRA requirements** For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention. **Policy Aims** In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond, through the layout and form of the development and the appropriate application of sustainable drainage systems.
Zone 2: Medium Probability	
Definition This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.	**Appropriate Uses** Essential infrastructure and the water compatible, less vulnerable and more vulnerable uses as set out in table 2 are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed. **FRA Requirements** All development proposals in this zone

	should be accompanied by a flood risk assessment. **Policy Aims** In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area, through the layout and form of the development and the appropriate application of sustainable drainage systems.

Zone 3a: High Probability	
Definition This zone comprises land assessed as having between a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	**Appropriate Uses** The water compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood. **FRA requirements** All development proposals in this zone should be accompanied by a flood risk assessment. **Policy Aims** In this zone, developers and local authorities should seek opportunities to: • Reduce the overall level of flood risk in the area, through the layout and form of the development and the appropriate application of sustainable drainage systems. • Relocate existing development to land in zones with a lower probability of flooding. • Create space for flooding to occur by

	restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b: Functional Floodplain	
Definition This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments, areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.	**Appropriate Uses** Only the water-compatible uses and the essential infrastructure listed in table 2 that has to be there should be permitted in this zone. It 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. • Not increase flood risk elsewhere. Essential infrastructure in this zone should pass the exception test. **FRA Requirements** All development proposals in this zone should be accompanied by a flood risk assessment. **Policy Aims** In this zone, developers and local authorities should seek opportunities to: • Reduce the overall level of flood risk in the area, through the layout and form of the development and the appropriate application of sustainable drainage systems. • Relocate existing development to land with a lower probability of flooding.

Table 5.2 – Flood Risk Vulnerability Classification

Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations, grid and primary substations and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent (where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).
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 and hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable" and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewerage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water Compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewerage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigations facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping

	accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Note:

1. This classification is based partly on DEFRA/Environment Agency research on Flood Risks to People (FD2321/TR2) and also on the need of some uses to keep functioning during flooding.

2. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

3. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

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Flood Risk Vulnerability and Flood Zone Compatibility

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate

× Development should not be permitted

Notes to table:

This table does not show:

a) The application of the "Sequential Test" which guides development to Flood Zone 1 first, then Zone 2 and then Zone 3.

b) Flood Risk Assessment requirements, or

c) The Policy aims for each flood zone.

5.5 Flood and Water Management Act 2010

5.5.1 The FWMA is a direct result of the recommendations made by Sir Michael Pitt, taken from his report on the severe flooding experienced across the country in 2007 and was given Royal Assent in April 2010. It provides for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges and protects water supplies to the consumer.

5.5.2 The Act is being implemented by a series of ministerial orders. Currently, orders have been commenced which:

- Require the EA to develop a national flood risk and coastal management strategy,
- Establish Lead Local Flood Risk and Coastal Management authorities,
- Establish Regional Flood Risk and Coastal Management Committees,
- Providing for changes to administration and financing of Flood Risk and Water Management.

5.5.3 However, the most significant change facilitated by the FWMA is the establishment of the Sustainable Drainage National Standards and the Sustainable Drainage Approval Bodies (SABs). The National Standards will prescribe how surface water management design will have to be approached during new development and redevelopment proposals, adopting sustainable methods and practices. The SABs who will sit within the Lead Local Authority will then be tasked with scrutinising proposed surface water management strategies and evaluating them in terms of their technical feasibility and sustainability credentials. The documentation related to commencement of this part of the Act was issued for consultation in December 2011 and ended on the 13th March 2012. The full commencement of this Act is still outstanding as are the release of the National Standards.

5.6 Planning Strategic Flood Risk Assessment

5.6.1 The Birmingham City Council, Level 1 and 2 Strategic Flood Risk Assessment (2012) has been reviewed.

5.6.2 The Council Flood Zone map shows the site to be within Flood Zone 1.

5.7 Information Source

5.7.1 The Environment Agency's website was checked to assess the potential risk to the site from flooding. An extract of the flood map is included in Appendix A5.

5.7.2 To review and identify sources of flooding, data has been obtained from Centremaps in the format of Groundsure Enviro Insight Report. The results of this report are reviewed and summarised as part of this chapter. Extracts of the report can be found in Appendix A6.

5.8 Fluvial Flooding (from Rivers and the Sea)

5.8.1 The overall aim should be to steer new developments to Flood Zone 1. Where there is no reasonably available site in Flood Zone 1, local planning authorities allowing land in local plans or determining planning applications for development at any location should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the exception test if required.

5.8.2 The site lies entirely within in Flood Zone 1, which is at low risk from flooding, with less than 0.1% or 1 in 100 chance of flooding from river and sea in any one year.

5.9 Historic Flooding

5.9.1 According to the Groundsure Enviro Insight report for the site, there are no reported historical flooding incidents within the site.

5.10 Surface Water (Pluvial) Flooding

5.10.1 Pluvial flooding results from rainfall generated overland flow before the runoff enters any watercourse or sewers or where the sewerage/drainage system and watercourses are overwhelmed and therefore unable to accept surface water.

5.10.2 Pluvial flooding is usually associated with high intensity rainfall events but may also occur with lower intensity rainfall where the ground is saturated, developed or

otherwise has low permeability which will result in overland flow and ponding within depressions.

5.10.3 Surface water flooding is limited to the south of the site. The majority of flooding is based on a 1 in 1000-year return period with depths ranging from between 0.1m to 0.3m.

5.11 **Flooding from Sewers and Drains**

5.11.1 Sewer flooding occurs when the capacity of the sewerage system is overwhelmed by heavy rainfall. This may be due to the sewer becoming blocked or having inadequate capacity resulting in flooding.

5.11.2 At the time of writing this report, there are no instances of sewers flooding within the site.

5.12 **Flooding from Groundwater**

5.12.1 According to the Groundsure Enviro Insight report and EA Flood Maps, the majority of the site is at low risk from ground water flooding. However, ¼ of the site towards the north is recorded to be at moderate risk from groundwater flooding.

5.13 **Flooding failure of infrastructure and/or artificial sources**

5.13.1 There are no artificial sources of water from reservoirs or canals that are recorded within the vicinity of the site which may influence the development; therefore, the site is considered at negligible risk from these sources.

5.13.2 There are existing surface water sewers close to the site which could lead to infrastructure failure and in turn lead to flooding, but this is unlikely to affect the site due to the site topography.

5.14 **Potential Flood Risk to the Site**

5.14.1 An appraisal was made of the site and surrounding areas to assess the potential risk of flooding at the site.

5.14.2 The proposed development is bound to the north and west by Boleyn Road, playing field to the east and residential properties to the south.

5.14.3 Boleyn Road falls east to west and then north to south west. The site falls from north to south by approximately 3m.

5.14.4 There is very little potential for flooding to occur from third party land.

6.0 Existing Ground Conditions

6.1 Patrick Parsons have prepared a Phase 2 Site Appraisal, dated May 2021. Below is a summary of its main findings.

6.2 **Site History**

The earliest reviewed mapping (1882) shows the site to be undeveloped in an agricultural landscape with minimal residential or industrial development. There is no significant development on site or any change to the site layout in subsequent mapping other than a drainage ditch marked in the centre of the site, and issues around 20m off the south east corner (1966).

6.3 **Ground Conditions**

A surface cover of grass was encountered in all the exploratory holes and was underlain by dark brown slightly sandy clayey topsoil generally between 0.20m and 0.30m in thickness.

Made ground was recorded in a number of locations across the site, small concrete cobbles were recorded in the north of the site. Deeper made ground was recorded in locations up to a maximum depth of 3.40m, which was interpreted as reworked natural Aveley Member soils above 2.50m begl and gravelly sandy clay with clay pipe. This is considered to be associated with the burying of the former onsite stream running along the southern quarter and the subsequent raising of site levels towards the south of the site to create a level sports pitch.

Superficial deposits of reddish brown slightly gravelly silty clay of quartzite, siltstone and gravel were recorded in the south and west of the site and was proven to a maximum depth of 2.50m begl, as well as a greenish grey sandy clay which was recorded along the south of the site.

The Aveley Member was recorded in most boreholes as a stiff reddish brown slightly silty (in parts friable) clay. These bedrock residual soils were proven to a maximum depth of 5.00m begl.

6.4 **Groundwater**

No groundwater was encountered during the ground investigation in any exploratory holes. However, groundwater was recorded within the groundwater monitoring points at 0.88m, 1.32m and 0.40m begl respectively during the first two visits, but were recorded as dry on the third visit. As such this water is considered likely to be ephemeral, perched water.

6.5 **Soakaway Drainage**

A soakaway drainage strategy will not be feasible for use within the proposed development due to the extensive thickness of made ground across the site and the presence of cohesive natural soils beneath.

7.0 Sustainable Urban Drainage

7.1 Sustainable Urban Drainage Systems (SUDS)

7.1.1 Sustainable urban drainage systems (SUDS) involve the management of storm water from developments effectively, to reduce the impact of runoff both to the site in question and properties downstream and not to exacerbate existing problems. This is best achieved by using runoff as a resource by not increasing peak flows that will otherwise result from the development and by slowing and storing runoff to mimic, as closely as possible, the natural drainage run off and volumes from a site before development. Ensuring storm water runoff is treated so there is no detriment to water quality of the receiving watercourse is also fundamental.

7.1.2 Using a SUDS system may provide water quantity and quality control, as well as increased amenity value. Appropriately designed and maintained schemes may improve the sustainable water management at the site by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream.
- Reducing the volume, rate of discharge and the frequency of water flowing directly to watercourses or sewers from the developed sites.
- Improving water quality compared with conventional surface water sewers by removing pollutants and/or reducing levels of pollutants.
- Allowing the development to adapt to the effects of climate change.
- Protecting groundwater resources from contamination.

7.2 The SUDS Approach

7.2.1 The design of SUDS should follow the “Management Train” as described in CIRIA 753 guidance. The aim of this is to consider an interconnected system of measures that combine effectively from where water falls to its eventual discharge or outfall, where practicable, controlling water as close to the source as possible by:

- Prevention (i.e., good housekeeping measures for individual properties).
- Source control including pervious infiltration systems.
- Conveyance systems that also provide flow and volume control as well as treatment.

- Larger and further downstream site control including storage systems.
- Treatment systems.

7.2.2 As an entire development is planned, the option of site control is available. However, where possible, it is desirable to control runoff at the source to reduce the size of any storage needed. Source control is the preferred option in any SUDS scheme and should be considered first. It involves controlling runoff at the source, by techniques including permeable pavements, etc.

7.2.3 There are many potential options using infiltration methods to lower the volume of water reaching the receiving watercourse. However, these options are not suitable where the infiltration capacity of the soil is low, where there is high water table and/or where ground contaminants might be mobilised.

7.2.4 The SUDS scheme must satisfy criteria for water quality and river protection, both during normal water levels and during flood conditions. In addition, an acceptably low level of site flooding frequency must be ensured and buildings must be designed to protect against flooding from the selected design storm event.

7.3 Potential SUDS Options on Site

7.3.1 The following represents our considered views on suitable SUDS options appropriate to this site. CIRIA C753 - The SUDS manual was initially consulted to examine the use of SUDS on this site in conjunction with the industry standard drainage hierarchy and the local guidance. It is the guidance that wherever possible, allowing for site conditions, for surface water to be managed as close to source as possible, as well as treated to achieve water quality improvements to surface water runoff from proposed developments.

7.4 Potential SUDS Techniques Considered for this Site

7.4.1 Below is a matrix of the feasibility of a range of SUD's techniques to identify which measures may be suitable for this site.

SUDS Feasibility Matrix		
Technique	*Physical Constraints*	*Feasibility*
Permeable pavement	Ideally requires a level site – good infiltration and no contamination	Extensive thickness of Made Ground and Cohesive soil beneath
Permeable Car Park with underground storage	Permeable blocks; impermeable membrane liner; geotextiles; crushed stone; engineered sub-base storage.	Removed after LLFA request due to high maintenance.
Green roofs	Roof slope for proposed buildings will preclude their use; flat roofs are ideal; also known as brown roofs and garden roofs.	Not provided
Bio-retention – shallow landscaped areas	Primarily used to remove pollutants from runoff and due to their shallow nature are not as effective at run-off attenuation as other SUDS techniques.	Has been accommodated
Soakaways and infiltration trenches	Require infiltration rates of 1 x 10^{-6} m/s or greater. Shallow soakaways or infiltration trenches could be required where groundwater is shallow. Ground contamination may	Extensive thickness of Made Ground and Cohesive soil beneath

	be an issue.	
Grassed filter strips – wide gently sloping areas of grass or other vegetation	Normally used to treat polluted run-off from car parks or roads. Not as effective at run-off attenuation as other SUDS techniques.	Provided
Infiltration basins/swales	Area widely applicable for attenuation and treatment of surface run-off by infiltration into the ground. Require slope of no more than 4-10% and can act as a substitute for soakaways where groundwater is shallow – need to consider the impact these techniques have on local groundwater. Ground contamination may be an issue.	Extensive thickness of Made Ground and Cohesive soil beneath
Non-infiltration swales	Used in the same concept as carrier ditches or storage bunds.	Provided
Filter drains	These are normally used adjacent to areas of car parking or roads and convey run-off via flow through an engineered substrate (normally gravel).	Not provided
Balancing ponds	These are permanent ponds that provide storage above the resting water level in the pond. Are appropriate for most sites but require suitable space. Require impermeable soils or can be lined.	Insufficient room at low levels

Rainwater harvesting	The collection and recycling of rainwater to be used for washing machines, irrigation and particularly for this site, ideal for vehicle washing.	Not Provided
Bio-retention Tree Pits	They filter out litter, oil and other pollutants washed from the street.	Has been provided

7.4 **SUDS Techniques Considered for this Site**.

7.4.1 **Rainwater Harvesting**

Rainwater from roofs can be stored and reused. If designed appropriately, the systems can also be used to reduce the rates and volumes of runoff.
Can provide a good source of water supply and reduce annual surface water runoff.

To be considered in detail design. Empirical evidence gathered from developers has indicated that there are significant maintenance issues associated with these facilities. Not Recommended.

7.4.2 **Discharge to a Surface Water Body**

Discharge to a surface water body would be discharging into an existing water course, canal, river or body of water such as lake or pond. Discharging to an ordinary watercourse requires approval from LLFA, whereas discharge to a main river will require approval from the Environment Agency, discharge to a canal will require approval from Canal and River Trust.

Not Recommended. Due to the site location, discharging to a Surface Water Body is not possible. No discharge opportunity available.

7.4.3 **Discharge to a combined sewer, Highway Drain or other drainage system**

Discharge to a combined water sewer, highway drain or other drainage system was historically the more conventional way of dealing with surface water before SUDs became a requirement through legislation and Planning Policy.

Recommended – existing public sewers are local to the site.

7.4.4 **Green Roofs**

Green roofs comprise a multilayered system that covers the roof of a building or podium structure with vegetation cover, over a drainage layer. They are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.

Cost to the structure can be considerable, suitable for shallow pitch roofs and poor maintenance will leave it looking unsightly.

Not feasible for residential properties.

7.4.5 **Swales**

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate. They should promote low flow velocities to allow much of the suspended particulate load in the storm water runoff to settle out, thus providing effective pollutant removal. Roadside swales can replace conventional gullies and drainage pipes.

To be reviewed in Detailed Design, however, room available for some limited swales.

7.4.6 **Pervious Pavements**

Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored between infiltration to the ground, reuse or discharge to a watercourse or other drainage system. Pavements with aggregate subbases can provide good water quality treatment.

The use of permeable paving for parking bays can be used as a stone subbase not only stores and slows down the rate of discharge, but also raises the water quality.

Not Recommended, the LLFA have stated that they `wouldn't recommend the inclusion of permeable paving which will result in a substantial amount of maintenance for future occupants and BMHT in the finalised detailed drainage strategy. `

7.4.7 Geocellular/Modular Systems

Modular plastic geocellular systems with a high void ratio that can be used to create a below ground storage structure. Modular tanks can be used for runoff attenuation but requires silt trap protection and a suitable means of access for cleaning and inspection.

Whilst the preferred option is to utilise open, at-ground attenuation basins, these crates offer an efficient, cost-effective solution that can be located under parking areas.

Recommended, to be utilised as a storage system.

8 Surface Water discharge

8.1 Initially, it must be demonstrated that soakaways and other forms of infiltration are not feasible, although permeability tests for the site have not been undertaken, the site investigation report prepared by Patrick Parsons indicated that soakaway drainage strategy will not be feasible for use with the proposed development… due to extensive thickness of Made Ground across the site and the presence of cohesive natural soils beneath.

8.2 Allowable levels of storm water discharge from the site to the public sewer system or watercourses are to be implemented after discussions with Severn Trent Water Limited and the Lead Local Flood Authority at Birmingham City Council.

8.3 Birmingham City Council provide the following guidance which is summarised below:

- All developments (greenfield and brownfield) surface water to be limited to greenfield run-off.
- Birmingham City Council, Lead Local Flood Authority promote the implementation of SUDS.
- Assessment on surface water flood risk and mitigation.
- To check if infiltration is viable and compliance with drainage hierarchy.
- Discharge to public sewers to be approved by Severn Trent Water Limited.
- Calculation will be based on 100 year plus 40% climate change.
- Finish floor levels should be designed to mitigate flood risk.

  Consideration should be given to exceedance flows.

8.4 Proposals are to have a surface water discharge from the site into the existing 450mmØ surface water sewer to the south of the site in Dorset Close.

8.5 The total discharge from the site is based on Q bar. Greenfield rates have been calculated using ICP SUDS based on the following:

Area = 2.32Ha
SAAR = 807mm
SPR = 0.47

Q bar	11.6 l/s
Q1	11.0 l/s
Q30	25.9 l/s
Q100	34.0 l/s

The Lead Local Flood Authority has requested greenfield run-off calculations that relate to the previously undeveloped site must be provided.

Based upon a standard requirement of 5l/s/ha.

Area = 2.32Ha – gives a discharge rate of 11.6l/s.

8.6 Based upon the proposals for the site, it has been estimated that the total impermeable contribution area is calculated at 0.98Ha.

With 10% for Urban Creep this area has been calculated at 1.078Ha.

Based upon a discharge rate of 11.6l/s the 1 in 100 year + 40% design total attenuation has been calculated.

307.59m³ in attenuated in oversized pipes for a return period of 1 in 30 years. The 1 in 100 years + climate change will be attenuated in Storage tanks with 370m³ capacity.

8.7 The surface water strategy and drainage calculations can be found in Appendix A7 and Appendix A8 respectively.

8.8 It is likely that oversized pipes in the adopted roads within the site will accommodate the 1 in 30-year storm event, restricted to Q bar with an adoptable Vortex flow control. The pipes will be offered for adoption to Severn Trent Water Limited under a section 104 agreement.

8.9 Private storage for the balance of the storage up to the 1 in 100-year event including an allowance of 40% for climate change will likely be in the form of cellular underground storage tank etc, within the site.

8.10 The development layout shall be designed to have a minimum impact on the existing sewers, with 6m easement provided for 225mmØ pipe and 10m for pipes over 225mm.

8.11 Flood routing is to be provided within the site to direct water in extreme storm events, above the 1 in 100 year + climate change, away from properties and towards the roads and/or landscaped areas. Flood routing can be provided by careful selection of floor levels, reshaping ground and utilising natural channels formed by the kerbs.

8.12 A separate surface water drainage system is to be provided within the site. There are existing sewers within the site.

8.13 The following SUDS features should be considered at detail design:

- Water Butts
- Swales
- Bioretention Rainwater Garden

8.14 The final storm connection would be made under a Section 106 Agreement with Severn Trent Water Limited.

8.15 Any required sewer diversions will be under a Section 185 Agreement with Severn Trent Water Limited.

9 Maintenance and Operational Considerations

9.1 Maintenances of SUDs features are important considerations to the effectiveness and design life of the drainage system as well as the SUDs features. In this development, all storm flows up to the 1 in 100-year flood event plus 40% climate change are accommodated within attenuation tanks in the private areas. Overland flow routing has been undertaken and the house floor levels set to ensure they are not at risk in such flood events.

9.2 Any other private areas or other drainage systems considered in the future would be the responsibility of the client or their management sub-contractors and consultation is underway to evidence the maintenance agreements required.

More details regarding the SUDS facilities incorporated in the site can be found in the table below.

SUDS Facility	Operation and Maintenance
Attenuation Tanks	Inspect after first storm Inspect /check inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed – annually Thereafter survey inside of tank for sediment build-up and remove as necessary - every 5 years or as required. (as outlined in Ciria report C753)
Silt Trap	Inspect six-monthly, empty every 12 months and after every major storm or local flood event.
Flow Control	Inspect every 12 months and following every major storm or local flood event.
Gullies (road)	Inspect per 6 months, empty every 12 months.

Bioretention Wetlands	Removing litter and debris monthly or required. Inspecting silt accumulation half yearly. Removing Vegetation (25%) annually.
Swale	Removing litter and debris monthly or as required. Inspect inlets half yearly.

Road Gullies – To be maintained by Birmingham City Council

Adoptable Sewers/Flow Control – To be maintained by Severn Trent Water Limited

A more detailed operational and maintenance document will be required at detailed design once all of the SUDS features have been identified.

10 Foul Water Discharge

10.1 An estimation of the foul flows has been provided in the table below, based on a Dry Weather Flow (DWF) of 3 with the number of occupants per house calculated using the development proposals plan in Appendix A3.

Size of Unit	Number of units	Flow (l/sec)
2, 3 and 4 bed properties and apartments	70	2.3

10.2 The proposed foul discharge rate from the development will be discussed with Severn Trent Water to gain their comment and/or approval.

10.3 It is suggested that an unrestricted foul water discharge should be provided subject LLFA and Severn Trent Water approval.

10.4 Proposals are for the foul water to discharge into the existing 225mmØ public foul sewer to the south of the site in Dorset Close.

10.5 A separate foul water drainage system is to be provided within the site.

10.6 The development layout shall be designed to have a minimum impact on the existing sewers, with a 6m easements provided for the 225mmØ pipes and 10m for pipes over 225mmØ. Where this is not possible, a sewer diversion will be required with the route agreed with Severn Trent Water Limited.

10.7 All sewer diversions will be under a Section 185 Agreement with Severn Trent Water Limited.

10.8 The final outflow pipe, a gravity connection, will be adopted under a Section 104 Agreement with Severn Trent Water Limited.

10.9 A copy of the foul drainage strategy can be found in Appendix A7.

11 Conclusions

11.1 Guidelines set out by Severn Trent Water Limited and Lead Local Flood Authority have been considered to determine the foul and surface water strategy for this development.

11.2 Surface water will discharge into the existing Severn Trent Sewer with additional flows attenuated on site within the below ground cellular attenuation restricted to Greenfield Runoff with a discharge rate of 11.6 l/s.

11.3 A full implementation of the guidelines should be undertaken at detail design. Applying for section 106 and 104 to Severn Trent Water Limited and satisfying the guidelines set out by the Lead Local Flood Authority which include the implementation of SUDS, flood storage mitigation, flood routing, network calculations and detailed operational and maintenance manual.

11.4 The use of sustainable urban drainage (SUDS) has been considered and can be incorporated within the design, with the use of porous paving will be implemented.

11.5 Foul water will discharge to existing public foul sewers at an unrestricted discharge rate subject to LLFA and Severn Trent Water Approval.

11.6 The site lies within Flood Zone 1, and it is not at risk from flooding.

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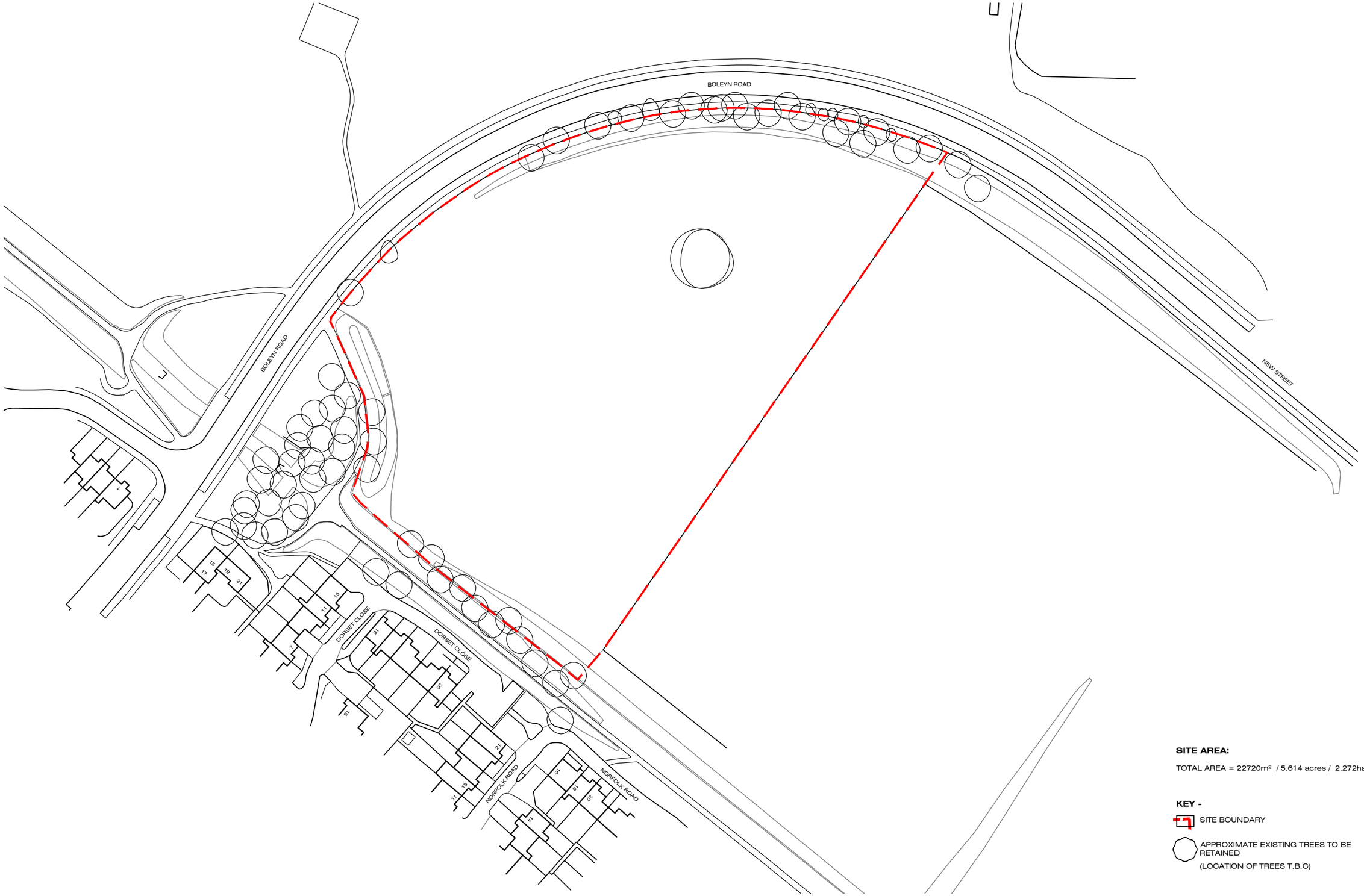
A1 LOCATION PLAN



SITE AREA:

TOTAL AREA = 22720m² / 5.614 acres / 2.272ha

KEY -

SITE BOUNDARY

APPROXIMATE EXISTING TREES TO BE RETAINED

(LOCATION OF TREES T.B.C)

Revision	Date	By	Chkd
A	99.99.99	ZZ	ZZ

Project	Drawing	Client
BOLEYN ROAD RUBERY	SITE LOCATION PLAN	

Scale	Dated	Job No.	Drawing No.	Drawn by	Checked	CiSfb Element	Revision
1:1250	23.07.2020	71210	D - 001	DR	NW	FEASIBILITY	-

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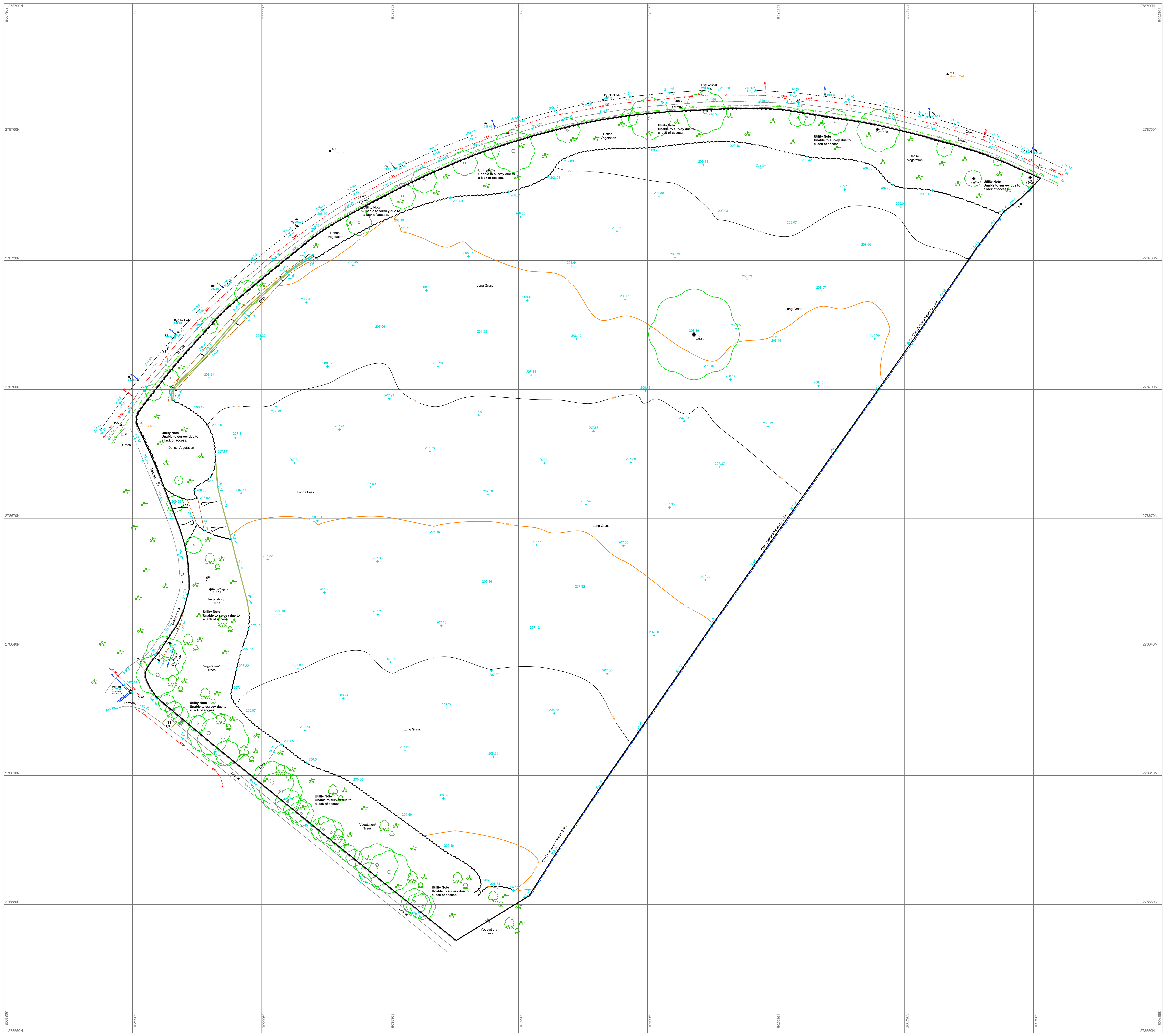
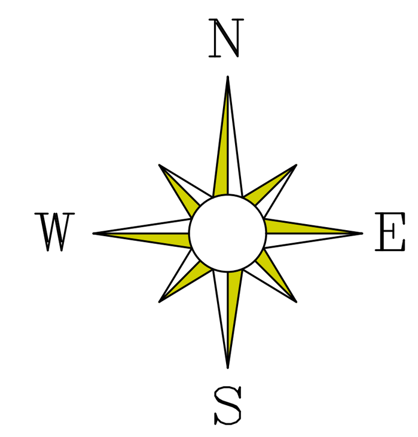
A2 TOPOGRAPHICAL SURVEY





KEY FOR UNDERGROUND SERVICES

- Combined water
- Foul water
- Surface water
- Other
- Gas — GAS
- Electric — E
- Telephone — BT
- Cable TV — CATV
- Unidentified — U
- Water
- Closed Circuit TV — CCTV
- Communications — COM
- Heating Pipe — HP
- Empty Duct — ED
- Fibre Optics — FO
- Vents — V
- Pipe — PIPE
- Traffic Signal — TS
- Gauge Lines — G
- Vapor Recovery — VR
- Offsets — O
- Fuel — F

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus;

ABBREVIATION KEY

AR	assumed route	PTG	pipe to ground
BD	base bend	PTS	pipe to surface
BD	backdrop	RE	rodding eye
BL	bed level	RWP	rainwater pipe
BOS	bottom of shaft	SV	stop valve
CL	cover level	SVP	soil vent pipe
CR	cable riser	TE	trapped exit
DP	down pipe	TFR	taken from records
EOT	end of trace	TP	telegraph pole
EP	electricity pole	UTF	unable to find
FH	fire hydrant	UTL	unable to lift
G	gully	UTS	unable to survey
GV	gas valve	UTT	unable to trace
HOR	head of run	VP	vent pipe
HL	high level	WL	water level
IC	inspection chamber	WM	water meter
IL	invert level	WO	wash out valve
MH	manhole	D	depth
PR	pipe riser		

UTILITY SURVEY NOTES

ELECTROMAGNETIC AND/OR GROUND PENETRATING RADAR TECHNIQUES HAVE BEEN USED TO LOCATE AND MAP UNDERGROUND UTILITIES AND FEATURES ON THIS DRAWING. MAPMATIC HAVE MADE EVERY ENDEAVOUR TO MAKE SURE THAT THE INFORMATION CONTAINED WITHIN THIS DRAWING IS ACCURATE AND OF THE HIGHEST QUALITY. HOWEVER, THE RESULTS FROM THESE TYPES OF SURVEYS ARE NOT INFALLIBLE AND SHOULD THE LOCATION OR DEPTH OF SERVICES/FEATURES BE OF PARTICULAR IMPORTANCE TO A PROJECT, THEN IT IS STRONGLY ADVISED THAT TRIAL EXCAVATIONS SHOULD BE UNDERTAKEN TO CONFIRM SURVEY RESULTS.

MAPMATIC HAVE USED ALL RECORD DRAWINGS THAT WERE AVAILABLE TO US BY THE CLIENT OR BY THE STATUTORY UTILITY PROVIDERS AT THE TIME OF THE SURVEY. ANY INFORMATION TAKEN FROM THESE DRAWINGS (IE PIPE SIZES, MATERIAL) IS NOT GUARANTEED. SERVICES LOCATED FROM RECORD DRAWINGS WILL BE SHOWN AND ANNOTATED AS TAKEN FROM RECORDS (TFR). HISTORIC RECORD INFORMATION IS OFTEN INCOMPLETE/INACCURATE AND CANNOT BE RELIED UPON.

A SINGLE LINE INDICATING A UTILITY MAY INDICATE THE PRESENCE OF MULTIPLE SERVICES WITHIN CLOSE PROXIMITY TO EACH OTHER. WHERE A SINGLE LINE TYPE IS SHOWN WE RECOMMEND HAND DIGGING WITHIN 0.5m, TO EXPOSE HIDDEN SERVICES.

WHERE QUOTED, DEPTH INFORMATION OF UNDERGROUND SERVICES/FEATURES IS STATED. DEPTHS ARE GENERALLY WITHIN +/- 10% ACCURATE, BUT CANNOT BE GUARANTEED. ANY DEPTHS SHOWN ARE USUALLY TO THE TOP OF THE SERVICE/FEATURE. GRAVITY SEWERS AND DRAINS ARE USUALLY TO INVERT (BASE OF DRAINAGE CHANNEL) UNLESS OTHERWISE STATED.

AT MAPMATIC WE USE SKILLED STAFF AND MODERN CALIBRATED EQUIPMENT TO PERFORM OUR SURVEYS. HOWEVER, THE COMPLETENESS OF ANY UNDERGROUND SURVEY CANNOT BE 100% GUARANTEED AND WE CANNOT BE HELD RESPONSIBLE FOR ANY INACCURACIES BEYOND THOSE THAT COULD BE REASONABLY EXPECTED BY A COMPETENT COMPANY.

CONTRACTORS UTILIZING OUR DRAWINGS FOR INTRUSIVE WORK SHOULD TAKE ALL REASONABLE MEASURES TO WORK SAFELY IN ACCORDANCE WITH HSG47 GUIDELINES "AVOIDING DANGER FROM UNDERGROUND SERVICES".

SITE SPECIFIC NOTES–

ANY SERVICE IN THE LINE TYPE TFR OR AR OR WITH EITHER TFR OR AR WRITTEN ON IT IS TO BE USED AS A GUIDE ONLY AND IS NOT TO BE TREATED AS ACCURATE.

THERE WERE SEVERAL AREAS OF VEGETATION THAT WERE UNABLE TO SURVEY DUE TO A COMPLETE LACK OF ACCESS, ALL SUCH AREAS HAVE BEEN INDICATED ON THE DRAWING.

THE UTILITY SURVEY AREA IS INDICATED ON THE DRAWING WITHIN THE LAYER UG–SURVEY BOUNDARY.

Key:

Av	Air valve	G:	Girth circumference	Sv	Stop valve
Bg	Back gully	Gy	Gully	TCB	Telephone call box
BH	Borehole	Ht.	Height	TTL:	Tree top level
BM	Benchmark	IC	Inspection cover	THL	Threshold level
Boll	Bollard	IFL	Internal floor level	TCB	Telephone call box
Bs	Bus stop	IL	Invert level	TL	Traffic light
BT	British Telecom	Lb	Letter box	THL	Threshold level
Bg	Back Gully	Lp	Lamp Post	Tp	Telegraph post
CL	Cover Level	MG	Multigirth	Ts	Traffic signal
CBX	Control box	MH	Manhole	TT	Tactile paving
CPS	Concrete paving slab	Mkr	Marker post	Twl:	Top of wall level
CTV	Cable TV cover	NVP	No visible pipes	UTL	Unable to lift
Elc	Electric cover	PInv	Pipe invert	WL	Water level
Ep	Electricity post	Pb	Post box	Wm	Water meter
Er	Earth rod	Re	Rodding eye	Wo	Wash out
Fh	Fire hydrant	Sp	Sign post		
Fs	Flagstaff	St	Stop tap		

- Road
- Drop Kerb
- Verge Tarmac
- Verge Concrete
- Verge Grass
- Verge
- Tops
- Bottoms

Ordnance Survey information is provided for a guide only.

- OS BUILDING OUTLINE
- OS DETAIL

Station	Easting (m)	Northing (m)	Level (m)
M1	398517.354	278691.699	208.268
M2	398566.035	278755.602	209.325
M3	398710.012	278773.404	211.702

REV	DATE	DESCRIPTION OF WORK	SURVEYOR	CHECKED BY

MAPMATIC
MEASURED SURVEYS

SETTING OUT · UTILITY SURVEYS · CAMERA SURVEYS · FLOOD RISK ASSESSMENT
AERIAL PHOTOGRAPHY · EARTHWORK CALCULATIONS · MEASURED BUILDING SURVEYS · TOPOGRAPHICAL SURVEYS

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Tel: 01332 650 580 www.mapmatic.com Email: info@mapmatic.com

CLIENT
GM3

PROJECT
Boleyn Road
Birmingham
B45 0ND

TITLE
Topographical
Survey

Scale	1: 500@A1	Date	11.08.2020
Drawn	JT. JH	Checked	AW
Level datum	GNSS	Grid orientation	GNSS
Job number	3753	Revision	0
Drawing no.	0001	Sheet	1 of 1

Notes:

All critical measurements should be checked on site prior to design. No liability will be taken for this plan if passed onto 3rd parties. Trees and other survey data may be omitted due to dense vegetation. Some services may have been omitted due to parked vehicles and vegetation. Please note the drainage information has been ascertained by visual inspection from the surface and therefore values are estimated.

This survey has been orientated to the Ordnance Survey (OS) national grid via a Global Navigation Satellite System (GNSS) and the OS Active Network (OS NET). A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true OS bearing for angle orientation. No scale factor has been applied to the survey therefore the coordinates shown are arbitrary and not true OS coordinates.
Please refer to the survey station table to enable establishment of the on-site grid.

A3 DEVELOPMENT PROPOSALS

New retaining wall to be introduced

New external steps leading down from Boleyn Road to site

EMERGENCY ACCESS POINT & FIRE HYDRANT FOR EMERGENCY SERVICES WITH DROP KERB

Speed cushions to be introduced along Boleyn Road to reduce traffic speed

BOLEYN ROAD

QUEEN ELIZABETH ROAD

DORSET CLOSE

DORSET CLOSE

Drop kerb to allow parking space access

Existing 1.8 - 2 meter high metal fence

Dotted line indicates root protection zone

New external steps leading from existing footpath to site

KING EDWARD VI
BALAAM WOOD ACADEMY
PLAYING FIELDS

ACCOMMODATION SCHEDULE

	UNIT TYPE	AREA m²	STOREY	TOTAL	Tenure mix%
	MOSELEY (2B4P)	80.4	2	4	35
	WALMLEY (2B4P)	80.8	2	20	
	WALMLEY G (2B4P)	84.6	2	1	
	HARBORNE (3B5P)	93.8	2	10	30
	HARBORNE+ (3B5P)	96.7-101.8	2	6	
	HIGHGATE(3B5P)	94	2	2	
	COTTORIDGE+ (3B5P)	104	2	2	
	NORTHFIELD (4B7P)	123	2	5	11
	LIFFORD+ (4B7P)	130	2	3	
	BRANDWOOD (2B4P)	82.7	1.5	4	7
	BORDESLEY (2B4P)	91.4	1.5	1	
	2 BED APARTMENT	70.0	1	5	17
	2 BED APARTMENT	79.0	1	1	
	2 BED APARTMENT	70.0	1	6	
GRAND TOTAL				70	100
TOTAL CAR PARKING					98

SITE AREA:

TOTAL AREA = 23157m² / 5.722 acres / 2.3157ha

KEY -

- Site Boundary
- Existing Trees To Be Retained - CAT A
- Existing Trees To Be Retained - CAT B
- Existing Trees To Be Retained - CAT C
- Proposed Trees
- Existing Trees To Be Removed
- Affordable Units
- Private Drive
- Air Source Heat Pump
- *ECP - Wall Mounted
- *ECP - Pole Mounted
- *ECP - Ducting Only
- WATER BUTT
  Installed to rainwater downpipe
- Indicative ACO Drainage Locations TBC
  See engineer's drawings

Notes
- Copyright in this drawing remains the property of BM3 Architecture Limited.
- Do not scale this drawing. Work to figured dimensions only.
- Contractors and consultants are to advise BM3 Architecture Limited of any discrepancies.

Revision	Date	By	Chkd	CDM Notes
A - Site layout amended following comments from planing and D.T.M.	-	-	-	

Project	Drawing	Client
BOLEYN ROAD RUBERY	SITE LAYOUT PLAN	

Scale	Dated	Job No.	Drawing No.	Drawn by	Checked	CiSfb Element	Revision
1:500 @A1	13.09.2022	71210	SK - 003	DR	NW	FEASIBILITY	A

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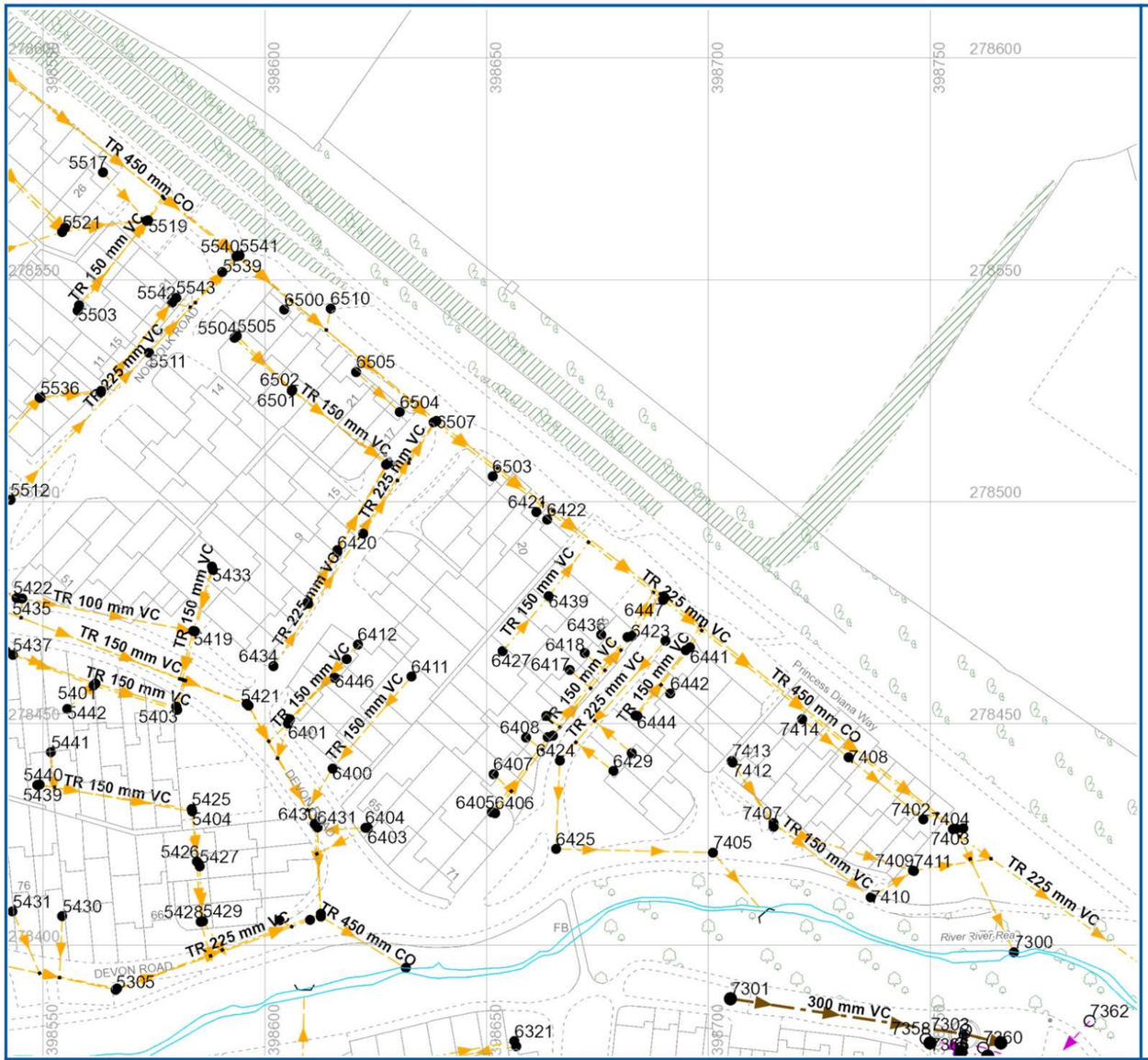
A4 SEVERN TRENT WATER DEVELOPMENT ENQUIRY RESPONSE



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
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SO98787318	<UNK>	<UNK>	195.788	F	VC	C	225	<UNK>	0	31/12/1899 00:00:00
SO98787371	<UNK>	<UNK>	196.548	S	VC	C	300	<UNK>	0	31/12/1899 00:00:00
SO98787309	198.9859	197.046	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SO98787307	199.0939	196.904	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SO98787362	198.6799	197.5	<UNK>	S	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SO98787358	199.0749	197.195	<UNK>	S	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SO98787301	200.248	196.808	195.488	F	VC	C	300	<UNK>	40.61	31/12/1899 00:00:00
SO98787360	198.983	197.093	<UNK>	S	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SO98787366	198.9579	196.538	196.537	S	VC	C	300	<UNK>	0	31/12/1899 00:00:00
SO98787303	198.9579	195.458	195.342	F	VC	C	300	<UNK>	68.75	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00
SO98787406	200.51	198.86	197.14	F	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98787407	200.53	198.69	198.28	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98787408	200.15	198.99	198.52	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98787409	199.66	<UNK>	<UNK>	F	VC	U	225	<UNK>	<UNK>	28/02/2018 00:00:00
SO98787410	199.94	198.25	197.36	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98785418	202.9	<UNK>	<UNK>	F	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98785419	202.91	201.26	<UNK>	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98786400	202.2	200.57	<UNK>	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98786401	202.45	200.93	<UNK>	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
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SO98786407	201.69	201.54	<UNK>	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98786408	201.65	201.5	<UNK>	S	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00
SO98786427	202.08	<UNK>	<UNK>	F	VC	C	<UNK>	<UNK>	<UNK>	05/02/2017 00:00:00

LEGEND

LandlinePoint
Spot Height
Emergency Telephone
Site Of Heritage
Culvert
Positioned Nonconiferous Tree
Inland Water
Roadside
Overhead Construction
Rail
Positioned Coniferous Tree
Boundary Post Or Stone
Triangulation Point Or Pillar
Historic Interest
Landform
Tidal Water
Structure
LandlineTex
LandlineLine
Polygon Closing Line
Property Closing Line
Bottom Of Slope
Top Of Slope
Step
Mean High Water
Traffic Calming
Standard Gauge Track
Bottom Of Cliff
Top Of Cliff
Mean Low Water
Path
Overhead Construction
Culvert
Pylon
Ridge Or Rock Line
Narrow Gauge Track
Railway Buffer
Tunnel Edge
Line Of Posts
Drain
Default Line
Building Outline
Edge Line
Road Or Track
Building Division
Inland water Line
General Surface Natural Line
Building Overhead Line
Landform Natural Line
Historic Interest Line
Landform Manmade Line
Unclassified
LandlineArea
Other
Mixed Woodland Fill
Nonconiferous Tree Fill
Coniferous Tree Fill
Orchard Fill
Coppice Or Osiers Fill
Scrub Fill
Boulders Fill
Rock Fill
Scree Fill
Rough Grassland Fill
Hearth Fill
Saltmarsh Fill
Marsh Fill
Reeds Fill
Slope Fill
Cliff Fill
Ancillary
Balancing Lagoon
Grease Trap
Interceptor
Screen
Chamber
Flushing Chamber
Scalaway
Overflow
Connector
Sewer Junctions
SewerLine Connection Node
Fitting
Blind Shaft
Facility Connector
Head Node
Lamphole
Sewerage Air Valve
Sewerage Chemical Injection Point
Sewerage Hatch Box
Sewerage Pressure Washout
Vent Column
Waste Water Outfall
Control Valve
Hydrobrake
Penstock
Sewerage Isolation Valve
Sewerage Non Return Valve
Manhole
Foul Bifurcation Manhole
Combined Bifurcation Manhole
Surface Water Bifurcation Manhole
Dual Manhole
Foul Single Manhole
Combined Single Manhole
Surface Water Single Manhole
Twin Manhole
Foul Adopted Manhole
Combined Adopted Manhole
Surface Adopted Manhole
Transferred Manhole
Unsurveyed Manhole
Operational Site
Waste Water Pump
S104
Transferred Asset
S102
Null STW
Adopted Sewer
None
Highway Drain
Null Private
S24
Storage
Disposal Site
Off-Line Waste Water Storage
On-Line Waste Water Storage
Wet Well
Waste Water Process Structure
Sewage Treatment Point
Sewage Treatment Structure
Sludge Treatment Point
Sludge Treatment Structure
Gravity Sewer Pipe
Foul Gravity Sewer
Combined Gravity Sewer
Surface Water Gravity Sewer
S104 Surface Water Gravity Sewer
S104 Combined Gravity Sewer
S104 Foul Gravity Sewer
Private Surface Water Gravity Sewer
Private Combined Gravity Sewer
Private Foul Gravity Sewer
Surface Water Unsurveyed Pipe
Combined Unsurveyed Pipe
Foul Unsurveyed Pipe
Transferred Surface Water Sewer
Transferred Combined Sewer
Transferred Foul Sewer
Disposal Pipe
Overflow Pipe
Culverted Water Course
Waste Internal Site Pipe
Sewer Service Connection
Gravity Sewer Others
Pressure Sewer Pipe
Surface Water Pressure Sewer
Combined Pressure Sewer
Foul Pressure Sewer
S104 Surface Water Pressure Sewer
S104 Combined Pressure Sewer
S104 Foul Gravity Sewer
Private Surface Water Gravity Sewer
Private Combined Gravity Sewer
Private Foul Gravity Sewer
Surface Water Unsurveyed Pipe
Combined Unsurveyed Pipe
Foul Unsurveyed Pipe
Transferred Surface Water Sewer
Transferred Combined Sewer
Transferred Foul Sewer
Disposal Pipe
Overflow Pipe
Culverted Water Course
Waste Internal Site Pipe
Sewer Service Connection
Gravity Sewer Others
Pressure Sewer Pipe
Surface Water Pressure Sewer
Combined Pressure Sewer
Foul Pressure Sewer
S104 Surface Water Pressure Sewer
S104 Combined Pressure Sewer
S104 Foul Pressure Sewer
Private Surface Water Pressure Sewer
Private Combined Pressure Sewer
Private Foul Pressure Sewer
S104 Surface Water Pressure Sewer
S104 Combined Pressure Sewer
S104 Foul Pressure Sewer
Surface Water Pressure Sewer
Combined Pressure Sewer
Foul Pressure Sewer

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: 1:1,250

Date of Issue: 05-01-21

This map is centred upon:

X: 398669.32 **Y:** 278493.00

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**

WONDERFUL ON TAP

Severn Trent Water Ltd
Regis Road
Wolverhampton
WV6 8RU

Tel: 0345 2667930
www.stwater.co.uk
net.dev.west@severntrent.co.uk

Contact: Sadeq Hadi

Your ref:
Our ref: 8450321

29th December 2020

Mr Riaz Alam
Mucklow & Harris
Studio 313 Scott House
Custard Factory
Gibb Street
Digbeth
Birmingham

Dear Mr Alam

Proposed development for 100 residential units @ Boleyn Road, Rednal, Rubery, Birmingham

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

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 also have protective strips 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

As noted on the sewer records there is a 225mm foul water sewer south of the site. The foul flows from the proposed 100 dwellings (approx. 1.56 l/s @2DWF) should have no adverse effects upon the system. As such a foul water gravity connection will be suitable at any convenient point subject to formal S106 sewer connection approval (see later). We always recommend a survey to verify the location and depth of the network before you progress with the designs as the pipe may not be plotted correctly on the sewer map.

Surface Water Drainage

If soakaways are proved to be unsuitable, a connection to the 450mm surface water sewer south or west of the site would be appropriate with flow restrictions to be agreed with Birmingham City Council as the Lead Local Flood Authority and statutory consultee in the planning process. Please see the guidance notes for further information.

WONDERFUL ON TAP

SEVERN TRENT

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 7076600 or download from www.stwater.co.uk.

Please quote 8450321 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

Sadeq Hadi
Asset Protection (Waste Water) West
Wholesale Production

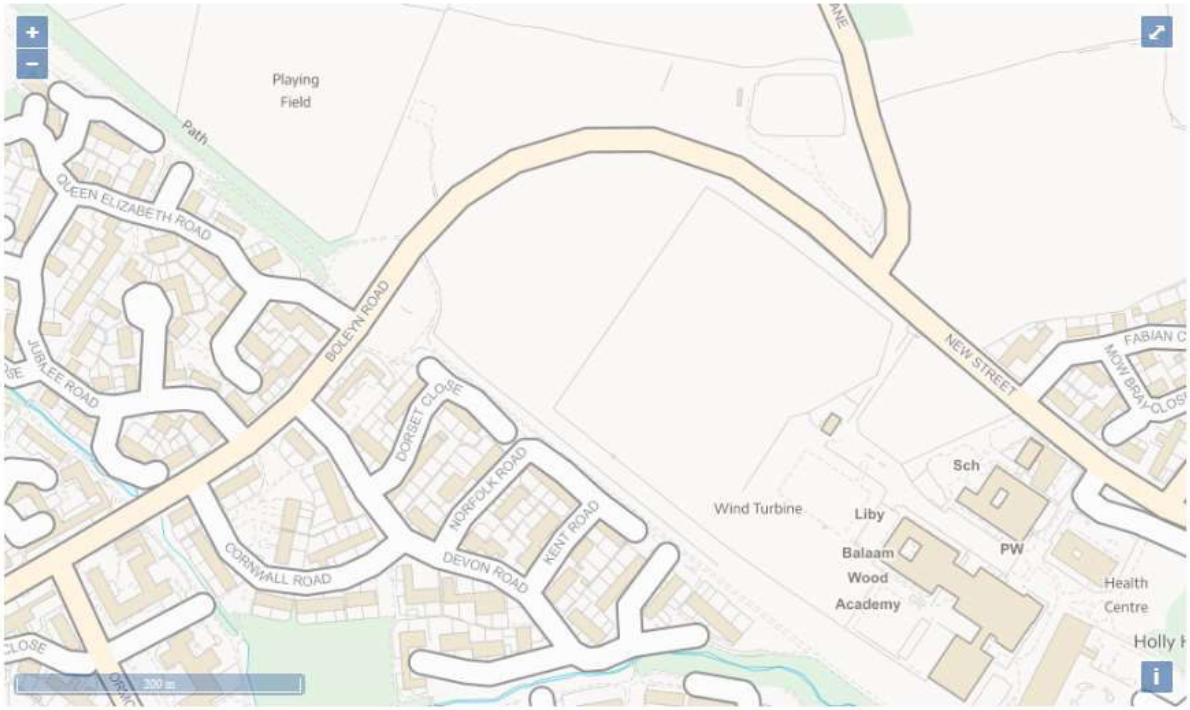
A5 ENVIRONMENT AGENCY FLOOD MAPS

Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from rivers or the sea

High Medium Low Very low

Flood risk

Extent of flooding

Location

Enter a place or postcode

Extent of flooding from surface water

High Medium Low Very low

A6 FLOOD ZONE MAPS – GROUNDSURE REPORT

Groundsure LOCATION INTELLIGENCE

Enviro Insight

STREET RECORD, BOLEYN ROAD, BIRMINGHAM, B32 4BD

Order Details

Date: 25/01/2021

Your ref: 20131

Our Ref: GS-7511991

Client: Mucklow and Harris

Site Details

Location: 398607 278665

Area: 2.34 ha

Authority: Bromsgrove District Council, Birmingham City Council

Contact us with any questions at:
info@groundsure.com
08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
12	1.1	Historical industrial land uses	4	3	4	27	-
14	1.2	Historical tanks	0	1	0	3	-
15	1.3	Historical energy features	0	0	1	4	-
15	1.4	Historical petrol stations	0	0	0	0	-
15	1.5	Historical garages	0	0	0	0	-
16	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
17	2.1	Historical industrial land uses	4	5	7	37	-
19	2.2	Historical tanks	0	1	0	3	-
20	2.3	Historical energy features	0	0	2	9	-
21	2.4	Historical petrol stations	0	0	0	0	-
21	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
22	3.1	Active or recent landfill	0	0	0	0	-
22	3.2	Historical landfill (BGS records)	0	0	0	0	-
23	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
23	3.4	Historical landfill (EA/NRW records)	0	0	0	1	-
23	3.5	Historical waste sites	0	0	0	0	-
23	3.6	Licensed waste sites	0	0	0	0	-
24	3.7	Waste exemptions	0	0	0	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
25	4.1	Recent industrial land uses	0	0	2	-	-
26	4.2	Current or recent petrol stations	0	0	0	0	-
26	4.3	Electricity cables	0	0	0	0	-
26	4.4	Gas pipelines	0	0	0	0	-
26	4.5	Sites determined as Contaminated Land	0	0	0	0	-

26	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
27	4.7	Regulated explosive sites	0	0	0	0	-
27	4.8	Hazardous substance storage/usage	0	0	0	0	-
27	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
27	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
27	4.11	Licensed pollutant release (Part A(2)/B)	0	0	0	0	-
28	4.12	Radioactive Substance Authorisations	0	0	0	0	-
28	**4.13**	**Licensed Discharges to controlled waters**	0	0	0	2	-
28	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
28	4.15	Pollutant release to public sewer	0	0	0	0	-
29	4.16	List 1 Dangerous Substances	0	0	0	0	-
29	4.17	List 2 Dangerous Substances	0	0	0	0	-
29	**4.18**	**Pollution Incidents (EA/NRW)**	0	0	2	2	-
30	4.19	Pollution inventory substances	0	0	0	0	-
30	4.20	Pollution inventory waste transfers	0	0	0	0	-
30	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Geology (basic)	
31	**5.1**	**Superficial geology (625k)**	Identified (within 500m)
31	**5.2**	**Bedrock geology (625k)**	Identified (within 500m)

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
32	**6.1**	**Superficial aquifer**	Identified (within 500m)				
34	**6.2**	**Bedrock aquifer**	Identified (within 500m)				
36	**6.3**	**Groundwater vulnerability**	Identified (within 50m)				
37	6.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
37	6.5	Groundwater vulnerability- local information	None (within 0m)				
38	**6.6**	**Groundwater abstractions**	0	0	0	0	2
39	6.7	Surface water abstractions	0	0	0	0	0
39	6.8	Potable abstractions	0	0	0	0	0
40	6.9	Source Protection Zones	0	0	0	0	-

40	6.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
41	**7.1**	**Water Network (OS MasterMap)**	0	0	7	-	-
42	**7.2**	**Surface water features**	0	0	3	-	-
42	**7.3**	**WFD Surface water body catchments**	1	-	-	-	-
43	**7.4**	**WFD Surface water bodies**	0	0	0	-	-
43	**7.5**	**WFD Groundwater bodies**	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
44	8.1	Risk of Flooding from Rivers and Sea (RoFRaS)	None (within 50m)				
44	8.2	Historical Flood Events	0	0	0	-	-
44	8.3	Flood Defences	0	0	0	-	-
44	8.4	Areas Benefiting from Flood Defences	0	0	0	-	-
45	8.5	Flood Storage Areas	0	0	0	-	-
46	8.6	Flood Zone 2	None (within 50m)				
46	8.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
47	**9.1**	**Surface water flooding**	1 in 100 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding					
49	**10.1**	**Groundwater flooding**	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
50	**11.1**	**Sites of Special Scientific Interest (SSSI)**	0	0	0	0	1
51	11.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
51	11.3	Special Areas of Conservation (SAC)	0	0	0	0	0
51	11.4	Special Protection Areas (SPA)	0	0	0	0	0
51	11.5	National Nature Reserves (NNR)	0	0	0	0	0
52	**11.6**	**Local Nature Reserves (LNR)**	0	0	0	0	4
52	**11.7**	**Designated Ancient Woodland**	0	0	0	0	15
53	11.8	Biosphere Reserves	0	0	0	0	0
53	11.9	Forest Parks	0	0	0	0	0

53	11.10	Marine Conservation Zones	0	0	0	0	0
54	**11.11**	**Green Belt**	1	0	0	0	1
54	11.12	Proposed Ramsar sites	0	0	0	0	0
54	11.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
54	11.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
55	**11.15**	**Nitrate Sensitive Areas**	0	0	0	0	1
55	**11.16**	**Nitrate Vulnerable Zones**	1	0	0	1	2
56	**11.17**	**SSSI Impact Risk Zones**	2	-	-	-	-
57	**11.18**	**SSSI Units**	0	0	0	0	1
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
58	12.1	World Heritage Sites	0	0	0	-	-
59	12.2	Area of Outstanding Natural Beauty	0	0	0	-	-
59	12.3	National Parks	0	0	0	-	-
59	12.4	Listed Buildings	0	0	0	-	-
59	12.5	Conservation Areas	0	0	0	-	-
60	**12.6**	**Scheduled Ancient Monuments**	0	0	1	-	-
60	12.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
61	**13.1**	**Agricultural Land Classification**	Grade 3 (within 250m)				
62	13.2	Open Access Land	0	0	0	-	-
62	13.3	Tree Felling Licences	0	0	0	-	-
62	13.4	Environmental Stewardship Schemes	0	0	0	-	-
62	13.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
63	**14.1**	**Priority Habitat Inventory**	0	4	4	-	-
64	14.2	Habitat Networks	0	0	0	-	-
64	14.3	Open Mosaic Habitat	0	0	0	-	-
64	14.4	Limestone Pavement Orders	0	0	0	-	-

Recent aerial photograph

Capture Date: 19/09/2019

Site Area: 2.34ha

Recent site history - 2016 aerial photograph

Capture Date: 06/05/2016

Site Area: 2.34ha

Recent site history - 2010 aerial photograph

Capture Date: 02/09/2010

Site Area: 2.34ha

Recent site history - 2005 aerial photograph

Capture Date: 02/09/2005

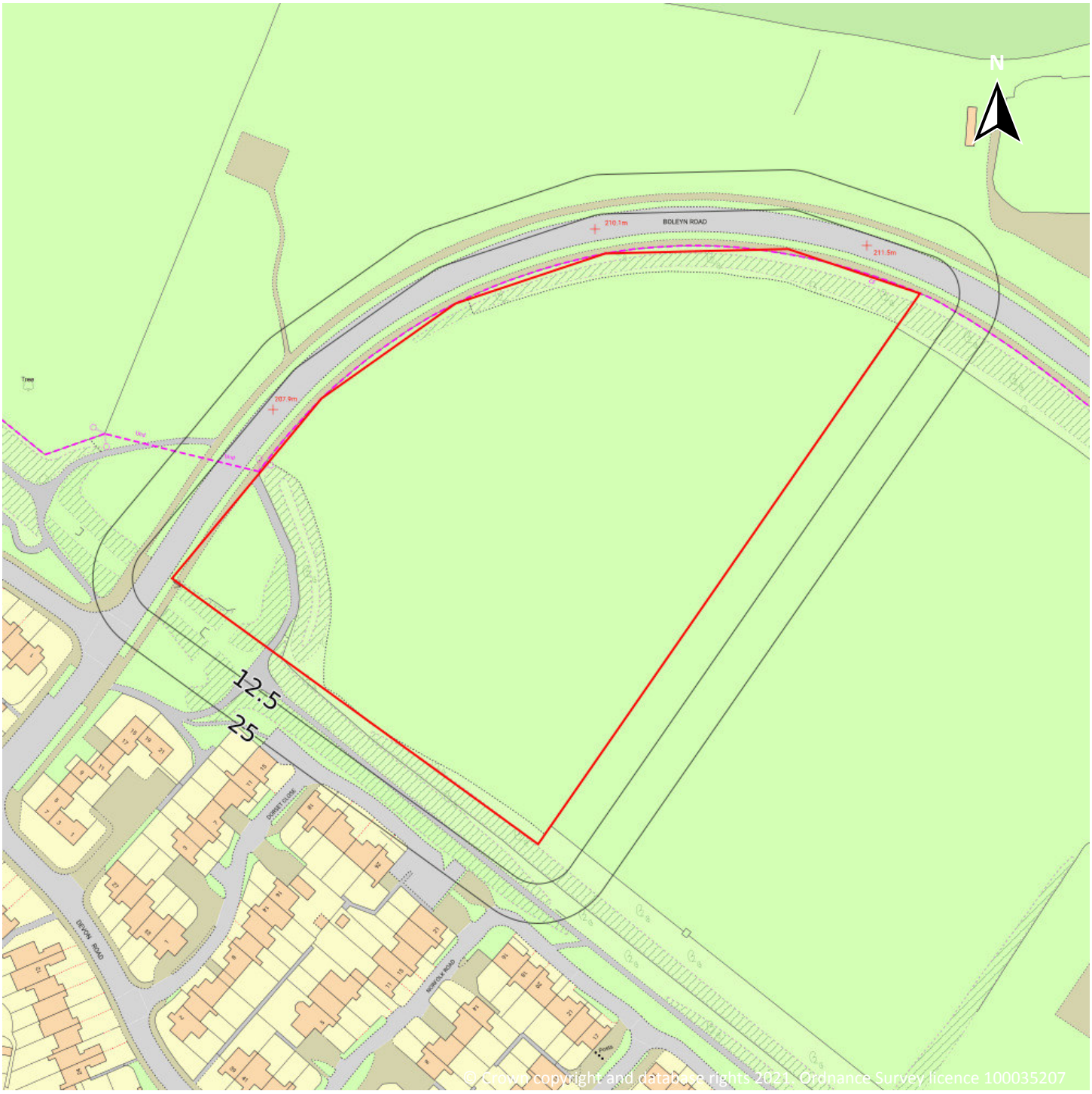
Site Area: 2.34ha

Recent site history - 1999 aerial photograph

Capture Date: 27/07/1999

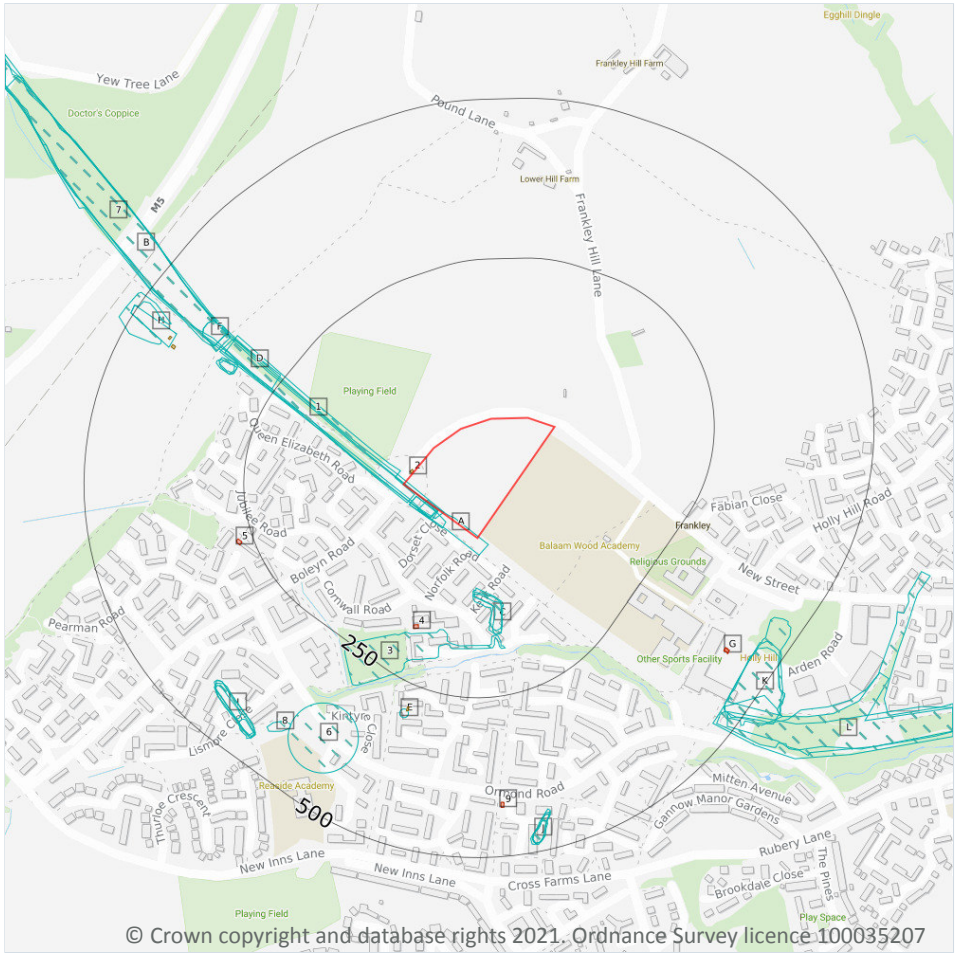
Site Area: 2.34ha

OS MasterMap site plan



Site Area: 2.34ha

1 Past land use



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

1.1 Historical industrial land uses

Records within 500m	38

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Cuttings**	**1982**	**1050476**

ID	Location	Land use	Dates present	Group ID
B	**On site**	**Cuttings**	**1954**	**1103067**
B	**On site**	**Cuttings**	**1921**	**1110616**
B	**On site**	**Cuttings**	**1938**	**1145750**
1	1m SW	Cuttings	1883 - 1982	1109389
A	3m SW	Cuttings	1904	1085236
A	3m SW	Cuttings	1883	1150716
C	78m S	Unspecified Heap	1938 - 1954	1079911
C	84m S	Unspecified Heap	1921	1151831
C	88m S	Unspecified Heap	1883 - 1904	1125336
3	153m S	Unspecified Ground Workings	1883	999907
D	254m NW	Cuttings	1971	1138903
E	290m SW	Unspecified Tank	1954	1017899
D	317m NW	Old Gravel Pit	1954	1115042
D	318m NW	Old Gravel Pit	1921 - 1938	1044230
D	320m NW	Old Gravel Pit	1904	1133669
6	340m SW	Sewage Pumping Station	1954	1025016
7	356m NW	Cuttings	1883 - 1904	1097560
F	364m NW	Unspecified Pit	1971	1080169
F	364m NW	Unspecified Pit	1982	1115979
8	407m SW	Cuttings	1883 - 1904	1060841
I	419m SW	Unspecified Heaps	1954	1040511
I	419m SW	Unspecified Heaps	1938	1057420
I	420m SW	Unspecified Heaps	1921	1156580
H	425m NW	Railway Sidings	1954	994178
I	426m SW	Unspecified Heap	1883 - 1904	1106301
J	438m S	Unspecified Pit	1904	1082949
H	439m NW	Gravel Pit	1954	1004477
J	443m S	Unspecified Pit	1938	1099647

ID	Location	Land use	Dates present	Group ID
I	443m SW	Unspecified Heap	1883 - 1904	1141283
J	445m S	Unspecified Pit	1921	1074760
K	450m SE	Unspecified Old Quarry	1954	1106873
J	454m S	Unspecified Pit	1954	1145332
K	456m SE	Unspecified Old Quarry	1921 - 1938	1145607
K	458m SE	Unspecified Quarry	1883 - 1904	1065211
L	467m SE	Railway Sidings	1904	1087130
L	469m SE	Railway Sidings	1921 - 1938	1067794
L	477m SE	Railway Sidings	1954	1057587

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**4**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
2	1m NW	Unspecified Tank	1937	154587
E	286m S	Tanks	1937	157853
H	417m NW	Tanks	1937	157850
H	430m NW	Tanks	1937	157848

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	5

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
4	164m SW	Electricity Substation	1983 - 1992	89177
5	269m W	Electricity Substation	1983 - 1992	90598
9	415m S	Electricity Substation	1983 - 1992	90617
G	417m SE	Electricity Substation	1992	89299
G	417m SE	Electricity Substation	1981 - 1989	94554

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

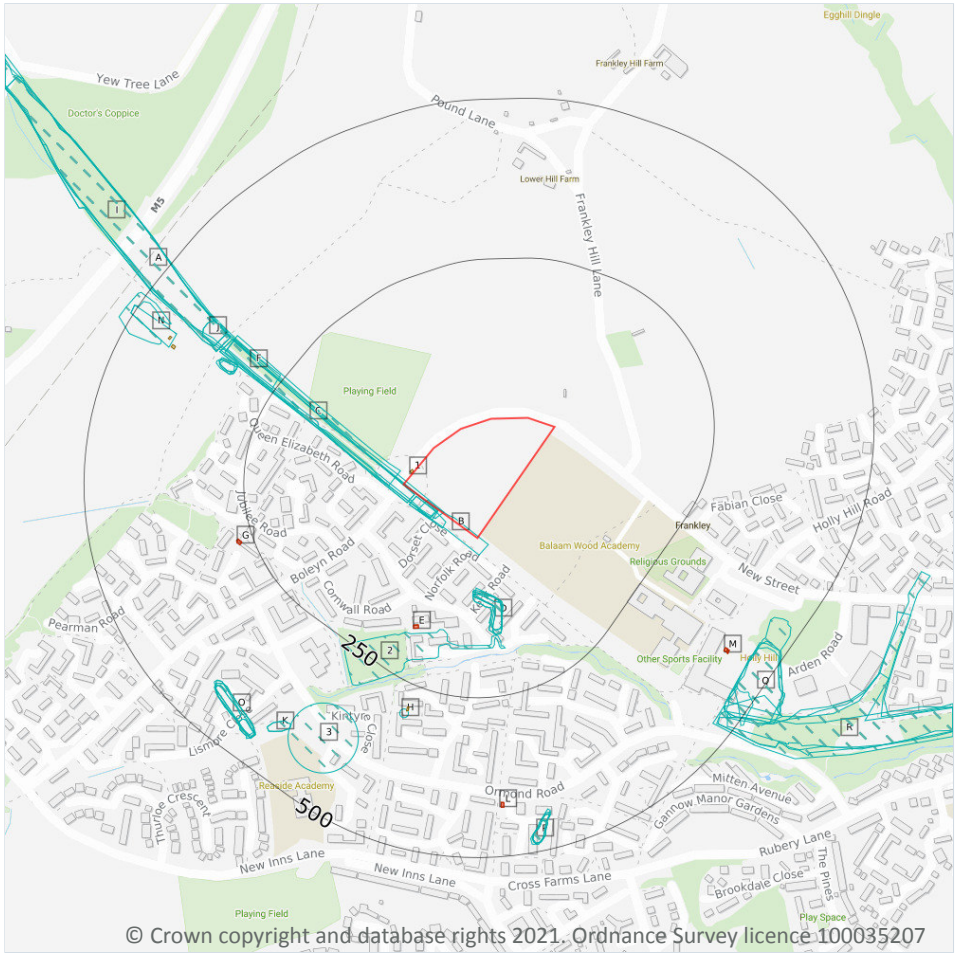
1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

2.1 Historical industrial land uses

Records within 500m	53

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 17**

ID	Location	Land Use	Date	Group ID
A	On site	Cuttings	1938	1145750
A	On site	Cuttings	1954	1103067
A	On site	Cuttings	1921	1110616

ID	Location	Land Use	Date	Group ID
B	**On site**	**Cuttings**	**1982**	**1050476**
C	1m SW	Cuttings	1904	1109389
C	1m SW	Cuttings	1883	1109389
B	3m SW	Cuttings	1904	1085236
B	3m SW	Cuttings	1883	1150716
C	17m NW	Cuttings	1982	1109389
D	78m S	Unspecified Heap	1938	1079911
D	82m S	Unspecified Heap	1954	1079911
D	84m S	Unspecified Heap	1921	1151831
D	84m S	Unspecified Heap	1921	1151831
D	88m S	Unspecified Heap	1883	1125336
D	88m S	Unspecified Heap	1904	1125336
2	153m S	Unspecified Ground Workings	1883	999907
F	254m NW	Cuttings	1971	1138903
H	290m SW	Unspecified Tank	1954	1017899
F	317m NW	Old Gravel Pit	1954	1115042
F	318m NW	Old Gravel Pit	1921	1044230
F	318m NW	Old Gravel Pit	1938	1044230
F	320m NW	Old Gravel Pit	1904	1133669
3	340m SW	Sewage Pumping Station	1954	1025016
I	356m NW	Cuttings	1904	1097560
I	356m NW	Cuttings	1883	1097560
J	364m NW	Unspecified Pit	1982	1115979
J	364m NW	Unspecified Pit	1971	1080169
K	407m SW	Cuttings	1904	1060841
K	407m SW	Cuttings	1883	1060841
O	419m SW	Unspecified Heaps	1938	1057420
O	419m SW	Unspecified Heaps	1954	1040511

ID	Location	Land Use	Date	Group ID
O	420m SW	Unspecified Heaps	1921	1156580
O	420m SW	Unspecified Heaps	1921	1156580
N	425m NW	Railway Sidings	1954	994178
O	426m SW	Unspecified Heap	1883	1106301
O	426m SW	Unspecified Heap	1904	1106301
P	438m S	Unspecified Pit	1904	1082949
N	439m NW	Gravel Pit	1954	1004477
P	443m S	Unspecified Pit	1938	1099647
O	443m SW	Unspecified Heap	1883	1141283
O	443m SW	Unspecified Heap	1904	1141283
P	445m S	Unspecified Pit	1921	1074760
P	445m S	Unspecified Pit	1921	1074760
Q	450m SE	Unspecified Old Quarry	1954	1106873
P	454m S	Unspecified Pit	1954	1145332
Q	456m SE	Unspecified Old Quarry	1938	1145607
Q	458m SE	Unspecified Quarry	1904	1065211
Q	459m SE	Unspecified Old Quarry	1921	1145607
Q	465m SE	Unspecified Quarry	1883	1065211
R	467m SE	Railway Sidings	1904	1087130
R	469m SE	Railway Sidings	1938	1067794
R	471m SE	Railway Sidings	1921	1067794
R	477m SE	Railway Sidings	1954	1057587

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	**4**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 17**

ID	Location	Land Use	Date	Group ID
1	1m NW	Unspecified Tank	1937	154587
H	286m S	Tanks	1937	157853
N	417m NW	Tanks	1937	157850
N	430m NW	Tanks	1937	157848

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	**11**

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 17**

ID	Location	Land Use	Date	Group ID
E	164m SW	Electricity Substation	1992	89177
E	165m SW	Electricity Substation	1983	89177
G	269m W	Electricity Substation	1983	90598
G	269m W	Electricity Substation	1992	90598
L	415m S	Electricity Substation	1983	90617
L	416m S	Electricity Substation	1992	90617
M	417m SE	Electricity Substation	1983	94554
M	417m SE	Electricity Substation	1992	89299
M	420m SE	Electricity Substation	1981	94554
M	420m SE	Electricity Substation	1989	94554
M	421m SE	Electricity Substation	1992	89299

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

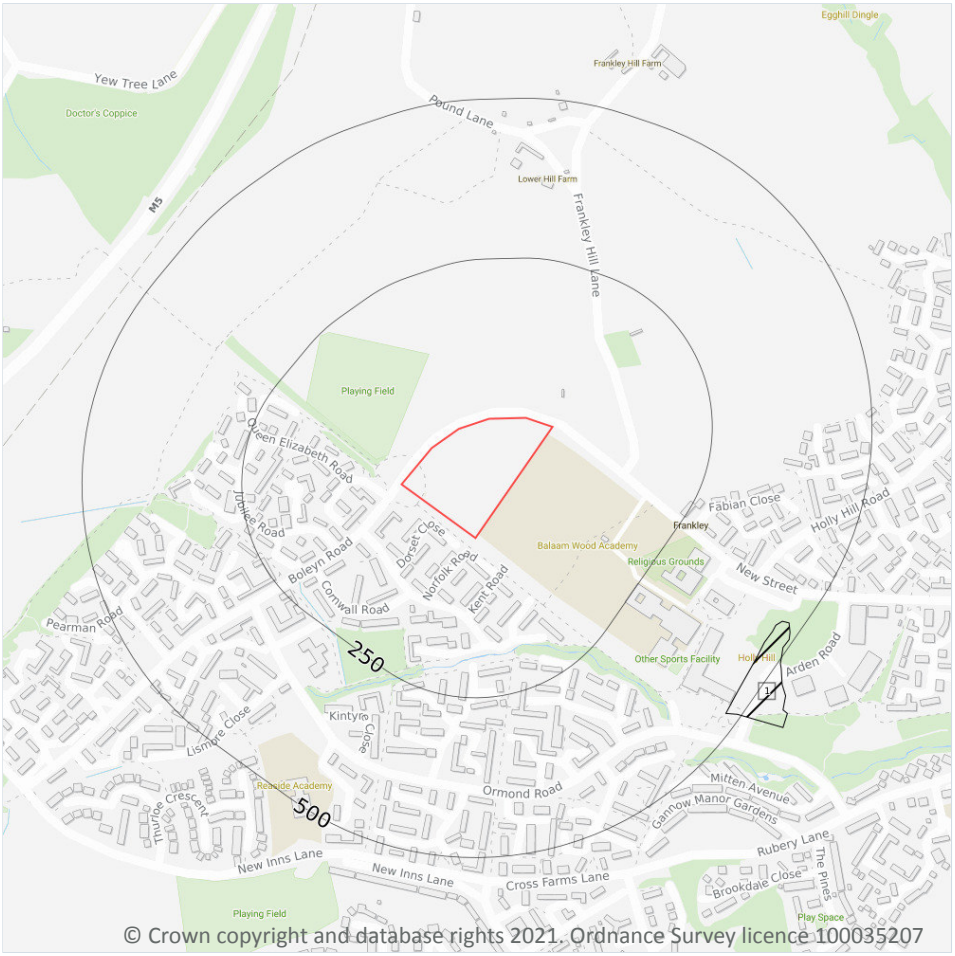
2.5 Historical garages

Records within 500m	0

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



Site Outline

Search buffers in metres (m)

Historical landfill (EA/NRW)

3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	1

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 22**

ID	Location	Details		
1	464m SE	Site Address: Holly Hill Landfill Site, Holly Hill, Frankley, Birmingham, West Midlands Licence Holder Address: -	Waste Licence: - Site Reference: 644/1908, LF/75, 4600/9000 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: - Licence Surrender: -	Operator: - Licence Holder: - First Recorded 01/01/1937 Last Recorded: 31/12/1967

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

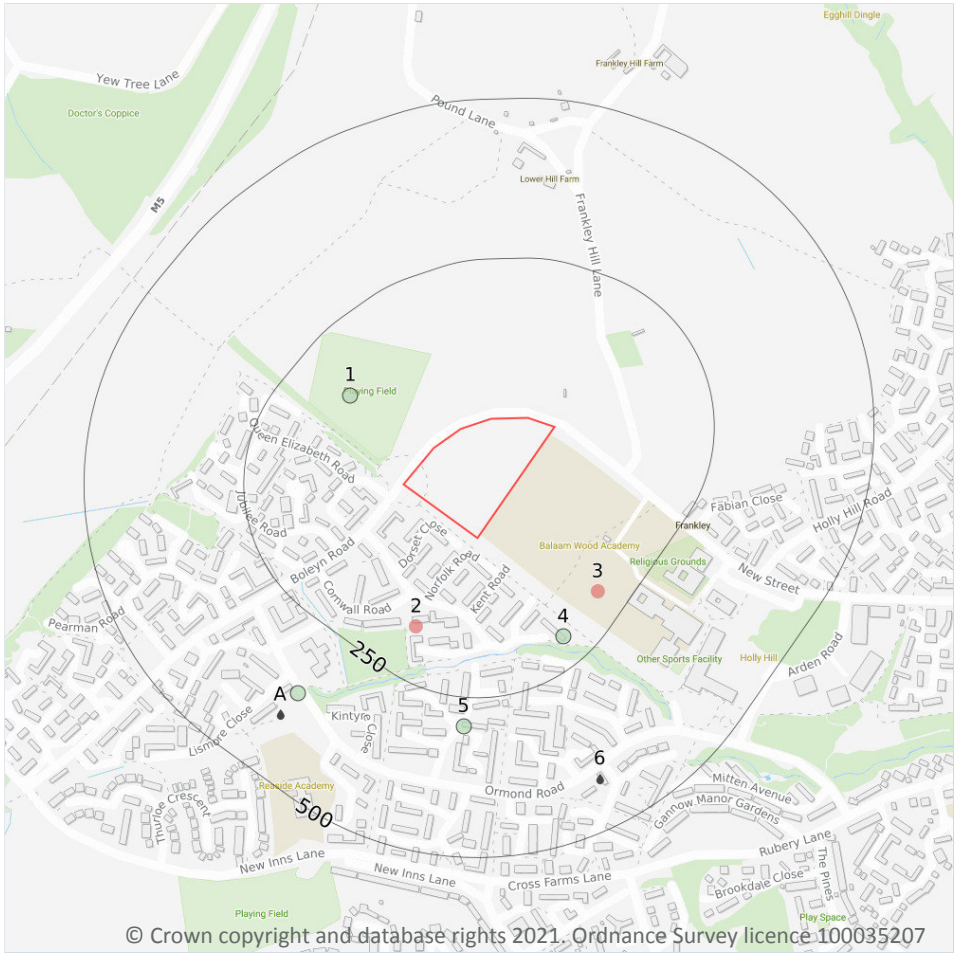
3.7 Waste exemptions

Records within 500m	0

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



Site Outline

Search buffers in metres (m)

Recent industrial land uses

Licensed Discharges to controlled waters

Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m	**2**

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Company	Address	Activity	Category
2	168m SW	Electricity Sub Station	West Midlands, B45	Electrical Features	Infrastructure and Facilities
3	202m SE	Wind Turbine	West Midlands, B45	Energy Production	Industrial Features

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	0

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	2

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Address	Details	
A	405m SW	FRANKLEY HOUSING DEVELOPMENT, OUTLET J	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: T/09/03762/O Permit Version: 1 Receiving Water: RIVER REA (RIVER TAME)	Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 27/06/1974 Effective Date: 27/06/1974 Revocation Date: 27/03/2000
6	422m SE	FRANKLEY HOUSING DEVELOPMENT, OUTLET J	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: T/09/03762/O Permit Version: 1 Receiving Water: RIVER REA (RIVER TAME)	Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 27/06/1974 Effective Date: 27/06/1974 Revocation Date: 27/03/2000

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	0

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	4

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Details	
1	153m NW	Incident Date: 05/10/2001 Incident Identification: 34943 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4	204m SE	Incident Date: 28/02/2002 Incident Identification: 61082 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
5	295m S	Incident Date: 25/04/2002 Incident Identification: 74834 Pollutant: Specific Waste Materials Pollutant Description: Clinical Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
A	361m SW	Incident Date: 14/01/2002 Incident Identification: 52322 Pollutant: Oils and Fuel Pollutant Description: Gas and Fuel Oils	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m	0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.21 Pollution inventory radioactive waste

Records within 500m	0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Geology (basic)

5.1 Superficial geology (625k)

Records within 500m	1

Generalised geology data based on BGS's published poster maps of the UK (North and South). Superficial related themes digitised from 1977 first edition Quaternary map (North and South).

Location	Lex code	Description	Rock type
5m S	TILL-DMTN	TILL	DIAMICTON

This data is sourced from the British Geological Survey.

5.2 Bedrock geology (625k)

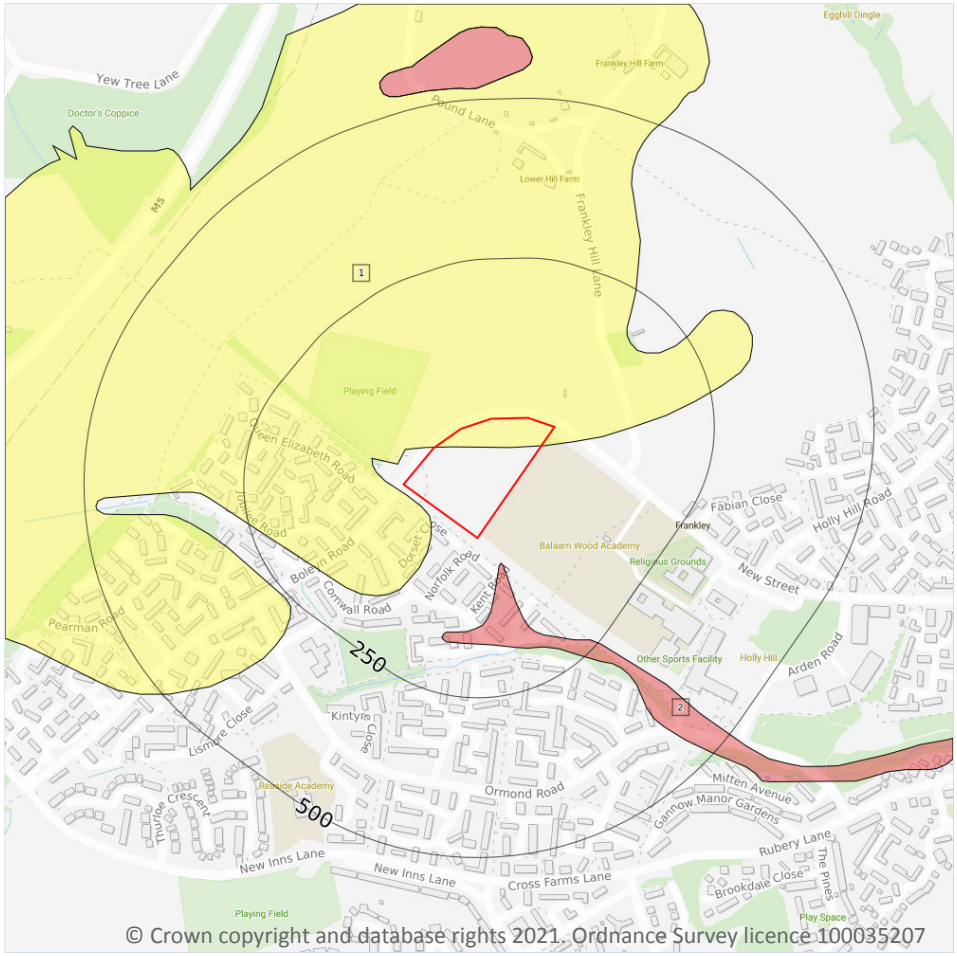
Records within 500m	3

Generalised geology data based on BGS's published poster maps of the UK (North and South). Bedrock related themes created through generalisation of 1:50,000 data.

Location	Lex code	Description	Rock type
On site	**WAWK-SISDM**	**WARWICKSHIRE GROUP**	**SILTSTONE AND SANDSTONE WITH SUBORDINATE MUDSTONE**
421m SE	WAWK-MSCI	WARWICKSHIRE GROUP	MUDSTONE, SILTSTONE, SANDSTONE, COAL, IRONSTONE AND FERRICRETE
421m SE	ARNG-MDSS	ARENIG ROCKS (UNDIFFERENTIATED)	MUDSTONE, SILTSTONE AND SANDSTONE

This data is sourced from the British Geological Survey.

6 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

6.1 Superficial aquifer

Records within 500m	2

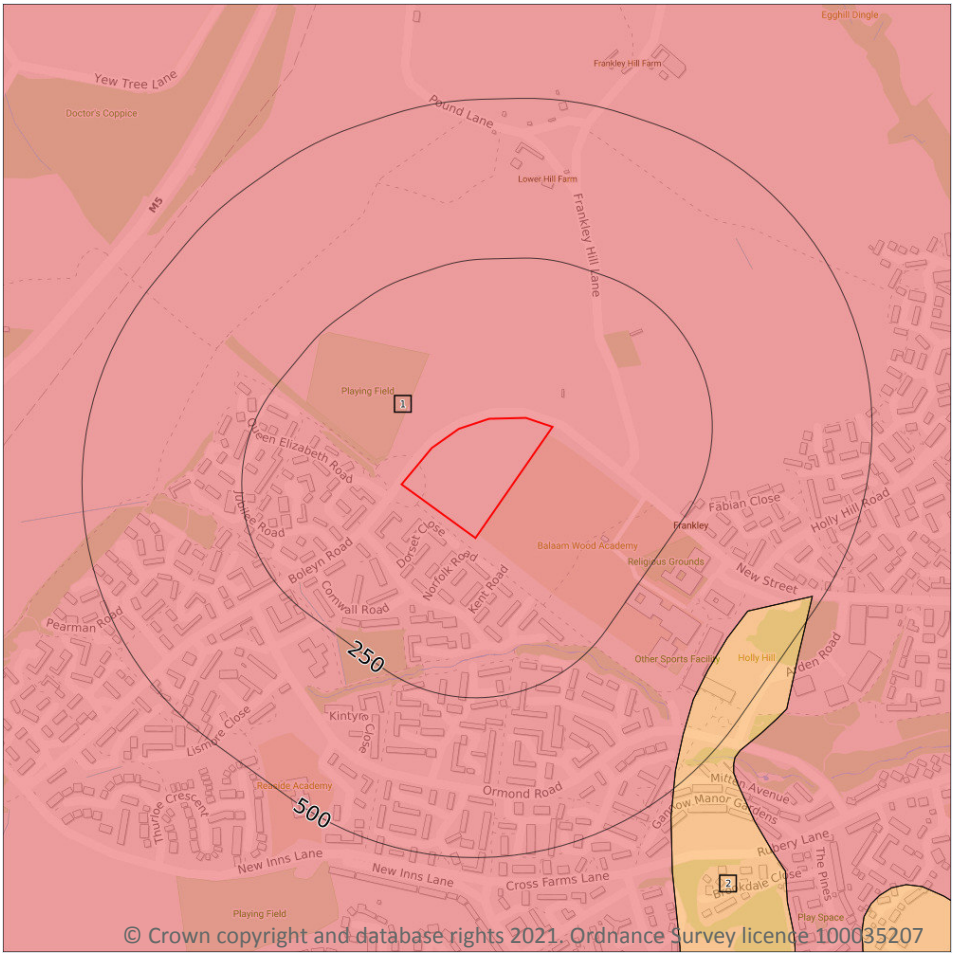
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 32**

ID	Location	Designation	Description
1	**On site**	**Secondary Undifferentiated**	**Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type**
2	54m SE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

6.2 Bedrock aquifer

Records within 500m	2

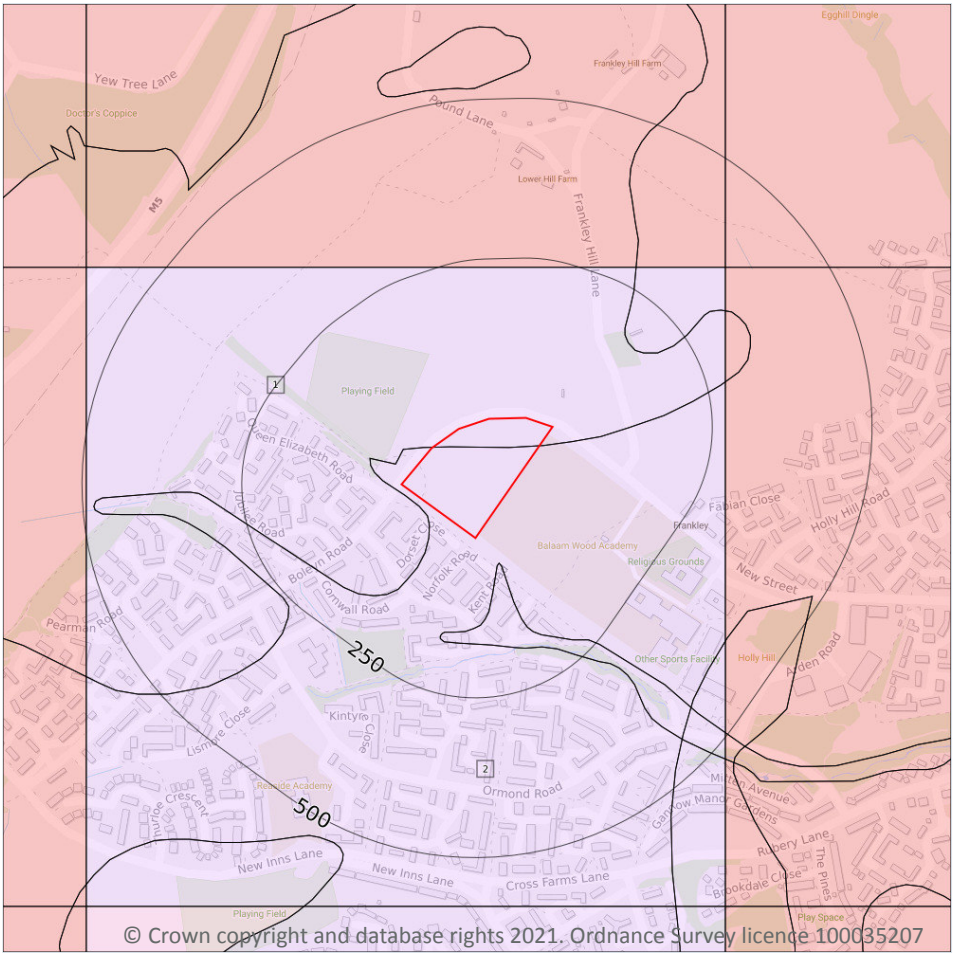
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 34**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	413m SE	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

6.3 Groundwater vulnerability

Records within 50m	2

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 36**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: Low Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: Medium	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary bedrock aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Low Infiltration value: <40% Dilution value: 300-550mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: Medium	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

6.4 Groundwater vulnerability- soluble rock risk

Records on site	0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

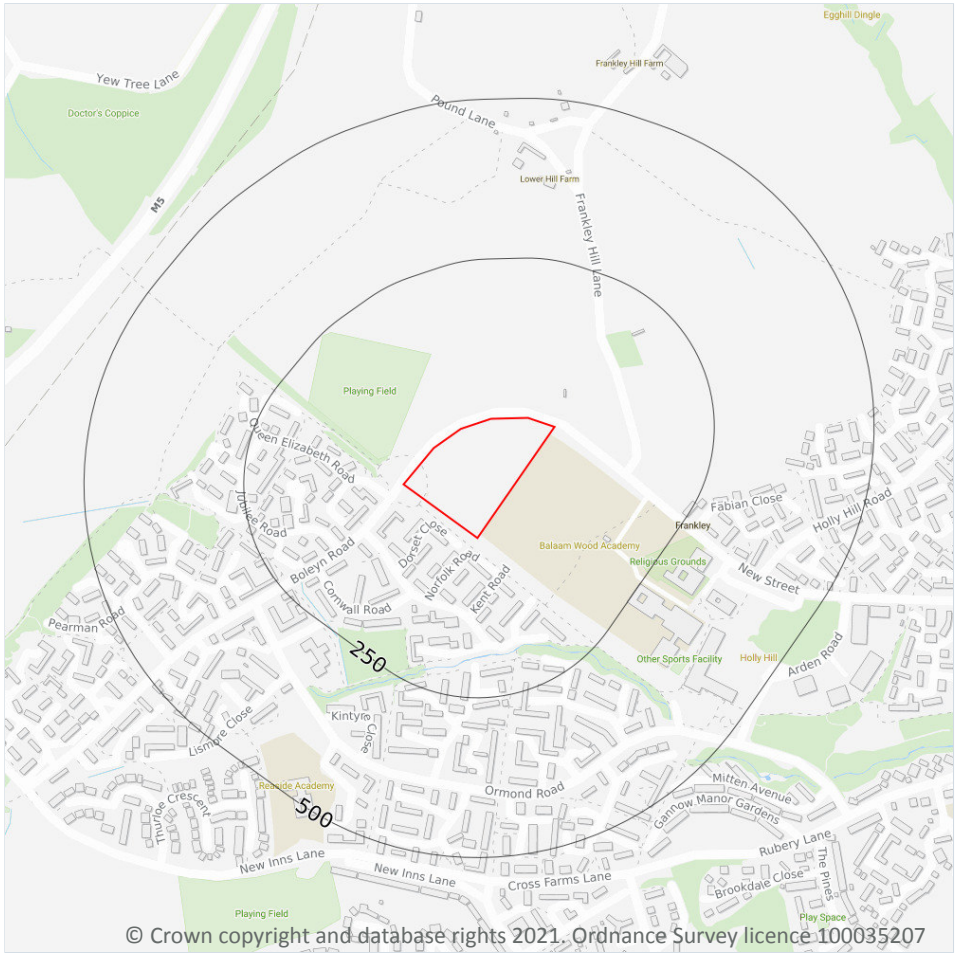
6.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones



- Site Outline

Search buffers in metres (m)

- Source Protection Zone 1 — Inner catchment
- Source Protection Zone 2 — Outer catchment
- Source Protection Zone 3 — Total catchment
- Source Protection Zone 4 — Zone of Special Interest
- Source Protection Zone 1c — Inner catchment - confined aquifer
- Source Protection Zone 2c — Outer catchment - confined aquifer
- Source Protection Zone 3c — Total catchment - confined aquifer
- Drinking water abstraction licences
- Drinking water abstraction licences — Polygon features
- Drinking water abstraction licences — Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

6.6 Groundwater abstractions

Records within 2000m	2

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 38**

ID	Location	Details	
-	1809m W	Status: Historical Licence No: 18/54/06/0040 Details: General Farming & Domestic Direct Source: Groundwater Midlands Region Point: MANOR FARM,ROMSLEY - RESERVOIR Data Type: Point Name: LOWE Easting: 396700 Northing: 278900	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 16/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 07/08/1995 Version End Date: -
-	1938m N	Status: Historical Licence No: 18/54/06/0157 Details: General Farming & Domestic Direct Source: Groundwater Midlands Region Point: PARK FARM - UNDERGROUND SPRING Data Type: Point Name: CLARKE Easting: 398800 Northing: 280700	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 21/10/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/01/1971 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

6.7 Surface water abstractions

Records within 2000m	**0**

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

6.8 Potable abstractions

Records within 2000m	**0**

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

6.9 Source Protection Zones

Records within 500m	0

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

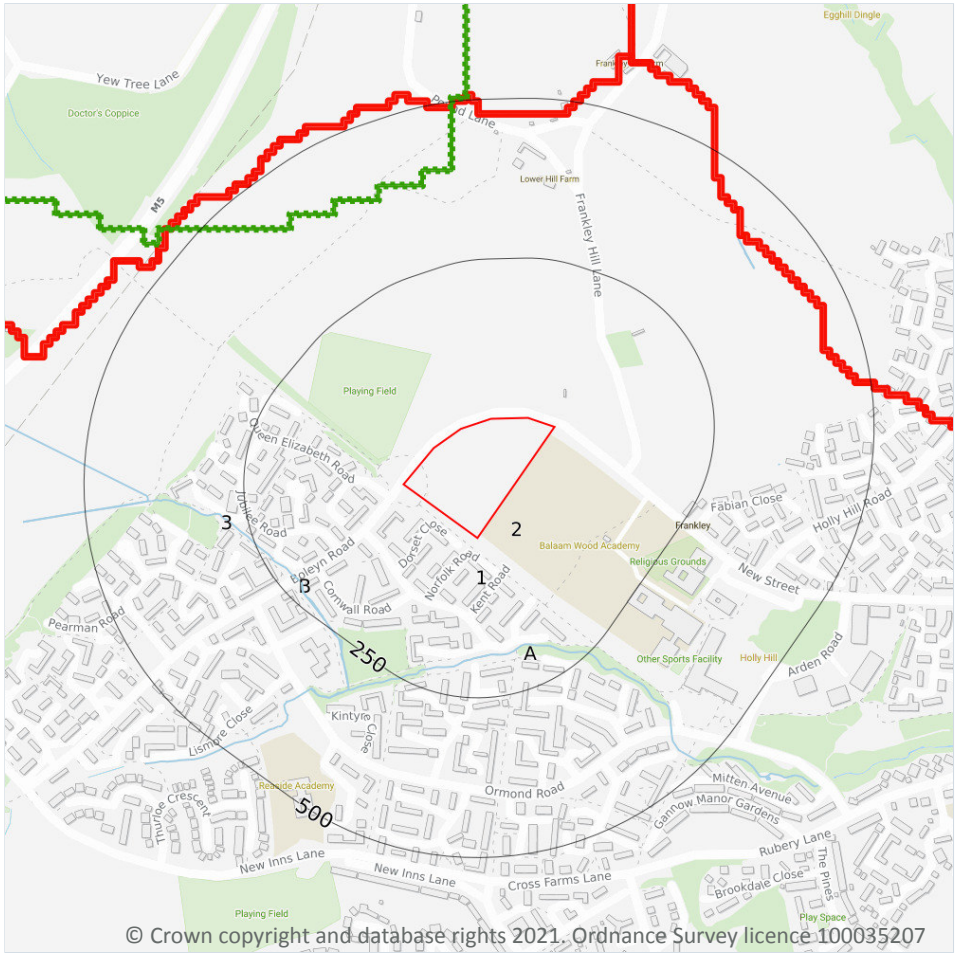
6.10 Source Protection Zones (confined aquifer)

Records within 500m	0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

7 Hydrology



Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

7.1 Water Network (OS MasterMap)

Records within 250m	**7**

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 41**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	181m S	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	River Rea

ID	Location	Type of water feature	Ground level	Permanence	Name
B	221m SW	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
B	221m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	224m SW	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
3	236m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
B	244m SW	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
B	246m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

7.2 Surface water features

Records within 250m	**3**

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 41**

This data is sourced from the Ordnance Survey.

7.3 WFD Surface water body catchments

Records on site	**1**

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 41**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**River WB catchment**	**Rea source to Bourn Brook**	**GB104028042510**	**Tame Lower Rivers and Lakes**	**Tame Anker and Mease**

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 WFD Surface water bodies

Records identified	**1**

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on **page 41**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
-	1209m SE	River	Rea source to Bourn Brook	GB104028042510	Moderate	Good	Moderate	2016

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 WFD Groundwater bodies

Records on site	**1**

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

Features are displayed on the Hydrology map on **page 41**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
2	**On site**	**Tame Anker Mease - Coal Measures Black Country**	**GB40402G992400**	**Good**	**Good**	**Good**	**2015**

This data is sourced from the Environment Agency and Natural Resources Wales.

8 River and coastal flooding

8.1 Risk of Flooding from Rivers and Sea (RoFRaS)

Records within 50m	0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

8.2 Historical Flood Events

Records within 250m	0

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.4 Areas Benefiting from Flood Defences

Records within 250m	0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones

8.6 Flood Zone 2

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

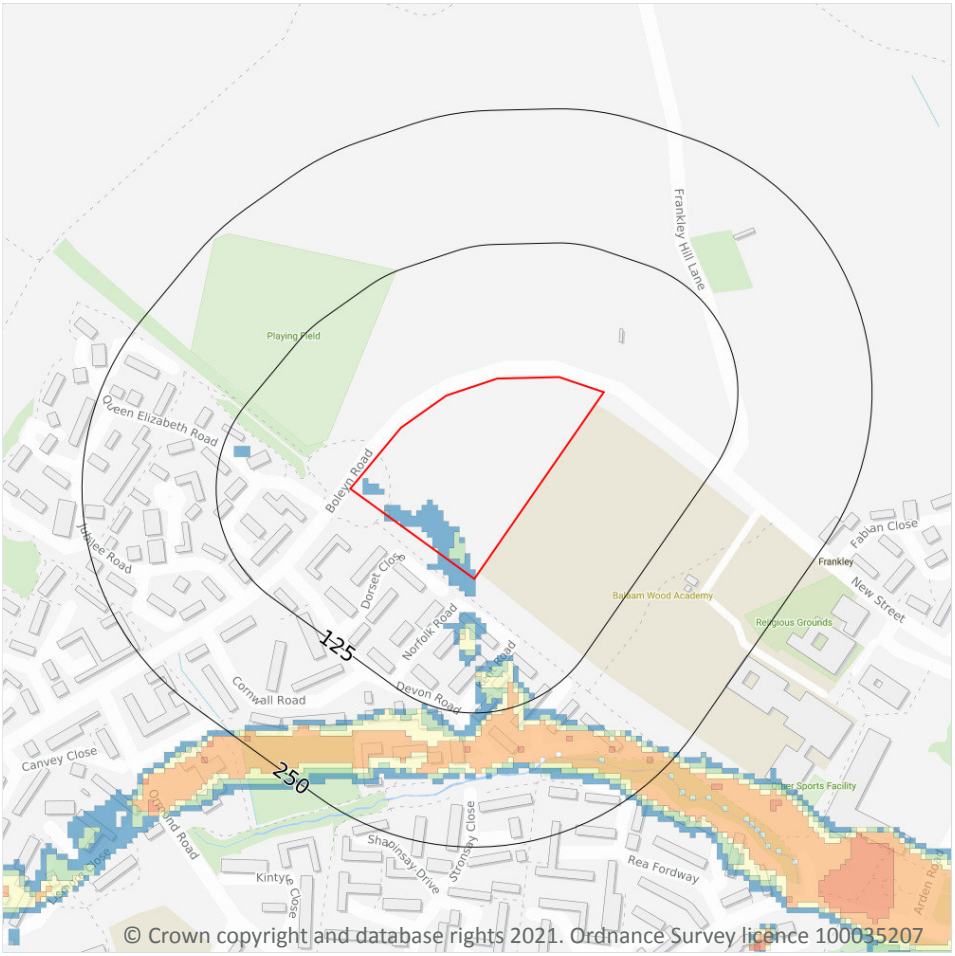
8.7 Flood Zone 3

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

9 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

9.1 Surface water flooding

Highest risk on site	**1 in 250 year, 0.1m - 0.3m**
Highest risk within 50m	**1 in 100 year, 0.1m - 0.3m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 47**

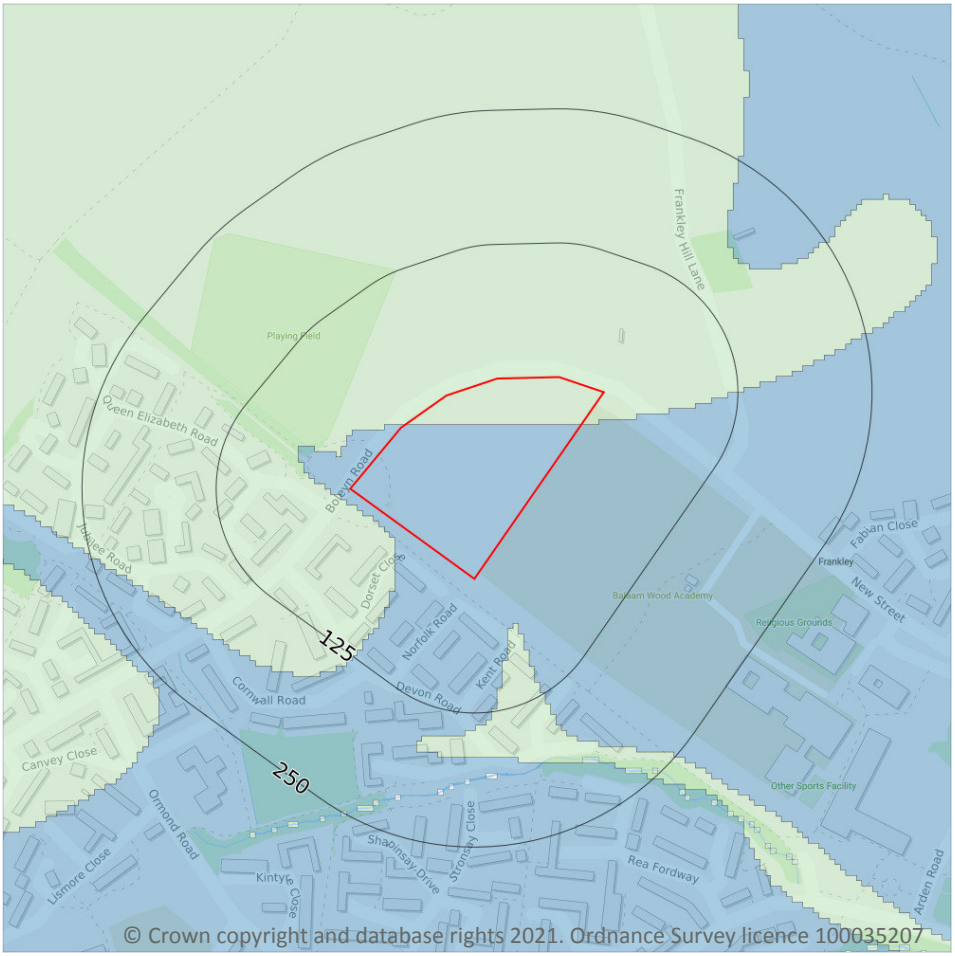
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.3m and 1.0m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Negligible
1 in 30 year	Negligible

This data is sourced from Ambiental Risk Analytics.

10 Groundwater flooding



10.1 Groundwater flooding

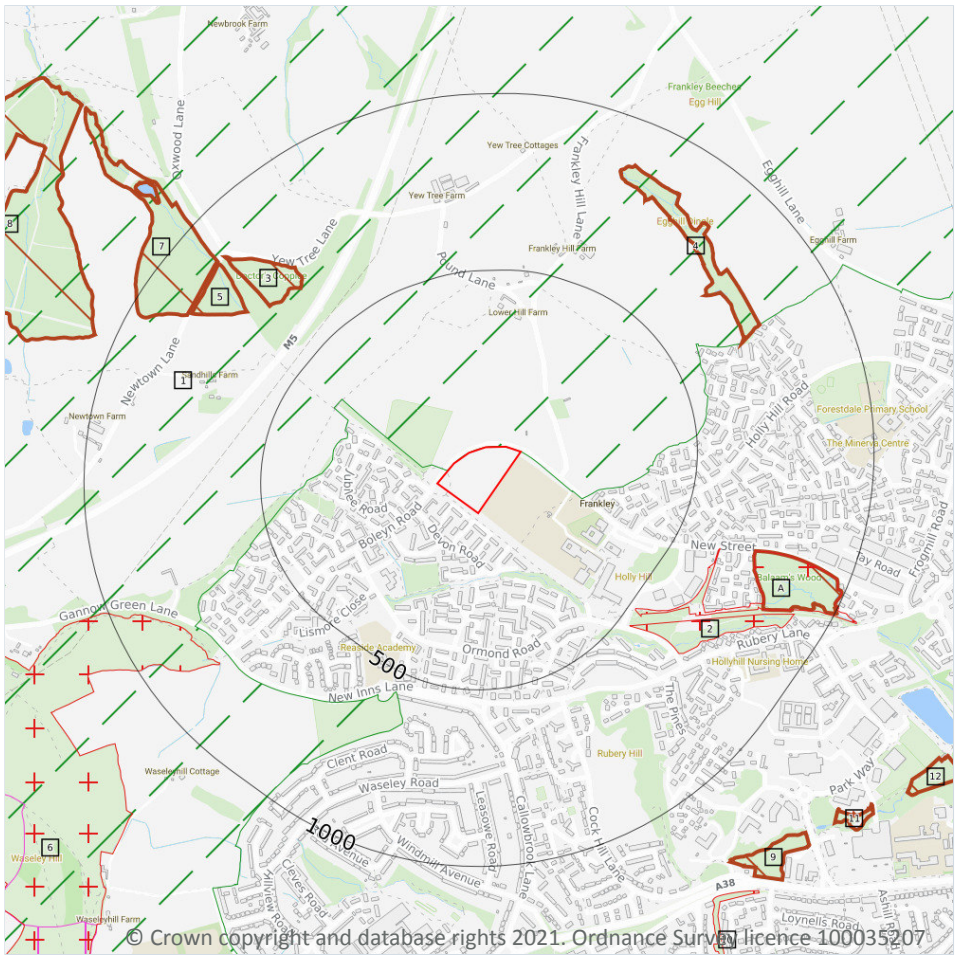
Highest risk on site	**Low**
Highest risk within 50m	**Low**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 49**

This data is sourced from Ambiental Risk Analytics.

11 Environmental designations



11.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	1

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on **page 50**

ID	Location	Name	Data source
-	1802m W	Romsley Manor Farm	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 Special Areas of Conservation (SAC)

Records within 2000m	0

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.4 Special Protection Areas (SPA)

Records within 2000m	0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.5 National Nature Reserves (NNR)

Records within 2000m	0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.6 Local Nature Reserves (LNR)

Records within 2000m	4

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on **page 50**

ID	Location	Name	Data source
A	520m SE	Balaams Wood	Natural England
2	535m SE	Balaams Wood	Natural England
6	798m SW	Waseley Hills Country Park	Natural England
10	1278m SE	Rubery Cutting	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.7 Designated Ancient Woodland

Records within 2000m	15

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

Features are displayed on the Environmental designations map on **page 50**

ID	Location	Name	Woodland Type
3	659m NW	Frankley Wood	Ancient & Semi-Natural Woodland
4	685m NE	Egghill Dingle	Ancient & Semi-Natural Woodland
A	722m SE	Balaam's Wood	Ancient & Semi-Natural Woodland
5	725m NW	Frankley Wood	Ancient Replanted Woodland
7	853m NW	Frankley Wood	Ancient & Semi-Natural Woodland
8	1057m NW	Frankley Wood	Ancient & Semi-Natural Woodland
9	1214m SE	Unknown	Ancient & Semi-Natural Woodland
11	1320m SE	Unknown	Ancient & Semi-Natural Woodland
12	1439m SE	Unknown	Ancient & Semi-Natural Woodland

ID	Location	Name	Woodland Type
-	1630m NW	Frankley Wood	Ancient Replanted Woodland
-	1701m N	Twiland Wood	Ancient & Semi-Natural Woodland
-	1746m NW	Frankley Wood	Ancient & Semi-Natural Woodland
-	1809m N	Raven Hays Wood	Ancient & Semi-Natural Woodland
-	1909m NW	Twiland Wood	Ancient & Semi-Natural Woodland
-	1932m N	Harriss And Kettles Woods	Ancient & Semi-Natural Woodland

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.8 Biosphere Reserves

Records within 2000m	0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.9 Forest Parks

Records within 2000m	0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

11.10 Marine Conservation Zones

Records within 2000m	0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.11 Green Belt

Records within 2000m	2

Areas designated to prevent urban sprawl by keeping land permanently open.

Features are displayed on the Environmental designations map on **page 50**

ID	Location	Name	Local Authority name
1	**On site**	**Birmingham**	**Bromsgrove**
-	1954m NE	Birmingham	Birmingham

This data is sourced from the Ministry of Housing, Communities and Local Government.

11.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

11.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

11.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

11.15 Nitrate Sensitive Areas

Records within 2000m	1

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

Features are displayed on the Environmental designations map on **page 50**

ID	Location	Name	Data source
13	1480m SW	Wildmoor	Natural England

This data is sourced from Natural England.

11.16 Nitrate Vulnerable Zones

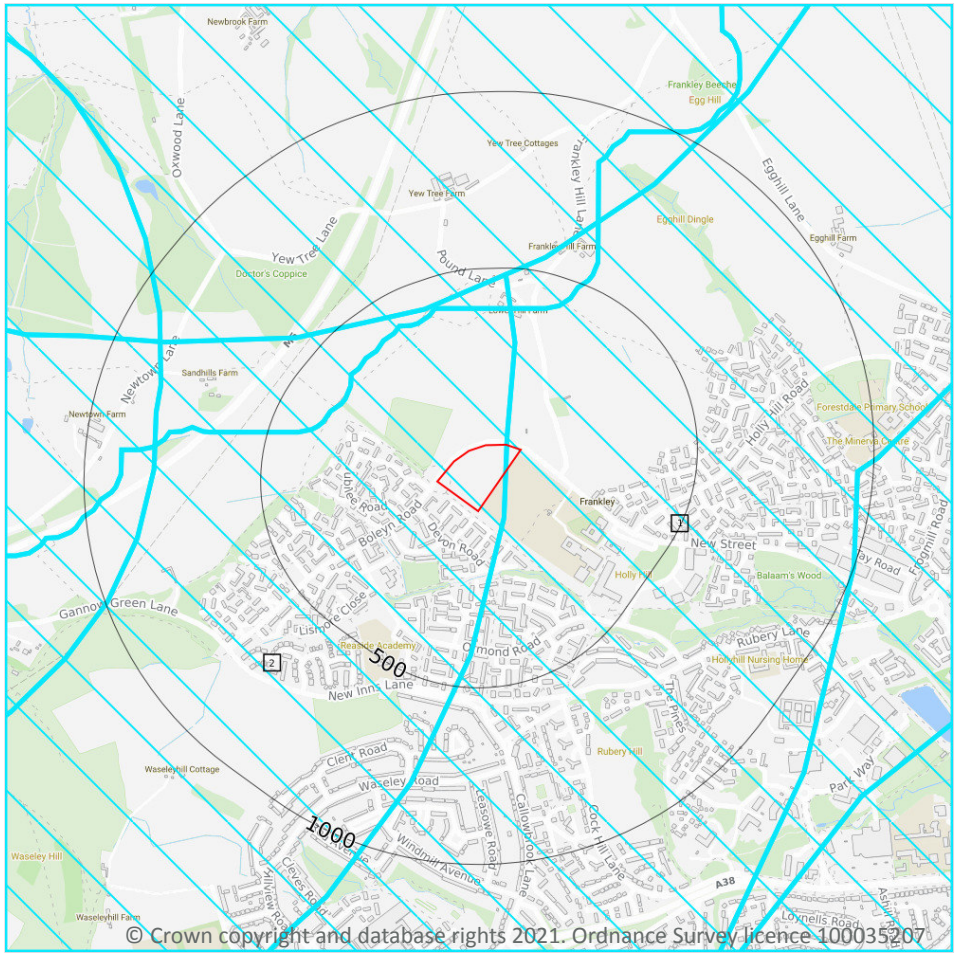
Records within 2000m	4

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status
On site	**River Trent (source to confluence with Derwent)**	**Surface Water**	**S308**	**Changed**
436m NW	R Stour (Worcs) - conf Smestow Bk to conf R Severn NVZ	Surface Water	S594	Existing
1481m SW	R Salwarpe - conf Elmbridge Bk to conf R Severn NVZ	Surface Water	S586	Existing
1774m SW	West Midlands	Groundwater	G29	Existing

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units



Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

11.17 SSSI Impact Risk Zones

Records on site	2

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 56**

ID	Location	Type of developments requiring consultation
1	**On site**	**Infrastructure - Airports, helipads and other aviation proposals. Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction. Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons > 750m² & manure stores > 3500t.**

ID	Location	Type of developments requiring consultation
2	**On site**	**Infrastructure - Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals** **Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.** **Air pollution - Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, livestock & poultry units with floorspace > 500m², slurry lagoons > 200m² & manure stores > 250t).** **Combustion - General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion** **Waste - Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill.** **Composting - Any composting proposal with more than 75000 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management** **Water supply - Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m² or more.**

This data is sourced from Natural England.

11.18 SSSI Units

Records within 2000m	**1**

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

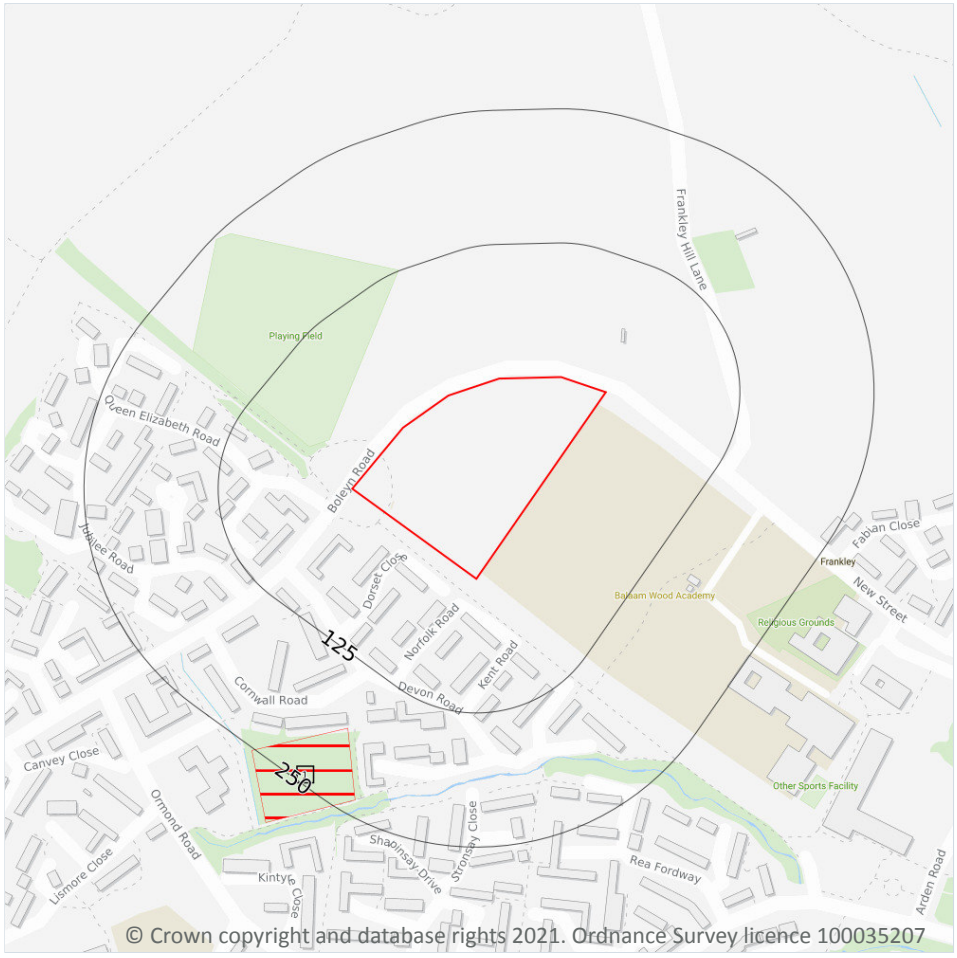
Features are displayed on the SSSI Impact Zones and Units map on **page 56**

ID: -
Location: 1802m W
SSSI name: Romsley Manor Farm
Unit name: 1
Broad habitat: Neutral Grassland - Lowland
Condition: Unfavourable - Declining
Reportable features:

Feature name	Feature condition	Date of assessment
Lowland neutral grassland (MG5)	Unfavourable - Declining	29/06/2011

This data is sourced from Natural England and Natural Resources Wales.

12 Visual and cultural designations



Site Outline

Search buffers in metres (m)

- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

12.1 World Heritage Sites

Records within 250m	0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12.2 Area of Outstanding Natural Beauty

Records within 250m	0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

12.3 National Parks

Records within 250m	0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

12.4 Listed Buildings

Records within 250m	0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

12.5 Conservation Areas

Records within 250m	0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

12.6 Scheduled Ancient Monuments

Records within 250m	**1**

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

Features are displayed on the Visual and cultural designations map on **page 58**

ID	Location	Ancient monument name	Reference number
1	183m SW	Moated site 700m east of Gannow Green Farm	1017810

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

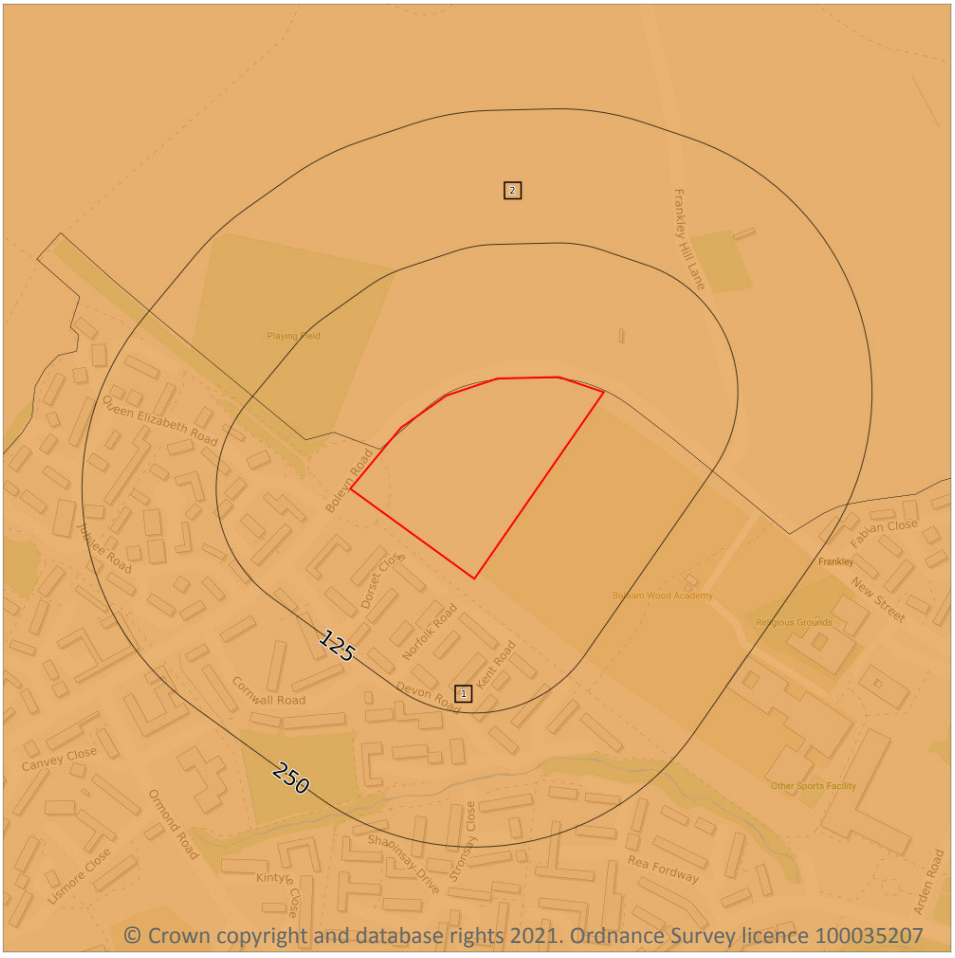
12.7 Registered Parks and Gardens

Records within 250m	**0**

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

13 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

13.1 Agricultural Land Classification

Records within 250m	2

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 61**

ID	Location	Classification	Description
1	On site	Grade 3	**Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.**

ID	Location	Classification	Description
2	**On site**	**Grade 3**	**Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.**

This data is sourced from Natural England.

13.2 Open Access Land

Records within 250m	**0**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

13.3 Tree Felling Licences

Records within 250m	**0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

13.4 Environmental Stewardship Schemes

Records within 250m	**0**

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment.

This data is sourced from Natural England.

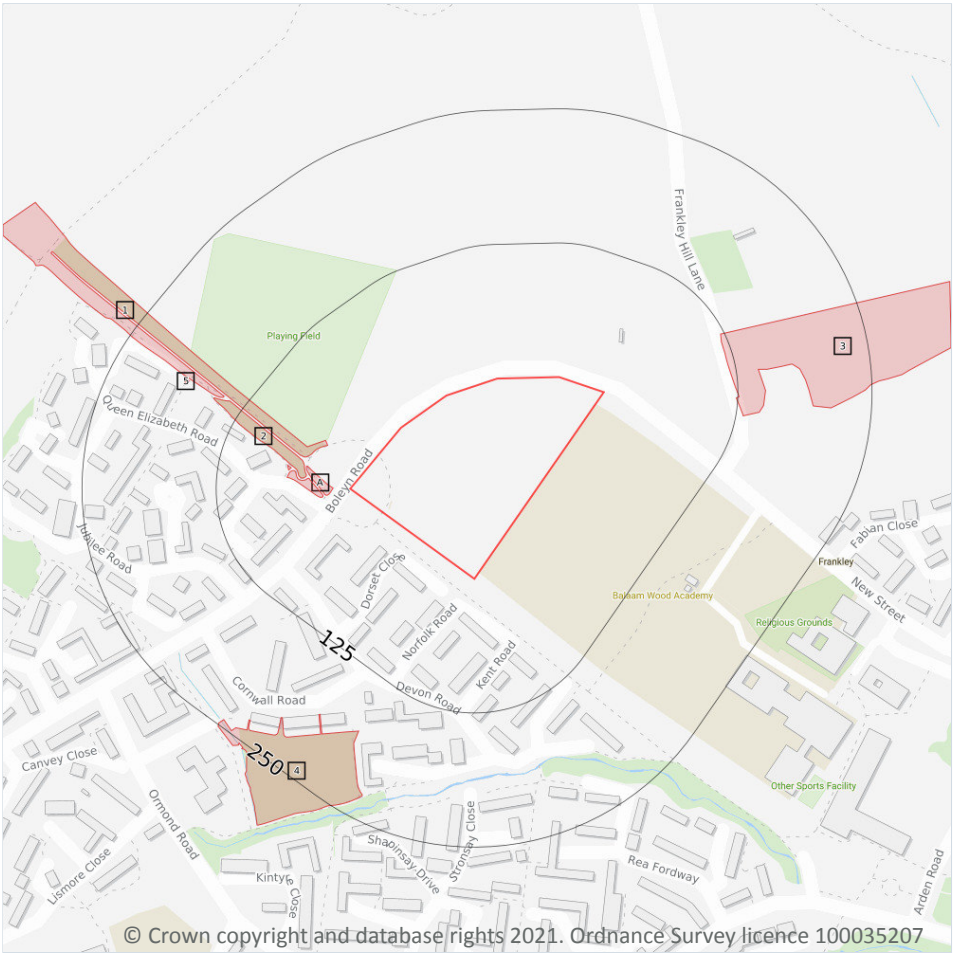
13.5 Countryside Stewardship Schemes

Records within 250m	**0**

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

14 Habitat designations



14.1 Priority Habitat Inventory

Records within 250m	8

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

Features are displayed on the Habitat designations map on **page 63**

ID	Location	Main Habitat	Other habitats
A	16m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
A	26m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
1	42m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
2	43m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

ID	Location	Main Habitat	Other habitats
A	58m W	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
3	118m E	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
4	178m SW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)
5	181m NW	Deciduous woodland	Main habitat: DWOOD (INV > 50%)

This data is sourced from Natural England.

14.2 Habitat Networks

Records within 250m	**0**

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

14.3 Open Mosaic Habitat

Records within 250m	**0**

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

14.4 Limestone Pavement Orders

Records within 250m	**0**

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference.

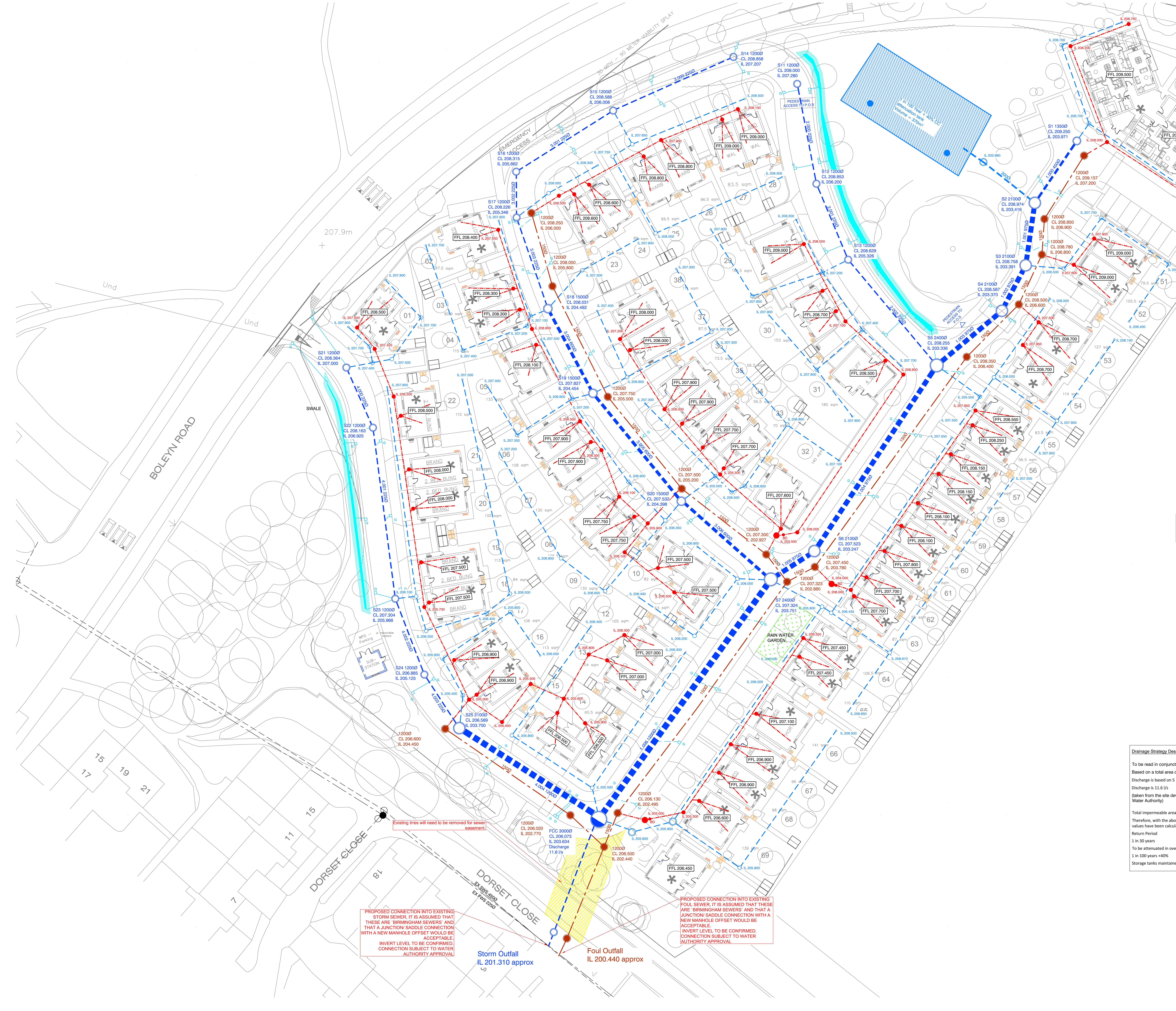
Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: https://www.groundsure.com/terms-and-conditions-jan-2020/.

MUCKLOW & HARRIS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Studio 313 Scott House, Custard Factory, Gibb Street, Digbeth, Birmingham, B9 4AA

A7 FOUL/ SURFACE WATER STRATEGY



Notes

Drawings must not be scaled. Work to figured dimensions only

1. Due to a change in legislation on 1st October 2011, there could be formally private sewers which have transferred over to the responsibility of the Sewerage Undertaker. If such sewers are located on site during construction works, please contact Mucklow & Harris Ltd so that a Section 185 Agreement can be prepared to divert these sewers.
2. The survey information used in the preparation of this drawing is not warranted. The contractor shall check all dimensions and levels on site.
3. This drawing must be read in conjunction with the site investigation report. Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken.
4. Before work commences, the contractor shall liaise with all Statutory Authorities to determine the exact location of all apparatus and take all precautions deemed necessary to locate, protect and where necessary divert such equipment.
5. This drawing is subject to approval by Local Authority, Building Control, Sewerage Undertaker and the Environment Agency. Any works undertaken prior to the granting of these approvals is carried out at risk to others.
6. Should any surplus excavated material require disposal off site, it should be taken to a suitably licensed landfill site.
7. The contractor shall check all dimensions and levels on site.
8. Setting out to be confirmed by the Architect.
9. Prior to commencing work on the drainage, all existing drains, sewers manholes and outfalls to remain shall be located, identified and a CCTV condition survey carried out. Where necessary, protection to the existing drainage infrastructure shall be provided.
10. All existing sewers and manholes abandoned due to the proposed works are to be either removed and suitably backfilled or grouted up.
11. All external drainage works shall be constructed in accordance with civil engineering specification for the water industry and Design Construction Guidance for adoptable drainage, for private drainage in accordance with the Building regulations Part H and BS.EN 752.
12. All existing drainage levels, diameters & locations need to be checked on site prior to any drainage works, and any discrepancies need to be reported back to the Engineer.
13. Cover levels for manholes are approximate only and should be adjusted to match surrounding levels.
14. All manhole and drainage covers shall comply with BS.EN124. Manhole covers within block paved area and buildings shall be recessed. Cover strengths to be:- Class E600 in areas of heavy loading. Class D400 in heavy trafficked areas (roads, services yards). Class C250 Lightly trafficked areas (car parks). Class B125 in landscape and non trafficked areas (min. 100mm dp frame).
15. Drainage pipes 100mm diameter unless stated otherwise.
16. Pipes to be :- Vitrified clay to BS EN 295 or Concrete to BS 5911 or UPVC pipes to BS EN 1452 or Thermoplastic Structured wall pipes complying with WIS 4-35-01. BSI Kitemarked. Class 8kM/m² nominal short term ring stiffness.
17. All pipes to be laid with soffits level, unless noted otherwise.
18. Where cover to pipes is less than 1200mm under carriageway - concrete bed and surround or concrete protection slab is required.
19. All pipes beneath buildings to be B&S in concrete. Where cover is less than 300mm the concrete is to be cast integrally with the floor slab.
20. Pipes Penetrating Walls. An opening is to be formed through walls to give pipes at least 50mm clearance all round. Brickwork over shall be supported by a lintel. Opening to be masked each side with rigid sheet material. Pipes embedded in walls shall have joints formed within 150mm of either wall face. Adjacent rocker pipes of max 600mm length with flexible joints shall continue the pipework.
21. Pipe runs near Buildings. If a trench is within 1m of a building it shall be filled with concrete up to the lowest level of the adjacent foundation. If a trench is greater than 1m from a building the trench shall be filled with concrete up to a level below the building equal to the distance from the building less 150mm.
22. Ventilation shall be provided at the head of the foul drainage runs.
23. For setting out of SVP and RWP, see architects layout.
24. Threshold drainage is required where levels fall towards a building entrance. Architect to confirm if not required.
25. Yard Gully positions are indicative, should be adjusted on site to suit levels.
26. All gully positions to suit low points and to be trapped.
27. Road gullies shall be trapped 450 diameter x 900mm deep with Class D 400 frame and grating to BS EN 124.
28. Drainage channel detailed design to be undertaken by manufactures. Alternative channels may be used, subject to Engineers approval.
29. All concrete to drainage, manholes bases, surrounds etc to be in accordance with the BRE special digest 1 - Concrete in aggressive ground. Refer to site investigation report for sulphate requirements.
30. All manholes, pipe trenches etc. to be backfilled with imported granular fill to Class 6F1-6F5 (Capping material) to (SHW) Table 6/1 & compacted in accordance with Table 6/4.
31. All pipelines shall be tested both before and after backfilling, using either air test or water test, in accordance with BS EN 1610.
32. Demarcation manholes and lateral drains need to be constructed in accordance with the Water UK/WRc "Design Construction Guidance".
33. All works to sewers/ manholes being offered for adoption or on existing public sewers should be in accordance with "Design Construction Guidance" and the Adopting Water Authority's recommendations.
34. Requirement for Land Drains to be assessed on site by the Site Manager.

NOTE

Preliminary scheme only for comment & review. Based upon information provided / available at the time. Scheme will be subject to full review and amendment as further information becomes available.
Scheme will be subject to amendment following receipt of comments from the Development Control, LA Planning Authority, Environment Agency, LA Highways department and the Sewerage Undertaker.
Following receipt of further information and comments the scheme may require a re-design.

Any drainage within proximity of existing or proposed trees is subject to STW and LA approval, additional protection or relocation may be required.

STW S106 Approval required prior to any connections works to public sewer.

All existing public sewers are shown indicative only. All locations and levels to be checked prior to any detailed drainage design or on-site works.

Additional Public Sewers may now be available post October 2011 'Transfer of Private Sewers'. Further onsite investigation required to ascertain suitability of making a Section 106 connection. Possible 3rd party land crossings required.

All pipes to be 150Ø unless otherwise stated

KEY

- Existing Storm Drain
- Existing Storm Drain Abandoned
- Existing Foul Drain
- Existing Foul Drain Abandoned
- Foul Drainage Offered for Adoption
- Foul Manhole Offered for Adoption
- Storm Drain
- Storm Inspection Chamber
- Storm Manhole
- Storm Drainage Offered for Adoption
- Storm Manhole Offered for Adoption
- Flow Control Chamber for Adoption
- Sewer Easement
- Permeable Paving
- Swale
- Rain Garden

Strategy only Subject to Detailed Design

Drainage Strategy Design Assumptions and Recommendations

To be read in conjunction with the Mucklow and Harris Limited FRA.

Based on a total area of 2.32Ha

Discharge is based on 5 L/S/HA

Discharge is 11.6 l/s

(taken from the site development plan to be confirmed by LLFA and Water Authority)

Total impermeable area, including urban creep is calculated at 1.078 ha.

Therefore, with the above Qbar value of 11.6 l/s the following attenuation values have been calculated.

Return Period	Volume attenuated
1 in 30 years	307.59 m³

To be attenuated in oversized pipes and adopted by Water Authority.

1 in 100 years +40%	370 m³

Storage tanks maintained privately.

REV	DATE	AMENDMENT	BY
C	13.02.23	Porous Paving removed at LLFA request	RAA
B	31.01.23	Updated to suit latest layout	ZH
A	05.09.22	Updated discharge rate and SuDs.	RAA

MUCKLOW & HARRIS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

DRAWING STATUS: PRELIMINARY

CLIENT: Capita

PROJECT
Proposed Development at Boleyn Road, Rednal, Birmingham

TITLE
Drainage Strategy

DATE	DRAWN
13.04.21	RAA

SCALE	SIZE	CHECKED
1:250	A0	AM

DRAWING NUMBER	REVISION
20131-102	C

MUCKLOW & HARRIS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

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A8 SURFACE WATER STORAGE CALCULATIONS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for STORM 27.01.23.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.700
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for STORM 27.01.23.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.707	4-8	0.371

Total Area Contributing (ha) = 1.078

Total Pipe Volume (m³) = 206.284

Network Design Table for STORM 27.01.23.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	14.412	0.030	480.4	0.049	4.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	13.000	0.025	520.0	0.049	0.00	0.0	0.600	o	975	Pipe/Conduit	
1.002	10.495	0.021	499.8	0.049	0.00	0.0	0.600	o	975	Pipe/Conduit	
1.003	16.795	0.034	494.0	0.049	0.00	0.0	0.600	o	975	Pipe/Conduit	
2.000	20.163	1.080	18.7	0.049	4.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	16.515	0.874	18.9	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	4.26	203.971	0.049	0.0	0.0	0.0	0.92	146.5	0.0
1.001	0.00	4.41	203.416	0.098	0.0	0.0	0.0	1.44	1072.7	0.0
1.002	0.00	4.53	203.391	0.147	0.0	0.0	0.0	1.47	1094.4	0.0
1.003	0.00	4.72	203.370	0.196	0.0	0.0	0.0	1.47	1100.8	0.0
2.000	0.00	4.11	207.280	0.049	0.0	0.0	0.0	3.04	121.0	0.0
2.001	0.00	4.20	206.200	0.098	0.0	0.0	0.0	3.02	120.2	0.0

Network Design Table for STORM 27.01.23.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.002	27.439	1.240	22.1	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	43.832	0.089	492.5	0.049	0.00	0.0	0.600	o	975	Pipe/Conduit	
1.005	10.742	0.021	511.5	0.049	0.00	0.0	0.600	o	975	Pipe/Conduit	
3.000	26.254	1.199	21.9	0.049	4.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	22.806	0.346	65.9	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	8.820	0.316	27.9	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	19.404	0.479	40.5	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	19.154	0.038	504.1	0.049	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.005	27.968	0.056	499.4	0.049	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.006	23.231	0.068	341.6	0.049	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.006	58.525	0.117	500.2	0.049	0.00	0.0	0.600	o	1200	Pipe/Conduit	
4.000	13.044	0.075	173.9	0.049	4.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	34.534	0.957	36.1	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.002	16.011	0.843	19.0	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.003	12.707	0.450	28.2	0.049	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.004	33.111	0.066	501.7	0.049	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.007	24.613	2.324	10.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.002	0.00	4.37	205.326	0.147	0.0	0.0	0.0	2.79	111.1	0.0
1.004	0.00	5.22	203.336	0.392	0.0	0.0	0.0	1.48	1102.5	0.0
1.005	0.00	5.34	203.247	0.441	0.0	0.0	0.0	1.45	1081.6	0.0
3.000	0.00	4.16	207.207	0.049	0.0	0.0	0.0	2.81	111.7	0.0
3.001	0.00	4.39	206.008	0.098	0.0	0.0	0.0	1.61	64.1	0.0
3.002	0.00	4.45	205.662	0.147	0.0	0.0	0.0	2.49	98.8	0.0
3.003	0.00	4.61	205.346	0.196	0.0	0.0	0.0	2.06	82.0	0.0
3.004	0.00	4.90	204.492	0.245	0.0	0.0	0.0	1.08	304.7	0.0
3.005	0.00	5.33	204.454	0.294	0.0	0.0	0.0	1.08	306.2	0.0
3.006	0.00	5.63	204.398	0.343	0.0	0.0	0.0	1.31	370.9	0.0
1.006	0.00	6.21	203.751	0.833	0.0	0.0	0.0	1.67	1884.1	0.0
4.000	0.00	4.22	207.000	0.049	0.0	0.0	0.0	0.99	39.3	0.0
4.001	0.00	4.48	206.925	0.098	0.0	0.0	0.0	2.18	86.9	0.0
4.002	0.00	4.57	205.968	0.147	0.0	0.0	0.0	3.02	119.9	0.0
4.003	0.00	4.66	205.125	0.196	0.0	0.0	0.0	2.47	98.3	0.0
4.004	0.00	4.99	203.700	0.245	0.0	0.0	0.0	1.66	1881.3	0.0
1.007	0.00	6.32	203.634	1.078	0.0	0.0	0.0	4.04	160.8	0.0

Manhole Schedules for STORM 27.01.23.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	209.250	5.279	Open Manhole	1350	1.000	203.971	450				
S2	208.974	5.558	Open Manhole	2100	1.001	203.416	975	1.000	203.941	450	
S3	208.758	5.367	Open Manhole	2100	1.002	203.391	975	1.001	203.391	975	
S4	208.587	5.217	Open Manhole	2100	1.003	203.370	975	1.002	203.370	975	
S11	209.000	1.720	Open Manhole	1200	2.000	207.280	225				
S12	208.853	2.653	Open Manhole	1200	2.001	206.200	225	2.000	206.200	225	
S13	208.629	3.303	Open Manhole	1200	2.002	205.326	225	2.001	205.326	225	
S5	208.255	4.919	Open Manhole	2400	1.004	203.336	975	1.003	203.336	975	
								2.002	204.086	225	
S6	207.523	4.276	Open Manhole	2100	1.005	203.247	975	1.004	203.247	975	
S14	208.858	1.651	Open Manhole	1200	3.000	207.207	225				
S15	208.588	2.580	Open Manhole	1200	3.001	206.008	225	3.000	206.008	225	
S16	208.315	2.653	Open Manhole	1200	3.002	205.662	225	3.001	205.662	225	
S17	208.226	2.880	Open Manhole	1200	3.003	205.346	225	3.002	205.346	225	
S18	208.031	3.539	Open Manhole	1500	3.004	204.492	600	3.003	204.867	225	
S19	207.827	3.373	Open Manhole	1500	3.005	204.454	600	3.004	204.454	600	
S20	207.532	3.134	Open Manhole	1500	3.006	204.398	600	3.005	204.398	600	
S7	207.324	4.098	Open Manhole	2400	1.006	203.751	1200	1.005	203.226	975	
								3.006	204.330	600	
S21	208.364	1.364	Open Manhole	1200	4.000	207.000	225				
S22	208.163	1.238	Open Manhole	1200	4.001	206.925	225	4.000	206.925	225	
S23	207.304	1.336	Open Manhole	1200	4.002	205.968	225	4.001	205.968	225	
S24	206.885	1.760	Open Manhole	1200	4.003	205.125	225	4.002	205.125	225	
S25	206.589	2.889	Open Manhole	2100	4.004	203.700	1200	4.003	204.675	225	
FCC	206.073	2.439	Open Manhole	3000	1.007	203.634	225	1.006	203.634	1200	
								4.004	203.634	1200	
10	203.500	2.190	Open Manhole	0		OUTFALL		1.007	201.310	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	398675.613	278733.910	398675.613	278733.910	Required	
S2	398667.243	278722.178	398667.243	278722.178	Required	

Manhole Schedules for STORM 27.01.23.SWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S3	398665.300	278709.324	398665.300	278709.324	Required	
S4	398660.517	278699.982	398660.517	278699.982	Required	
S11	398619.879	278745.673	398619.879	278745.673	Required	
S12	398623.669	278725.869	398623.669	278725.869	Required	
S13	398629.968	278710.603	398629.968	278710.603	Required	
S5	398647.439	278689.445	398647.439	278689.445	Required	
S6	398623.522	278652.714	398623.522	278652.714	Required	
S14	398607.187	278751.077	398607.187	278751.077	Required	
S15	398583.273	278740.241	398583.273	278740.241	Required	
S16	398563.992	278728.060	398563.992	278728.060	Required	
S17	398563.843	278719.242	398563.843	278719.242	Required	
S18	398570.270	278700.933	398570.270	278700.933	Required	
S19	398579.163	278683.969	398579.163	278683.969	Required	
S20	398597.023	278662.447	398597.023	278662.447	Required	
S7	398614.405	278647.034	398614.405	278647.034	Required	

Manhole Schedules for STORM 27.01.23.SWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S21	398530.064	278689.153	398530.064	278689.153	Required	
S22	398535.445	278677.271	398535.445	278677.271	Required	
S23	398539.870	278643.022	398539.870	278643.022	Required	
S24	398545.673	278628.099	398545.673	278628.099	Required	
S25	398552.549	278617.413	398552.549	278617.413	Required	
FCC	398580.354	278599.435	398580.354	278599.435	Required	
10	398604.967	278599.435			No Entry	

PIPELINE SCHEDULES for STORM 27.01.23.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	450	S1	209.250	203.971	4.829	Open Manhole	1350
1.001	o	975	S2	208.974	203.416	4.583	Open Manhole	2100
1.002	o	975	S3	208.758	203.391	4.392	Open Manhole	2100
1.003	o	975	S4	208.587	203.370	4.242	Open Manhole	2100
2.000	o	225	S11	209.000	207.280	1.495	Open Manhole	1200
2.001	o	225	S12	208.853	206.200	2.428	Open Manhole	1200
2.002	o	225	S13	208.629	205.326	3.078	Open Manhole	1200
1.004	o	975	S5	208.255	203.336	3.944	Open Manhole	2400
1.005	o	975	S6	207.523	203.247	3.301	Open Manhole	2100
3.000	o	225	S14	208.858	207.207	1.426	Open Manhole	1200
3.001	o	225	S15	208.588	206.008	2.355	Open Manhole	1200
3.002	o	225	S16	208.315	205.662	2.428	Open Manhole	1200
3.003	o	225	S17	208.226	205.346	2.655	Open Manhole	1200
3.004	o	600	S18	208.031	204.492	2.939	Open Manhole	1500
3.005	o	600	S19	207.827	204.454	2.773	Open Manhole	1500
3.006	o	600	S20	207.532	204.398	2.534	Open Manhole	1500
1.006	o	1200	S7	207.324	203.751	2.373	Open Manhole	2400

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	14.412	480.4	S2	208.974	203.941	4.583	Open Manhole	2100
1.001	13.000	520.0	S3	208.758	203.391	4.392	Open Manhole	2100
1.002	10.495	499.8	S4	208.587	203.370	4.242	Open Manhole	2100
1.003	16.795	494.0	S5	208.255	203.336	3.944	Open Manhole	2400
2.000	20.163	18.7	S12	208.853	206.200	2.428	Open Manhole	1200
2.001	16.515	18.9	S13	208.629	205.326	3.078	Open Manhole	1200
2.002	27.439	22.1	S5	208.255	204.086	3.944	Open Manhole	2400
1.004	43.832	492.5	S6	207.523	203.247	3.301	Open Manhole	2100
1.005	10.742	511.5	S7	207.324	203.226	3.123	Open Manhole	2400
3.000	26.254	21.9	S15	208.588	206.008	2.355	Open Manhole	1200
3.001	22.806	65.9	S16	208.315	205.662	2.428	Open Manhole	1200
3.002	8.820	27.9	S17	208.226	205.346	2.655	Open Manhole	1200
3.003	19.404	40.5	S18	208.031	204.867	2.939	Open Manhole	1500
3.004	19.154	504.1	S19	207.827	204.454	2.773	Open Manhole	1500
3.005	27.968	499.4	S20	207.532	204.398	2.534	Open Manhole	1500
3.006	23.231	341.6	S7	207.324	204.330	2.394	Open Manhole	2400
1.006	58.525	500.2	FCC	206.073	203.634	1.239	Open Manhole	3000

PIPELINE SCHEDULES for STORM 27.01.23.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	o	225	S21	208.364	207.000	1.139	Open Manhole	1200
4.001	o	225	S22	208.163	206.925	1.013	Open Manhole	1200
4.002	o	225	S23	207.304	205.968	1.111	Open Manhole	1200
4.003	o	225	S24	206.885	205.125	1.535	Open Manhole	1200
4.004	o	1200	S25	206.589	203.700	1.689	Open Manhole	2100
1.007	o	225	FCC	206.073	203.634	2.214	Open Manhole	3000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	13.044	173.9	S22	208.163	206.925	1.013	Open Manhole	1200
4.001	34.534	36.1	S23	207.304	205.968	1.111	Open Manhole	1200
4.002	16.011	19.0	S24	206.885	205.125	1.535	Open Manhole	1200
4.003	12.707	28.2	S25	206.589	204.675	1.689	Open Manhole	2100
4.004	33.111	501.7	FCC	206.073	203.634	1.239	Open Manhole	3000
1.007	24.613	10.6	10	203.500	201.310	1.965	Open Manhole	0

Network Classifications for STORM 27.01.23.SWS

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	S1	450	4.583	4.829	Unclassified	1350	0	4.829	Unclassified
1.001	S2	975	4.392	4.583	Unclassified	2100	0	4.583	Unclassified
1.002	S3	975	4.242	4.392	Unclassified	2100	0	4.392	Unclassified
1.003	S4	975	3.944	4.242	Unclassified	2100	0	4.242	Unclassified
2.000	S11	225	1.495	2.428	Unclassified	1200	0	1.495	Unclassified
2.001	S12	225	2.428	3.078	Unclassified	1200	0	2.428	Unclassified
2.002	S13	225	3.078	3.944	Unclassified	1200	0	3.078	Unclassified
1.004	S5	975	3.301	3.944	Unclassified	2400	0	3.944	Unclassified
1.005	S6	975	3.123	3.301	Unclassified	2100	0	3.301	Unclassified
3.000	S14	225	1.426	2.355	Unclassified	1200	0	1.426	Unclassified
3.001	S15	225	2.355	2.428	Unclassified	1200	0	2.355	Unclassified
3.002	S16	225	2.428	2.655	Unclassified	1200	0	2.428	Unclassified
3.003	S17	225	2.655	2.939	Unclassified	1200	0	2.655	Unclassified
3.004	S18	600	2.773	2.939	Unclassified	1500	0	2.939	Unclassified
3.005	S19	600	2.534	2.773	Unclassified	1500	0	2.773	Unclassified
3.006	S20	600	2.394	2.534	Unclassified	1500	0	2.534	Unclassified
1.006	S7	1200	1.239	2.373	Unclassified	2400	0	2.373	Unclassified
4.000	S21	225	1.013	1.155	Unclassified	1200	0	1.139	Unclassified
4.001	S22	225	1.013	1.111	Unclassified	1200	0	1.013	Unclassified
4.002	S23	225	1.111	1.535	Unclassified	1200	0	1.111	Unclassified
4.003	S24	225	1.535	1.689	Unclassified	1200	0	1.535	Unclassified
4.004	S25	1200	1.177	1.689	Unclassified	2100	0	1.689	Unclassified
1.007	FCC	225	1.943	2.214	Unclassified	3000	0	2.214	Unclassified

Free Flowing Outfall Details for STORM 27.01.23.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	10	203.500	201.310	0.000	0	0

Simulation Criteria for STORM 27.01.23.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for STORM 27.01.23.SWS

Hydro-Brake® Optimum Manhole: FCC, DS/PN: 1.007, Volume (m³): 114.9

Unit Reference	MD-SHE-0147-1160-1600-1160
Design Head (m)	1.600
Design Flow (l/s)	11.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	203.634
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	11.6
Flush-Flo™	0.468	11.6
Kick-Flo®	0.991	9.3
Mean Flow over Head Range	-	10.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	1.200	10.1	3.000	15.6	7.000	23.4
0.200	10.3	1.400	10.9	3.500	16.8	7.500	24.2
0.300	11.2	1.600	11.6	4.000	17.9	8.000	25.0
0.400	11.5	1.800	12.3	4.500	19.0	8.500	25.7
0.500	11.6	2.000	12.9	5.000	19.9	9.000	26.4
0.600	11.5	2.200	13.5	5.500	20.9	9.500	27.1
0.800	10.9	2.400	14.0	6.000	21.8		
1.000	9.3	2.600	14.6	6.500	22.6		

Storage Structures for STORM 27.01.23.SWS

Tank or Pond Manhole: S2, DS/PN: 1.001

Invert Level (m) 203.960

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	370.0	0.700	370.0	1.400	0.0	2.100	0.0
0.100	370.0	0.800	370.0	1.500	0.0	2.200	0.0
0.200	370.0	0.900	370.0	1.600	0.0	2.300	0.0
0.300	370.0	1.000	370.0	1.700	0.0	2.400	0.0
0.400	370.0	1.001	0.0	1.800	0.0	2.500	0.0
0.500	370.0	1.200	0.0	1.900	0.0		
0.600	370.0	1.300	0.0	2.000	0.0		

Manhole Headloss for STORM 27.01.23.SWS

PN	US/MH Name	US/MH Headloss
1.000	S1	0.500
1.001	S2	0.500
1.002	S3	0.500
1.003	S4	0.500
2.000	S11	0.500
2.001	S12	0.500
2.002	S13	0.500
1.004	S5	0.500
1.005	S6	0.500
3.000	S14	0.500
3.001	S15	0.500
3.002	S16	0.500
3.003	S17	0.500
3.004	S18	0.500
3.005	S19	0.500
3.006	S20	0.500
1.006	S7	0.500
4.000	S21	0.500
4.001	S22	0.500
4.002	S23	0.500
4.003	S24	0.500
4.004	S25	0.500
1.007	FCC	0.500

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	1	+0%	60/120 Winter				204.057
1.001	S2	120 Winter	1	+0%	50/120 Winter				204.007
1.002	S3	120 Winter	1	+0%	40/240 Winter				204.008
1.003	S4	120 Winter	1	+0%	40/120 Winter				204.007
2.000	S11	15 Winter	1	+0%					207.318
2.001	S12	15 Winter	1	+0%					206.252
2.002	S13	15 Winter	1	+0%					205.391
1.004	S5	120 Winter	1	+0%	30/120 Winter				204.008
1.005	S6	120 Winter	1	+0%	30/15 Winter				204.006
3.000	S14	15 Winter	1	+0%					207.246
3.001	S15	15 Winter	1	+0%	100/15 Summer				206.080
3.002	S16	15 Winter	1	+0%	70/15 Summer				205.736
3.003	S17	15 Winter	1	+0%	40/15 Summer				205.436
3.004	S18	15 Winter	1	+0%					204.661
3.005	S19	15 Winter	1	+0%					204.616
3.006	S20	15 Winter	1	+0%					204.546
1.006	S7	120 Winter	1	+0%					204.006
4.000	S21	15 Summer	1	+0%					207.071
4.001	S22	15 Winter	1	+0%					206.985

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.364	0.000	0.08		7.3	OK	
1.001	S2	-0.384	0.000	0.03		13.0	OK	
1.002	S3	-0.358	0.000	0.02		10.6	OK	
1.003	S4	-0.338	0.000	0.02		11.4	OK	
2.000	S11	-0.187	0.000	0.07		7.3	OK	
2.001	S12	-0.173	0.000	0.12		13.1	OK	
2.002	S13	-0.160	0.000	0.18		18.9	OK	
1.004	S5	-0.303	0.000	0.01		9.3	OK	
1.005	S6	-0.216	0.000	0.02		9.9	OK	
3.000	S14	-0.186	0.000	0.07		7.3	OK	
3.001	S15	-0.153	0.000	0.22		13.1	OK	
3.002	S16	-0.151	0.000	0.24		18.9	OK	
3.003	S17	-0.135	0.000	0.33		24.5	OK	
3.004	S18	-0.431	0.000	0.15		30.2	OK	
3.005	S19	-0.438	0.000	0.14		34.9	OK	
3.006	S20	-0.452	0.000	0.14		39.9	OK	
1.006	S7	-0.945	0.000	0.01		19.2	OK	
4.000	S21	-0.154	0.000	0.22		7.3	OK	
4.001	S22	-0.165	0.000	0.16		13.0	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	1	+0%	100/15 Summer				206.032
4.003	S24	15 Winter	1	+0%	100/15 Summer				205.208
4.004	S25	120 Winter	1	+0%	100/240 Winter				204.005
1.007	FCC	120 Winter	1	+0%	1/15 Summer				204.005

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.161	0.000	0.18		18.7	OK	
4.003	S24	-0.142	0.000	0.29		24.5	OK	
4.004	S25	-0.895	0.000	0.01		10.4	OK	
1.007	FCC	0.146	0.000	0.08		11.5	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	30	+0%	60/120 Winter				204.328
1.001	S2	240 Winter	30	+0%	50/120 Winter				204.329
1.002	S3	240 Winter	30	+0%	40/240 Winter				204.328
1.003	S4	240 Winter	30	+0%	40/120 Winter				204.328
2.000	S11	15 Winter	30	+0%					207.341
2.001	S12	15 Winter	30	+0%					206.290
2.002	S13	15 Summer	30	+0%					205.442
1.004	S5	240 Winter	30	+0%	30/120 Winter				204.327
1.005	S6	240 Winter	30	+0%	30/15 Winter				204.327
3.000	S14	15 Winter	30	+0%					207.270
3.001	S15	15 Summer	30	+0%	100/15 Summer				206.135
3.002	S16	15 Summer	30	+0%	70/15 Summer				205.799
3.003	S17	15 Summer	30	+0%	40/15 Summer				205.523
3.004	S18	15 Winter	30	+0%					204.792
3.005	S19	15 Winter	30	+0%					204.739
3.006	S20	15 Winter	30	+0%					204.663
1.006	S7	240 Winter	30	+0%					204.327
4.000	S21	15 Summer	30	+0%					207.116
4.001	S22	15 Summer	30	+0%					207.029

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.093	0.000	0.03		3.0	OK	
1.001	S2	-0.062	0.000	0.03		11.9	OK	
1.002	S3	-0.038	0.000	0.03		12.0	OK	
1.003	S4	-0.017	0.000	0.02		10.0	OK	
2.000	S11	-0.164	0.000	0.16		17.9	OK	
2.001	S12	-0.135	0.000	0.34		35.9	OK	
2.002	S13	-0.109	0.000	0.52		53.8	OK	
1.004	S5	0.016	0.000	0.01		9.6	SURCHARGED	
1.005	S6	0.105	0.000	0.03		11.1	SURCHARGED	
3.000	S14	-0.162	0.000	0.17		17.9	OK	
3.001	S15	-0.098	0.000	0.61		35.9	OK	
3.002	S16	-0.088	0.000	0.68		53.9	OK	
3.003	S17	-0.048	0.000	0.97		71.8	OK	
3.004	S18	-0.300	0.000	0.44		87.3	OK	
3.005	S19	-0.315	0.000	0.41		102.1	OK	
3.006	S20	-0.335	0.000	0.40		114.9	OK	
1.006	S7	-0.624	0.000	0.01		16.4	OK	
4.000	S21	-0.109	0.000	0.53		17.9	OK	
4.001	S22	-0.121	0.000	0.44		35.8	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	30	+0%	100/15 Summer				206.081
4.003	S24	15 Winter	30	+0%	100/15 Summer				205.284
4.004	S25	60 Winter	30	+0%	100/240 Winter				204.329
1.007	FCC	240 Winter	30	+0%	1/15 Summer				204.325

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.112	0.000	0.51		53.6	OK	
4.003	S24	-0.066	0.000	0.84		71.3	OK	
4.004	S25	-0.571	0.000	0.03		41.4	OK	
1.007	FCC	0.466	0.000	0.08		11.6	SURCHARGED	

40 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	40	+0%	60/120 Winter				204.375
1.001	S2	240 Winter	40	+0%	50/120 Winter				204.375
1.002	S3	240 Winter	40	+0%	40/240 Winter				204.376
1.003	S4	240 Winter	40	+0%	40/120 Winter				204.376
2.000	S11	15 Winter	40	+0%					207.343
2.001	S12	15 Winter	40	+0%					206.293
2.002	S13	15 Summer	40	+0%					205.446
1.004	S5	240 Winter	40	+0%	30/120 Winter				204.376
1.005	S6	240 Winter	40	+0%	30/15 Winter				204.375
3.000	S14	15 Winter	40	+0%					207.272
3.001	S15	15 Summer	40	+0%	100/15 Summer				206.140
3.002	S16	15 Summer	40	+0%	70/15 Summer				205.806
3.003	S17	15 Summer	40	+0%	40/15 Summer				205.589
3.004	S18	15 Winter	40	+0%					204.800
3.005	S19	15 Winter	40	+0%					204.748
3.006	S20	15 Winter	40	+0%					204.672
1.006	S7	240 Winter	40	+0%					204.375
4.000	S21	15 Summer	40	+0%					207.121
4.001	S22	15 Summer	40	+0%					207.033

40 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.046	0.000	0.04		3.2	OK	
1.001	S2	-0.016	0.000	0.03		12.5	OK	
1.002	S3	0.010	0.000	0.03		12.2	SURCHARGED	
1.003	S4	0.031	0.000	0.02		9.6	SURCHARGED	
2.000	S11	-0.162	0.000	0.17		19.1	OK	
2.001	S12	-0.132	0.000	0.36		38.2	OK	
2.002	S13	-0.105	0.000	0.56		57.3	OK	
1.004	S5	0.065	0.000	0.01		9.9	SURCHARGED	
1.005	S6	0.153	0.000	0.03		11.8	SURCHARGED	
3.000	S14	-0.160	0.000	0.18		19.1	OK	
3.001	S15	-0.093	0.000	0.65		38.2	OK	
3.002	S16	-0.081	0.000	0.72		57.4	OK	
3.003	S17	0.018	0.000	1.01		74.3	SURCHARGED	
3.004	S18	-0.292	0.000	0.46		92.1	OK	
3.005	S19	-0.306	0.000	0.44		107.7	OK	
3.006	S20	-0.326	0.000	0.42		122.1	OK	
1.006	S7	-0.576	0.000	0.01		16.4	OK	
4.000	S21	-0.104	0.000	0.56		19.1	OK	
4.001	S22	-0.117	0.000	0.47		38.1	OK	

40 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	40	+0%	100/15 Summer				206.086
4.003	S24	15 Winter	40	+0%	100/15 Summer				205.292
4.004	S25	240 Winter	40	+0%	100/240 Winter				204.372
1.007	FCC	240 Winter	40	+0%	1/15 Summer				204.372

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.107	0.000	0.54		57.1	OK	
4.003	S24	-0.058	0.000	0.90		75.8	OK	
4.004	S25	-0.528	0.000	0.01		16.4	OK	
1.007	FCC	0.513	0.000	0.08		11.6	SURCHARGED	

50 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	50	+0%	60/120 Winter				204.413
1.001	S2	240 Winter	50	+0%	50/120 Winter				204.413
1.002	S3	240 Winter	50	+0%	40/240 Winter				204.415
1.003	S4	240 Winter	50	+0%	40/120 Winter				204.415
2.000	S11	15 Winter	50	+0%					207.345
2.001	S12	15 Winter	50	+0%					206.295
2.002	S13	15 Summer	50	+0%					205.450
1.004	S5	240 Winter	50	+0%	30/120 Winter				204.414
1.005	S6	240 Winter	50	+0%	30/15 Winter				204.414
3.000	S14	15 Winter	50	+0%					207.274
3.001	S15	15 Summer	50	+0%	100/15 Summer				206.145
3.002	S16	15 Winter	50	+0%	70/15 Summer				205.817
3.003	S17	15 Summer	50	+0%	40/15 Summer				205.639
3.004	S18	15 Winter	50	+0%					204.808
3.005	S19	15 Winter	50	+0%					204.755
3.006	S20	15 Winter	50	+0%					204.679
1.006	S7	240 Winter	50	+0%					204.414
4.000	S21	15 Summer	50	+0%					207.124
4.001	S22	15 Summer	50	+0%					207.036

50 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.008	0.000	0.04		3.4	OK	
1.001	S2	0.022	0.000	0.02		11.1	SURCHARGED	
1.002	S3	0.049	0.000	0.03		12.0	SURCHARGED	
1.003	S4	0.070	0.000	0.02		12.0	SURCHARGED	
2.000	S11	-0.160	0.000	0.18		20.0	OK	
2.001	S12	-0.130	0.000	0.38		40.1	OK	
2.002	S13	-0.101	0.000	0.58		60.1	OK	
1.004	S5	0.103	0.000	0.01		9.8	SURCHARGED	
1.005	S6	0.192	0.000	0.03		11.4	SURCHARGED	
3.000	S14	-0.158	0.000	0.19		20.0	OK	
3.001	S15	-0.088	0.000	0.68		40.1	OK	
3.002	S16	-0.070	0.000	0.76		59.9	OK	
3.003	S17	0.068	0.000	1.05		77.7	SURCHARGED	
3.004	S18	-0.284	0.000	0.49		96.6	OK	
3.005	S19	-0.299	0.000	0.46		112.4	OK	
3.006	S20	-0.319	0.000	0.44		127.8	OK	
1.006	S7	-0.537	0.000	0.01		16.5	OK	
4.000	S21	-0.101	0.000	0.59		20.0	OK	
4.001	S22	-0.114	0.000	0.49		40.0	OK	

50 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	50	+0%	100/15 Summer				206.089
4.003	S24	15 Winter	50	+0%	100/15 Summer				205.298
4.004	S25	240 Winter	50	+0%	100/240 Winter				204.411
1.007	FCC	240 Winter	50	+0%	1/15 Summer				204.411

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.104	0.000	0.56		59.9	OK	
4.003	S24	-0.052	0.000	0.94		79.6	OK	
4.004	S25	-0.489	0.000	0.01		17.2	OK	
1.007	FCC	0.552	0.000	0.08		11.6	SURCHARGED	

60 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	60	+0%	60/120 Winter				204.446
1.001	S2	240 Winter	60	+0%	50/120 Winter				204.446
1.002	S3	240 Winter	60	+0%	40/240 Winter				204.447
1.003	S4	240 Winter	60	+0%	40/120 Winter				204.448
2.000	S11	15 Winter	60	+0%					207.346
2.001	S12	15 Winter	60	+0%					206.297
2.002	S13	15 Summer	60	+0%					205.453
1.004	S5	240 Winter	60	+0%	30/120 Winter				204.447
1.005	S6	240 Winter	60	+0%	30/15 Winter				204.447
3.000	S14	15 Winter	60	+0%					207.275
3.001	S15	15 Winter	60	+0%	100/15 Summer				206.148
3.002	S16	15 Winter	60	+0%	70/15 Summer				205.856
3.003	S17	15 Winter	60	+0%	40/15 Summer				205.663
3.004	S18	15 Winter	60	+0%					204.814
3.005	S19	15 Winter	60	+0%					204.761
3.006	S20	15 Winter	60	+0%					204.685
1.006	S7	240 Winter	60	+0%					204.447
4.000	S21	15 Summer	60	+0%					207.127
4.001	S22	15 Summer	60	+0%					207.039

60 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.025	0.000	0.04		3.5	SURCHARGED	
1.001	S2	0.055	0.000	0.02		11.1	SURCHARGED	
1.002	S3	0.081	0.000	0.03		12.0	SURCHARGED	
1.003	S4	0.103	0.000	0.02		13.1	SURCHARGED	
2.000	S11	-0.159	0.000	0.19		20.8	OK	
2.001	S12	-0.128	0.000	0.39		41.7	OK	
2.002	S13	-0.098	0.000	0.61		62.5	OK	
1.004	S5	0.136	0.000	0.01		10.5	SURCHARGED	
1.005	S6	0.225	0.000	0.03		12.3	SURCHARGED	
3.000	S14	-0.157	0.000	0.20		20.8	OK	
3.001	S15	-0.085	0.000	0.71		41.7	OK	
3.002	S16	-0.031	0.000	0.76		60.4	OK	
3.003	S17	0.092	0.000	1.09		80.6	SURCHARGED	
3.004	S18	-0.278	0.000	0.50		99.4	OK	
3.005	S19	-0.293	0.000	0.47		115.9	OK	
3.006	S20	-0.313	0.000	0.46		132.0	OK	
1.006	S7	-0.504	0.000	0.01		16.4	OK	
4.000	S21	-0.098	0.000	0.61		20.8	OK	
4.001	S22	-0.111	0.000	0.51		41.6	OK	

60 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	60	+0%	100/15 Summer				206.092
4.003	S24	15 Winter	60	+0%	100/15 Summer				205.303
4.004	S25	240 Winter	60	+0%	100/240 Winter				204.444
1.007	FCC	240 Winter	60	+0%	1/15 Summer				204.444

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.101	0.000	0.59		62.3	OK	
4.003	S24	-0.047	0.000	0.98		82.8	OK	
4.004	S25	-0.456	0.000	0.01		17.9	OK	
1.007	FCC	0.585	0.000	0.08		11.6	SURCHARGED	

70 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	240 Winter	70	+0%	60/120 Winter				204.476
1.001	S2	240 Winter	70	+0%	50/120 Winter				204.476
1.002	S3	240 Winter	70	+0%	40/240 Winter				204.476
1.003	S4	240 Winter	70	+0%	40/120 Winter				204.476
2.000	S11	15 Winter	70	+0%					207.347
2.001	S12	15 Winter	70	+0%					206.299
2.002	S13	15 Summer	70	+0%					205.455
1.004	S5	240 Winter	70	+0%	30/120 Winter				204.476
1.005	S6	240 Winter	70	+0%	30/15 Winter				204.476
3.000	S14	15 Winter	70	+0%					207.276
3.001	S15	15 Winter	70	+0%	100/15 Summer				206.152
3.002	S16	15 Winter	70	+0%	70/15 Summer				205.890
3.003	S17	15 Winter	70	+0%	40/15 Summer				205.690
3.004	S18	15 Winter	70	+0%					204.818
3.005	S19	15 Winter	70	+0%					204.766
3.006	S20	15 Winter	70	+0%					204.689
1.006	S7	240 Winter	70	+0%					204.476
4.000	S21	15 Summer	70	+0%					207.130
4.001	S22	15 Summer	70	+0%					207.041

70 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.055	0.000	0.04		3.6	SURCHARGED	
1.001	S2	0.085	0.000	0.03		12.3	SURCHARGED	
1.002	S3	0.110	0.000	0.03		12.2	SURCHARGED	
1.003	S4	0.131	0.000	0.02		11.7	SURCHARGED	
2.000	S11	-0.158	0.000	0.20		21.5	OK	
2.001	S12	-0.126	0.000	0.40		43.1	OK	
2.002	S13	-0.096	0.000	0.63		64.6	OK	
1.004	S5	0.165	0.000	0.01		10.5	SURCHARGED	
1.005	S6	0.254	0.000	0.03		11.3	SURCHARGED	
3.000	S14	-0.156	0.000	0.21		21.5	OK	
3.001	S15	-0.081	0.000	0.73		43.1	OK	
3.002	S16	0.003	0.000	0.78		62.2	SURCHARGED	
3.003	S17	0.119	0.000	1.12		82.5	SURCHARGED	
3.004	S18	-0.274	0.000	0.51		101.8	OK	
3.005	S19	-0.288	0.000	0.48		118.8	OK	
3.006	S20	-0.309	0.000	0.47		135.4	OK	
1.006	S7	-0.475	0.000	0.01		16.3	OK	
4.000	S21	-0.095	0.000	0.63		21.6	OK	
4.001	S22	-0.109	0.000	0.53		43.0	OK	

70 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	70	+0%	100/15 Summer				206.095
4.003	S24	15 Winter	70	+0%	100/15 Summer				205.342
4.004	S25	240 Winter	70	+0%	100/240 Winter				204.473
1.007	FCC	240 Winter	70	+0%	1/15 Summer				204.473

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	-0.098	0.000	0.61		64.4	OK	
4.003	S24	-0.008	0.000	1.00		84.4	OK	
4.004	S25	-0.427	0.000	0.01		18.6	OK	
1.007	FCC	0.614	0.000	0.08		11.6	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 40, 50, 60, 70, 100
Climate Change (%)	0, 0, 0, 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	360 Winter	100	+40%	60/120 Winter				204.946
1.001	S2	360 Winter	100	+40%	50/120 Winter				204.946
1.002	S3	360 Winter	100	+40%	40/240 Winter				204.947
1.003	S4	360 Winter	100	+40%	40/120 Winter				204.951
2.000	S11	15 Winter	100	+40%					207.364
2.001	S12	15 Winter	100	+40%					206.327
2.002	S13	15 Summer	100	+40%					205.499
1.004	S5	360 Winter	100	+40%	30/120 Winter				204.952
1.005	S6	360 Winter	100	+40%	30/15 Winter				204.952
3.000	S14	15 Winter	100	+40%					207.293
3.001	S15	15 Winter	100	+40%	100/15 Summer				206.880
3.002	S16	15 Winter	100	+40%	70/15 Summer				206.556
3.003	S17	15 Winter	100	+40%	40/15 Summer				206.195
3.004	S18	240 Winter	100	+40%					204.959
3.005	S19	240 Winter	100	+40%					204.957
3.006	S20	240 Winter	100	+40%					204.954
1.006	S7	360 Winter	100	+40%					204.951
4.000	S21	15 Summer	100	+40%					207.175
4.001	S22	15 Summer	100	+40%					207.078

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.525	0.000	0.05		4.0	SURCHARGED	
1.001	S2	0.555	0.000	0.08		36.0	SURCHARGED	
1.002	S3	0.581	0.000	0.08		34.4	SURCHARGED	
1.003	S4	0.606	0.000	0.05		30.2	SURCHARGED	
2.000	S11	-0.141	0.000	0.30		32.6	OK	
2.001	S12	-0.098	0.000	0.61		65.2	OK	
2.002	S13	-0.052	0.000	0.95		97.8	OK	
1.004	S5	0.641	0.000	0.02		19.3	SURCHARGED	
1.005	S6	0.730	0.000	0.04		17.6	SURCHARGED	
3.000	S14	-0.139	0.000	0.32		32.6	OK	
3.001	S15	0.647	0.000	0.97		56.9	SURCHARGED	
3.002	S16	0.669	0.000	1.07		84.4	SURCHARGED	
3.003	S17	0.624	0.000	1.51		111.9	SURCHARGED	
3.004	S18	-0.133	0.000	0.15		29.0	OK	
3.005	S19	-0.097	0.000	0.14		34.8	OK	
3.006	S20	-0.044	0.000	0.14		40.5	OK	
1.006	S7	0.000	0.000	0.01		14.6	OK	
4.000	S21	-0.050	0.000	0.96		32.6	OK	
4.001	S22	-0.072	0.000	0.79		65.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for STORM 27.01.23.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.002	S23	15 Winter	100	+40%	100/15 Summer				206.437
4.003	S24	15 Winter	100	+40%	100/15 Summer				205.805
4.004	S25	240 Winter	100	+40%	100/240 Winter				204.923
1.007	FCC	240 Winter	100	+40%	1/15 Summer				204.923

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.002	S23	0.244	0.000	0.86		91.6	SURCHARGED	
4.003	S24	0.455	0.000	1.42		120.0	SURCHARGED	
4.004	S25	0.023	0.000	0.02		28.2	SURCHARGED	
1.007	FCC	1.064	0.000	0.08		11.6	SURCHARGED	