

Report

Flood Risk Assessment

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1 Executive Summary

Sweco has been commissioned to prepare a Flood Risk Assessment for Wallace Land Investments in support of land that is being safeguarded for future development. The current proposal comprises of approximately 1,295 residential units and makes provision for other uses such as education and community facilities, a link road and associated infrastructure.

This report investigated all potential flooding mechanisms relevant to the Site using guidance from the National Planning Policy Framework, Planning Practice Guidance and Shropshire County Council, and additional information provided by the Environment Agency.

Most of the Site is located within Flood Zone 1, with one area (where development will not take place) located within Flood Zones 2 and 3b. There have been no reported incidents of historical flooding (from any source) affecting the Site. Modelled flood levels indicate that for an undefended 1 in 100-year flood, the lower lying areas of the Site, near Wesley Brook, would be affected. Prior to the submission of planning application updated hydrological and hydraulic modelling should consider the existing flood defences (which are located along Wesley Brook) and climate change in order to assess the future risk.

Most of the Site is a very low risk of surface water flooding; however, flood flow pathways result in areas of low to high surface water flood risk. Detailed hydraulic assessment should be undertaken to understand the risk to and from the Site and should be used to inform the development. There is a potential increase in surface water run-off from the development due to the consequential increase in impermeable area. It is recommended a surface water drainage strategy should be prepared alongside further assessments and discussions with the Lead Local Flood Authority to establish the requirements for appropriate SuDS methods at the Site. Further assessments are required to ensure appropriate underground structures are used to ensure groundwater flow to the local aquifer/SPZ is not restricted.

There is a risk of the Site being inundated from reservoir flooding. Although this is a very low probability event due to the strict regulations of reservoir maintenance, the consequences of a reservoir breach could be high not just to the Site but to upstream dwellings, including a large area of Shifnal. Further detailed hydraulic assessment is recommended to assist in understanding the risk and the output of such an assessment should be used to inform the development design.

Other sources of flood risk, including groundwater flooding and flooding from sewer infrastructure were not found to pose a significant risk to the Site. However, further assessment and discussions are required to confirm this as the development progresses.

Although climate change is expected to increase fluvial and surface water flood risk across the Site, both in terms of extent and frequency, however, the development is unlikely to be impacted if the above assessments and considerations are taken into account.

In conclusion, and subject to confirmation of the final design, it is considered that with the appropriate mitigation in place there will be negligible impact of flood risk to the Site or to others. Additional assessments highlighted above should be undertaken as the development progresses.

2 Introduction

Sweco has been commissioned to prepare a Flood Risk Assessment (FRA) for Wallace Land Investments in support of land west of Shifnal, Shropshire (approximate centre of the site is SJ 74421 07044) that is being safeguarded for future development beyond the plan period. This FRA has assessed the flood risk relating to and from the proposed development, which is hereby referred to as the Site.

2.1 Scope of Works

2.1.1 Aims and Objectives

The FRA has considered the following:

- risk of flooding (of any form) posed to the Site;
- predicted impacts of climate change;
- risk of flooding (of any form) posed by the Site; and
- mitigation measures required.

In order to comply with an outline of the requirements set out by the Council, the FRA also considers the following:

- discharge through Wesley Brook and likely effects of climate change
- presence and future proofing of Flood Zones 2 and 3 along the Brook
- presence of an aquifer to the east of Shifnal and its Source Protection Zones
- presence of the Shifnal Reservoir to the south of Shifnal
- hydraulic performance / potential surface water flows across the land parcels
- hydraulic modelling of any existing sewerage network likely to serve the site

2.1.2 Methodology

The FRA has been a desk-based assessment, completed in accordance with the current guidance contained in the National Planning Policy Framework (NPPF)¹ and the supporting online Planning Practice Guidance (PPG) for Flood Risk and Coastal Change². The steps for completing a site-specific FRA for planning applications have also been followed using a range of data sources listed below.

2.1.3 Data Sources

- The NPPF¹ and supporting PPG documents for flood risk and coastal change²;
- Environment Agency (EA) Flood Map for Planning³, Fluvial and Surface Water Flood Risk Maps⁴;
- British Geological Society (BGS) Geological Maps and proximal borehole logs via the Onshore Geoindex⁵, and;

¹ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>, accessed January 2020

² <https://www.gov.uk/guidance/flood-risk-and-coastal-change>, accessed January 2020

³ <https://flood-map-for-planning.service.gov.uk>, accessed January 2020

⁴ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>, accessed January 2020

⁵ <http://mapapps2.bgs.ac.uk/geoindex/home.html>, accessed January 2020

- Previous and ongoing flood studies conducted by the EA and local authorities, including: Shropshire Council Strategic Flood Risk Assessment (SFRA)⁶, Shifnal Surface Water Management Plan (SWMP)⁷, Shropshire Local Development Framework: Adopted Core strategy⁸

⁶ <https://shropshire.gov.uk/media/12734/shropshire-level-1-sfra.pdf>, accessed January 2020

⁷ <https://shropshire.gov.uk/media/5975/shifnal-swmp.pdf>, accessed January 2020

⁸ <https://shropshire.gov.uk/media/8534/core-strategy.pdf>, accessed January 2020

3 Planning Policy and Legislative Framework

The NPPF and associated PPG provide the regulatory framework and guidance for planning authorities in relation to flood risk issues for new developments. The Local Plan, informed by the SFRA, sets out local planning issues and requirements. Any applications lodged with a Planning Authority will be considered in conjunction with this guidance, and dependent on the nature and location of the application, the Planning Authority may request a FRA as part of the Planning Application documents.

The Environment Agency (EA) is a statutory consultee to the planning authority in relation to flood risk issues. The EA has provided a matrix for local planning authorities, which provides advice in terms of the requirements for FRA. The EA Standing Advice outlines the requirements relative to the scale of development and the predicted flood zones. The assessment is required for all sites greater than 1 hectare in Flood Zone 1 and all sites in Flood Zones 2 and 3, regardless of their size.

The EA publishes flood maps which indicate the probability of river and coastal flooding and the predicted extents of the natural floodplain and extreme floods. The maps identify three zones, with Flood Zone 3 being split into two sections, which refer to the probability of river or sea flooding:

- **Flood Zone 1.** This zone comprises of land with less than 1 in 1000 annual probability of river or sea flooding in any one year (0.1%)
- **Flood Zone 2.** This zone comprises of land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability flooding from the sea (0.5%-0.1%) in any one year.
- **Flood Zone 3a.** This zone comprises of land assessed as having a 1 in 100 year 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.
- **Flood Zone 3b.** The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood.

Depending upon the NPPF classification and the Flood Zone in which the proposal is designated, a Sequential and/or Exception Test may be required. The Sequential Test ensures that alternative sites at lower flood risk are considered as part of the application and that new developments are steered to areas with the lowest probability of flooding. An Exception Test may be needed to demonstrate that flood risk will be managed appropriately, while allowing necessary development to go ahead where suitable sites at a lower risk of flooding are not available. The Exception Test is required to ensure that any development is safe for its lifetime and that it will not increase (and ideally will decrease) flood risk elsewhere.

3.1 Local Planning Policy

Shropshire is both the Local Planning Authority and Lead Local Flood Authority (LLFA) for the Shifnal area. The current Adopted Core Strategy (2010 – 2020)⁹ provides

⁹ <https://shropshire.gov.uk/media/8534/core-strategy.pdf>, accessed January 2020

guidance concerning relevant policy information for development within the jurisdiction. Policy CS18 sets out requirements for developments with regards to sustainable water management to reduce flood risk, avoid an adverse impact on water quality and quantity within Shropshire, including groundwater resources, and provide opportunities to enhance biodiversity, health and recreation:

- New development is designed to be safe, taking into account the lifetime of the development, and the need to adapt to climate change. Proposals should have regard to the design guidance provided in the SFRAs for Shropshire;
- All development within local surface water drainage areas, as identified by the Water Cycle Study, and any major development proposals, demonstrate that surface water will be managed in a sustainable and coordinated way;
- New development enhances and protects water quality, including Shropshire's groundwater resources;

Shropshire's Local Plan is currently under review to ensure it is in line with the NPPF and will consider the period between 2016 and 2036.

3.2 Climate Change

For site specific flood risk assessments, the PPG for Achieving Sustainable Development, Section 14 (Meeting the challenge of climate change, flooding and coastal change)¹⁰ states:

“163. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- *within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
- *the development is appropriately flood resistant and resilient;*
- *it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- *any residual risk can be safely managed; and*
- *safe access and escape routes are included where appropriate, as part of an agreed emergency plan.”*

In addition to this, it also states:

“149. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as

¹⁰ <http://planningguidance.communities.gov.uk/blog/policy/achieving-sustainable-development/delivering-sustainable-development/10-meeting-the-challenge-of-climate-change-flooding-and-coastal-change/>, accessed December 2019

providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.”

The current online national planning guidance on climate change¹¹ established the climate change allowances for river rainfall and tidal sources for different catchment areas of the UK. As the proposed development is an area safeguarded for residential development and will include buildings used for dwelling houses it is considered appropriate to class it as “More Vulnerable”. As the areas being developed lie within Flood Zone 1 and the assessment for climate change being required, the Severn region central and higher central categories will be applied, with an assumed time horizon of 2080s (2070 to 2115). Subsequently, the PPG guidance states that peak river flow climate change allowance would be 25% and 35%. The revised peak rainfall intensity (to assess surface water flood risk) climate change allowance is between 20% and 40%, for the central and upper end allowances respectively.

A small part at the centre of the site is located within Flood Zone 3b (the ‘functional floodplain’) associated with Wesley Brook. However, the outline masterplan indicates there would be no development within this part of the Site.

¹¹ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>, accessed December 2019

4 Proposed Development

4.1 Site Description

The proposed development, herein known as the 'Site', is located to the west of Shifnal, Shropshire, approximately 4km east of Telford and 20km north west of Wolverhampton (see Figure 4.1). The land is currently classified as part of the Northern Green Belt¹² and is currently used for agricultural purposes.

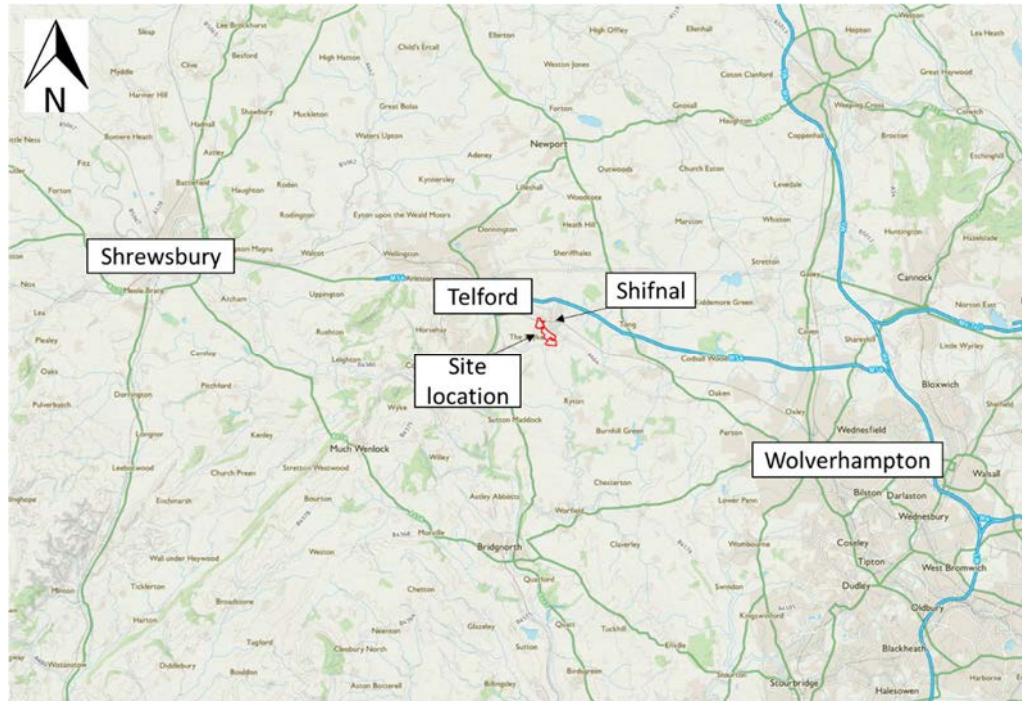


Figure 4-1 Geographical location of West Shifnal Safeguarded Site.

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Wesley Brook, an EA designated main river, enters the centre of the Site near Stafford Avenue and flows in a south westerly direction through the Site (Figure 4-2). A tributary of Wesley Brook, designated as an ordinary watercourse, enters the Site south of Wesley Brook near Tanglewood Close and flows in a westerly direction for 150m before it joins the main river. Local to the Site there are numerous ponds, ordinary watercourses and reservoirs.

¹² <https://shropshire.gov.uk/media/11254/16-preferred-sites-consultation-shifnal-place-plan-area.pdf>, accessed January 2020

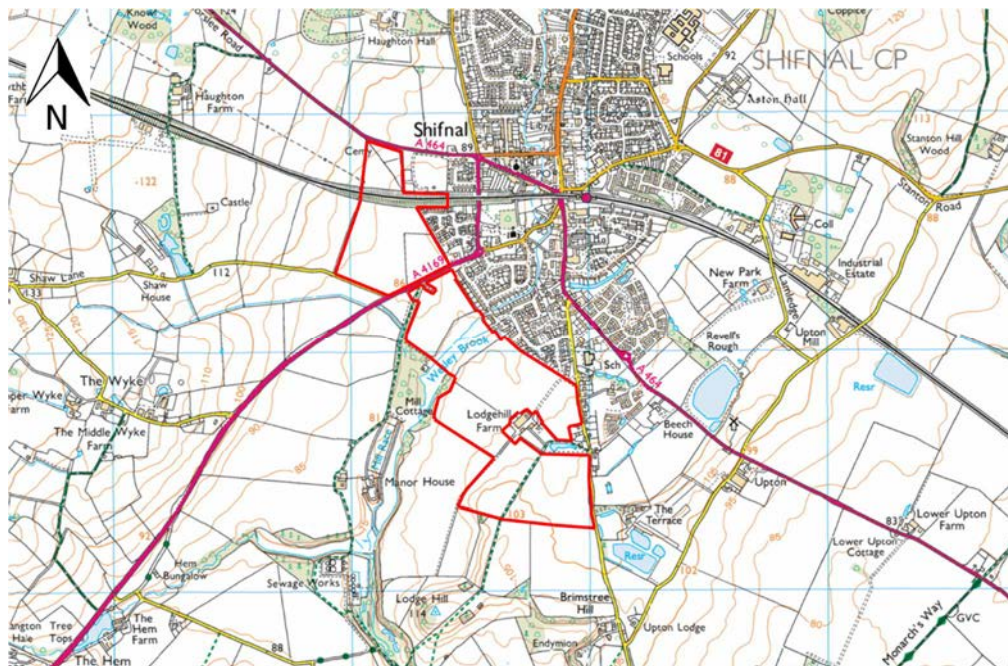


Figure 4-2 Boundary of the Site.
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The A4169 splits the northern section of the Site. North of this, a rail line runs east to west bisecting the Site.

In the northern and southern sections of the Site there is no Severn Trent Water wastewater infrastructure (Appendix A, drawing references 363627-2 and 363627-1, respectively). Appendix A (drawing references 363627-3) indicates there is wastewater infrastructure located within the central area of the Site:

- One public surface water gravity / lateral drain is piped from the estate north of the A4169 to Wesley Brook;
- One public combined gravity sewer is piped from the estate between Wesley Brook and its tributary in a south westerly direction toward a pumping station, which is located outside of the Site boundary; and,
- One public foul water gravity sewer is piped from the estate north of the A4169 to south of Wesley Brook which joins the public combined gravity/lateral drain.

Numerous man-holes associated with the above infrastructure are identified within the Site boundary.

4.2 Proposed Development

The proposed development Site is land that is proposed in the emerging local plan to be safeguarded for development beyond the plan period. Currently there are approximately 1,295 residential units planned to be built within this Site. The design of the units is currently unknown. Alongside new housing, the current proposal as identified in the Illustrative Masterplan (see Appendix B, drawing number DOO1)

indicates the Site will also consist of a school with a parking / drop off area, a local community centre, bypass and primary roads, public rights of way, vegetation and surface water attenuation areas. The bypass road will pass through the Site connecting the A464 at the north of the Site to Park Lane at the south of the Site, crossing the A4169 and the rail line. Primary access to the Site will be via Park lane to the south and the A464 to the north.

Appendix B, drawing number DOO1 indicated that a section surrounding Wesley Brook and its tributary will not be developed on and existing vegetation will remain in place.

The land to the east of the Site is also safeguarded for residential and commercial development. However, this has not been included in this assessment.

4.3 Topography

Within the Site boundary there is a natural depression which is associated with Wesley Brook valley. The topography of the Site naturally rises away from Wesley Brook to the north and south (see Figure 4.3). The ground levels range from 73 m above Ordnance Datum (AOD) to 103 m AOD. The southern area of the Site appears to have a larger area of higher ground.

Beyond the Site, the ground levels increase to the west and the north west of the Site. Increased ground levels are also observed in the south east.

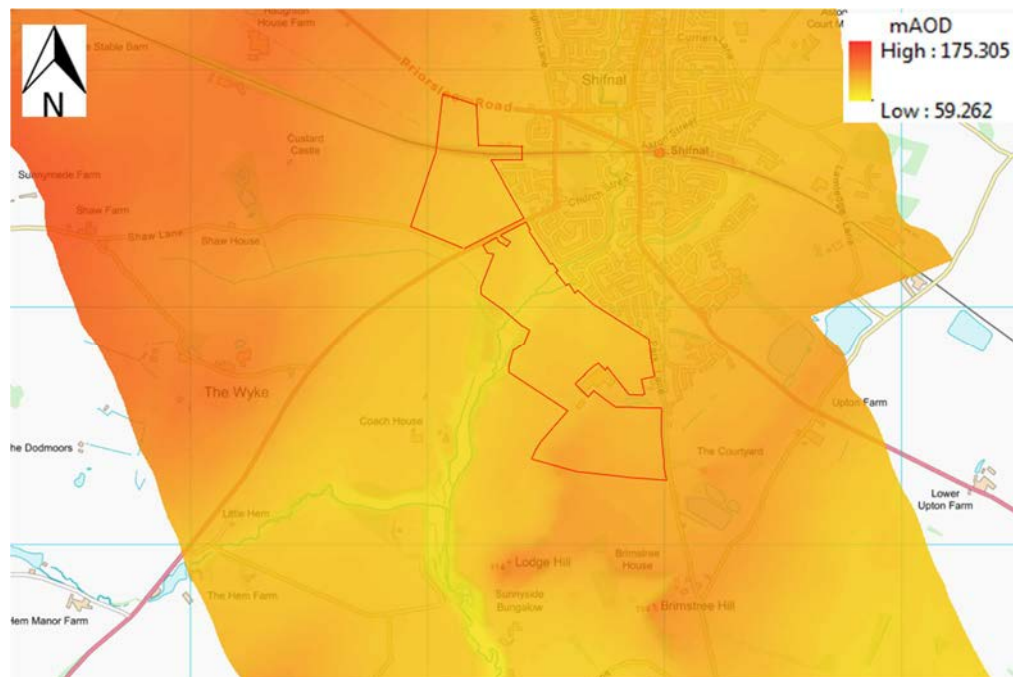


Figure 4-3 1m LiDAR map¹³ of the Site and the surrounding area. The Site boundary is denoted by the red line.

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4.4 Geology

The British Geological Survey's Geoindex⁵ shows that the Site is underlain by superficial deposits comprising:

- Till, Devensian – Diamicton
- Glaciofluvial Deposits, Devensian - Sand and gravel, and
- Alluvium - Clay, silt, sand and gravel.

The Alluvium - Clay, silt, sand and gravel is a sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period. Within the vicinity of Wesley Brook watercourse and its associated tributary, the Glaciofluvial Deposits, Devensian - Sand and gravel sedimentary superficial deposits formed between 116 and 11.8 thousand years ago during the Quaternary period. This deposit is found near the alluvium and follows a similar path of the watercourse, extending out the north of the central section of the Site. The remaining Site is underlain by Glaciofluvial Deposits, Devensian - Sand and gravel, which is a Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

The superficial deposits are underlain by bedrock comprising Bridgnorth Sandstone Formation – Sandstone across the Majority of the Site. This is a sedimentary bedrock formed between 298.9 and 272.3 million years ago during the Permian period. At the south of the Site there is a small section which is underlain by Chester Formation - Sandstone and at the north of the Site it is underlain by conglomerate, interbedded and Enville Member – Sandstone, Chester Formation - Sandstone and conglomerate, interbedded is a sedimentary bedrock formed between 250 and 247.1 million years ago during the Triassic period. Enville Member – Sandstone is a sedimentary bedrock formed between 309.5 and 272.3 million years ago during the Carboniferous and Permian periods.

4.5 Catchment Characteristics, Hydrology and Hydrogeology

The catchment upstream of the Site is 19.5km² and covers all of Shifnal up to the Telford, north west of the Site. Wesley Brook is the main river within this catchment and there are numerous ordinary watercourse tributaries, associated with Wesley Brook. In addition to this there are numerous ponds within the catchment area. North west of Shifnal, the Priorslee Flash Reservoir forms the head waters of Wesley Brook, and flows through Priorslee Lake (a balancing reservoir), approximately 1.2km downstream.

The British Geological Survey's Geoindex⁵ shows that there are a number of boreholes across the Site associated with the Shifnal by-pass and were drilled in 1968. In the central area of the Site water levels ranged from 251.67 ft AOD (76.71 mAOD) to 269.76ft AOD (82.22 mAOD) which was between 2m and 14m below current (1968)

¹³ <https://environment.data.gov.uk/DefraDataDownload/>, accessed September 2019

ground level. No water was encountered in the northern and southern section of the Site.

The Aquifer Designation Map¹⁴ indicates the centre of the Site is underlain by a secondary superficial aquifer and the majority of the northern and southern section is underlain by a Secondary (Undifferentiated) superficial aquifer. The entire Site is underlain Principal bedrock aquifer.

The majority of the Site is within an area designated as Source Protection Zone (SPZ) 3¹⁴. The zone is defined as the area around a water supply source within which all groundwater will flow towards the abstraction point. In confined aquifers, the source catchment area may extend for some distance from the source. The Site, at its closest point is located 2km west from the SPZ1.

¹⁴ <https://magic.defra.gov.uk/MagicMap.aspx>, accessed January 2020

5 Existing Sources of Flood Risk

5.1 Sources of Potential Flooding

Existing sources of flood risk affecting the Site have been assessed and any potential impacts arising from development on this Site have been evaluated. This process has utilised the existing flood information and recommends mitigation strategies where required. Site relevant potential sources of existing flood risk include fluvial, surface water and groundwater flooding as well as risk of flooding from sewers and from the failure of an upstream reservoir.

There are no canals near the Site and therefore this has not been included in this assessment.

5.2 Historic Flooding

The SFRA⁶ notes the combined DG5 registers of recorded historical sewer flooding was supplied and indicates a total of 347 recorded incidences of sewer flooding in Shropshire from 1990 (Severn Trent record) and 1999 (Welsh Water record). However, only four incidents of sewer flooding have been observed in the Shifnal area.

High intensity rainfall in June and July 2007 caused flooding from multiple sources. Key affected areas included Shifnal, Bridgnorth, Shrewsbury and Ludlow. The flooding in Ludlow caused the collapse of the Burway Bridge⁶.

The EA indicate that there are no records of historical flooding within the area of the Site (Appendix C).

5.3 Fluvial and Tidal Flood Risk

The SFRA⁶ notes the primary flood risk is along the River Severn and its main tributaries. These present fluvial flood risk to rural communities as well as some of the main urban centres which includes Shifnal.

The EA Flood Map for Planning³ indicates the majority of the Site is within Flood Zone 1. However, there is a section within the centre of the Site that is within Flood Zone 2 and 3. The SFRA⁶ indicates that the Flood Zone 3 in this area is classified as Flood Zone 3b (see Appendix D). Flood Zone 2 is identified as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability flooding from the sea (0.5%-0.1%) in any one year. Flood Zone 3b is identified by the EA as being the Functional Floodplain and comprises of land where water must flow or be stored in times of flood.

According to the EA Flood Map for Planning³ and the SFRA maps⁶, the site is not within an area that benefits from flood defences. However, EA data¹⁵ indicates defences are located along Wesley Brook upstream of the Site. The defences were

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<https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/SpatialFloodDefencesIncStandardisedAttributes&Mode=spatial> , accessed January 2020

constructed within the last five years and give a standard of protection equal to or better than 1% (1 in 100-year event).

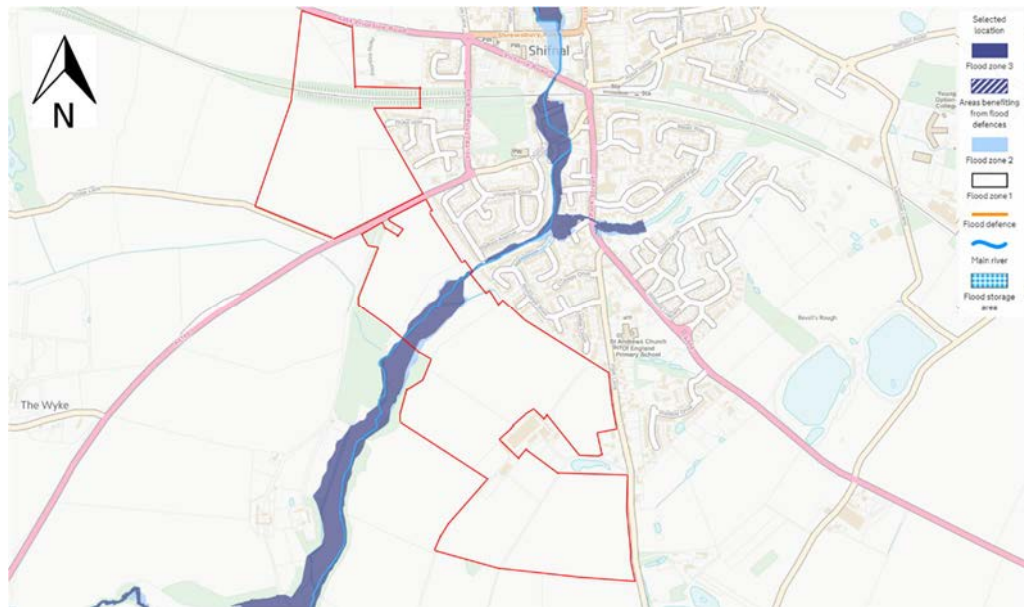


Figure 5-1 An extract of the EA Flood Map for Planning. The approximate location of the Site is denoted by the red outline.

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Hydraulic modelling of Wesley Brook was undertaken by the EA as part of the 2001/2002 Section 105 Flood Risk Mapping studies commissioned by the EA, Midlands Region. Three model nodes (77, 79 and 80) are located along Wesley Brook within the Site boundary. Modelled water levels for the undefended 1 in 100-year and 1 in 200-year return period are identified as being above the ground level of the Site within the area of Wesley Brook, where there will be no development. Outside of this development area, the lowest ground levels are 80m to the north and 84m to the south. The presence of fluvial defences provide protection of up to a 1 in 100-year and defended scenarios should be modelled and should include climate change allowances as peak river flows are assumed to increase by 25% and 35% for 2080s (2070 to 2115), which will increase the frequency and severity of fluvial flooding without mitigation.

Table 5-1 Modelled fluvial flood levels (mAOD) for Wesley Brook local to the Site.

Node Label	Annual Exceedance Probability - Maximum Water Levels (mAOD) (undefended)				
	20% (1 in 5)	2% (1 in 50)	1% (1 in 100)	0.75% (1 in 150)	0.5% (1 in 200)
77	77.76	78.15	78.30	78.37	78.45
79	77.58	78.03	78.19	78.28	78.39
80	77.25	77.86	78.07	78.18	78.30

The section of the Site within Flood Zone 2 and 3 is identified as being within the area where no construction would occur and the current vegetation (floodplain woodland⁶) will remain in place. Flood risk is likely to remain low if no development occurs within predicted future Flood Zone 3 (that is, with climate change allowance). This is subject to a detailed hydraulic modelling assessment and a consideration of freeboard (allowance for uncertainty) when determining finished floor levels and access.

5.4 Pluvial (Surface Water) Flood Risk

The SFRA⁶ notes flooding from surface water runoff is usually caused by intense rainfall that may only last a few hours and usually occurs in lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems can be linked to issues of poor drainage, or drainage blocked by debris, and sewer flooding. This can be made worse by local insufficient drainage capacity. Where discharge is directly to a watercourse, locally high water levels can cause a back-up and prevent drainage taking place.

The EA classify the four levels of surface water flood risk as:

- High - each year, the area has a chance of flooding of greater than 1 in 30 (3.3%) chance of pluvial flooding in any given year.
- Medium - each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) chance of pluvial flooding in any given year.
- Low - each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) chance of pluvial flooding in any given year.
- Very low - each year, the area has a chance of flooding of less than 1 in 1000 (0.1%) chance of pluvial flooding in any given year.

The EA Flood Risk from Surface Water Map⁴ indicates the majority of the Site is at very low risk from surface water flooding with instances of low risk identified to the north (see Figure 5.2). However, there are instances of low to high risk of surface water flooding associated with surface water flow paths and areas of ponding:

- To the north of the rail line there is a surface water flood flow pathway that runs along the base of the embankment. At this location there is low to high risk of surface water flooding.
- Immediately north of the A4169 there are two areas of visible ponding of high and medium surface water flood risk.
- High and medium surface water flood risk is identified in the centre of the Site and this is associated with Wesley Brook and its tributary. To the north of this a flood flow pathway (of low and medium risk) feeds into Wesley Brook from the corner of the Site north of the A4169. This appears to align with the placement of the existing sewerage pipework.
- Areas of low and medium surface water flood risk flows in a northerly direction in the centre of the Site and meets the upper extent of the tributary of Wesley Brook.
- Low to high surface water flood risk is observed in the south section of the Site, where the flood flow pathway moves in a northerly direction from the most southern section of the Site, through the pond (located outside of the Site boundary) to West of Park Lane. This flow path is potentially linked to the flow path above but is disconnected due to the observed ponding.
- A small area of high and low flood risk is also observed in the south of the Site.

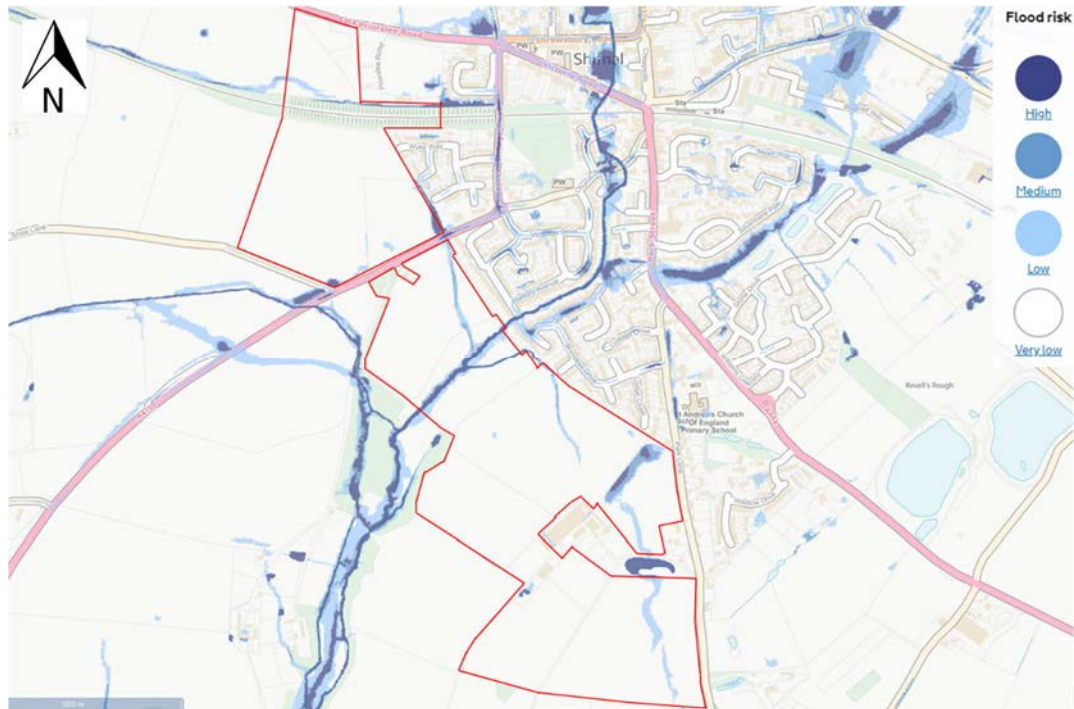


Figure 5-2 An extract of the EA Flood Risk from Surface Water Map. The approximate location of the Site is denoted by the red outline.

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Most of the Site is at very low risk of surface water flooding. However, for the other isolated areas of higher risk noted above, and because the risk map is based on coarse scale mapping, a detailed hydraulic assessment (including an allowance for climate change) should be undertaken to verify the surface water flood risk. The assessment will be used to inform the development alongside the outcome of the surface water drainage strategy.

5.5 Risk of Flooding from Sewers

The SFRA⁶ indicates there have been four recorded sewer flooding incidents within the Shifnal area. These incidents occurred over 3.5km north of the Site. The historic flood incident register does not contain information about properties and areas at risk of sewer flooding caused by operational issues such as blockages.

Two sewerage drains have been identified within the area of the Site, and additional existing sewers are located within existing roads or along the valley. As identified in Section 5.4, existing sewers within the Site are aligned with surface water flood flow paths and so development should be avoided in these areas.

As there are only two drains (public foul and public surface) identified within the area of the Site where development will take place, together with the lack of historical sewer flooding incidents, the existing risk of sewer flooding is considered to be low.

Consultation with Severn Trent Water identified that flooding has been observed within the area of the Site, however, due to the sensitivity of the data, specific information could not be provided. Severn Trent Water were not able to provide any specific details of the hydraulic performance of the local network. Further liaison with Severn Trent Water should be undertaken to discuss the capacity of the network, as the development will significantly increase input into the public sewer.

5.6 Risk of Flooding from Reservoir Failure

The SFRA⁶ notes there are no records of flooding from reservoir failure within the SFRA study area and the level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low.

The EA Flood Risk from Reservoir Map⁴ indicates the majority of the Site is not at risk should there be a failure of a local reservoir (see Figure 5.3). However, the area surrounding Wesley Brook, where there is no proposed development, and the south of the Site along the east boundary is at risk should the local reservoirs (Priorslee Flash and Priorslee Lake) fail. Depth of flooding in this area is identified as being between below 0.3m and up to 2m. Modelling has not been undertaken to confirm these depths or flood flow patterns.

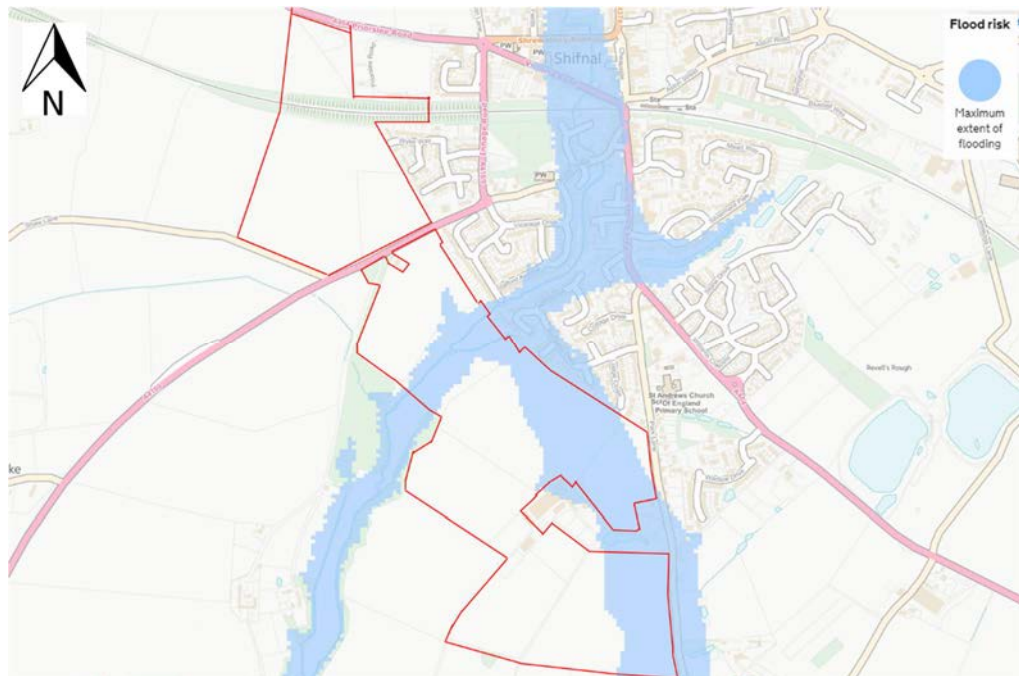


Figure 5-3 An extract of the EA Flood Risk from Reservoirs Map. The approximate location of the Site is denoted by the red outline.

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Although reservoir failure is a very low probability event, due to the strict regulations of reservoir maintenance, the consequence of failure could be high, not just to the Site but also to upstream dwellings including most of Shifnal. It is recommended that a detailed assessment (breach modelling) is undertaken to confirm the predicted flood flow paths, depth, velocity and hazard within the Site. This assessment should be used to inform the development design.

5.7 Groundwater Flood Risk

A coarse scale map (1km squared) produced as part of the SFRA⁶ indicates that the northern section of the Site is susceptible to high risks of groundwater flooding (>=75%) and the southern section is susceptible to low risk (between 25 and 50%). In addition to this, a range of groundwater levels (2 – 14m below ground level) have been observed during borehole investigations undertaken in 1968 (see Section 4.5). However, there is no historic evidence of groundwater flooding in the area⁶ and the high risk identified in the mapping may be due to the coarse scale of the assessment. Further detailed assessment is required to fully understand the risk of groundwater flooding to the Site, which should be undertaken prior to development.

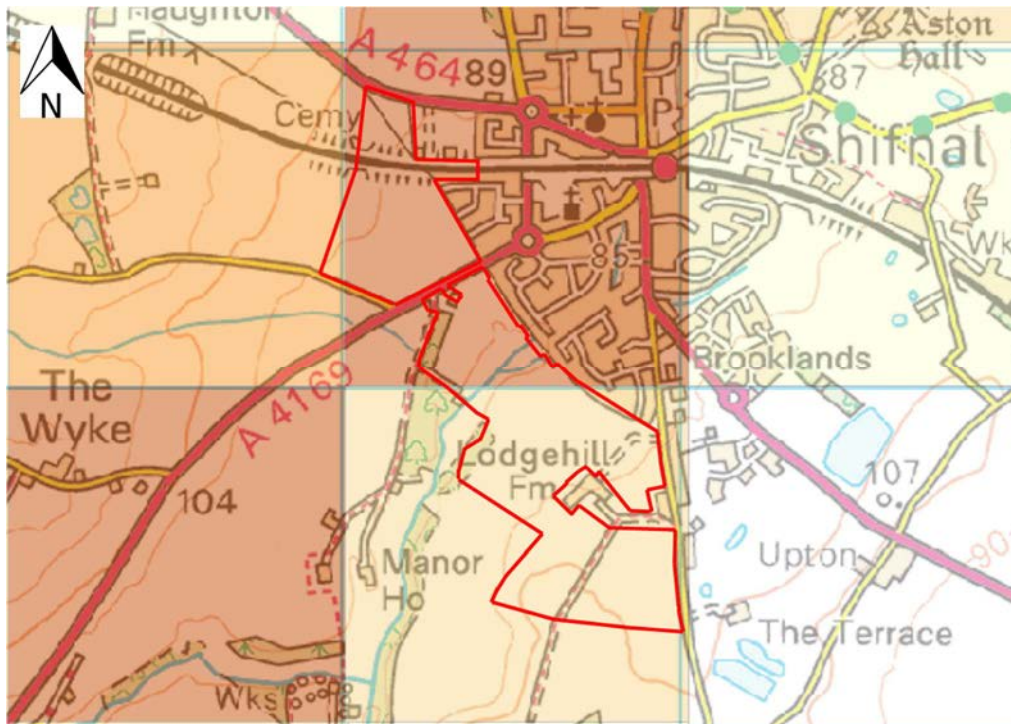


Figure 5-4 An extract of the SFRA Areas Susceptible to Groundwater Flooding Map. The approximate location of the Site is denoted by the red outline.

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5.8 Summary of Existing Flood Risk to the Development

The EA Flood Map for Planning and the SFRA identifies a section of the Site as being located within Flood Zone 3b. However, as most of the Site is within Flood Zone 1, and the section within Flood Zone 3 is not planned to be developed on, it is considered that the level of fluvial flood risk is low. Flood risk is likely to remain low if no development occurs within predicted future Flood Zone 3 (with climate change allowance). This is subject to detailed assessment. Defences are located along Wesley Brook upstream of the Site and give a standard of protection equal to or better than 1% (1 in 100-year event). In addition to this, there have been no reported incidents of fluvial flooding affecting the Site.

The EA Flood Risk from Surface Water Map indicates that most of the Site is at very low risk from surface water flooding. There are areas where the risk of surface water flooding low to high and following the topography of the land creating flood flow pathways. Due to most of the Site being at very low risk of surface water flooding, it is considered that the risk to the overall Site is low. However, detailed hydraulic assessment (with an allowance for climate change) should be undertaken to confirm the surface water flood risk.

The south east of the Site is at risk of flooding from reservoir failure, however, given this is a very low probability event, the risk of flooding is low. This is subject to detailed assessment which would confirm the predicted flood flow paths, depth, velocity and hazard within the Site and should be used to inform the design of the development.

Due to historical evidence stating the area of, and around, the site has not been affected by sewer flooding, and the minimal sewer infrastructure within the boundary of the Site, it is considered that the risk of flooding sewer infrastructure failure is low. However, consultation with Severn Trent Water is required to determine the hydraulic performance in the area and confirm the scale of the risk and the capacity of the network, as the development will increase input into the public sewer.

The SFRA indicated the Site is within an area which is susceptible to low and high risk of groundwater flooding and there are no historical records of ground water flooding within the vicinity of the site. However, borehole investigations undertaken in 1968 identified a range of water levels in the centre of the Site and therefore further detailed assessment is required to fully understand the risk of groundwater flooding to the Site, which should be undertaken prior to development.

6 NPPF Guidance (Sequential Test)

The proposed development is an area safeguarded for residential development and will include buildings used for dwelling houses. Therefore, the proposed development is classified as “More Vulnerable”. Section 5.3 indicated that most of the Site is within Flood Zone 1 with a small section within Flood Zone 3b. Therefore, provided infrastructure is sited within Flood Zone 1, the Sequential Test has been satisfied. The Exception Test would not be required for development outside for Flood Zone 3. According to the NPPF guidance, shown in Table 6.1 below, the Site is considered appropriate for development.

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

Key	
✓	Development is appropriate
×	Development should not be permitted
†	In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
*	In Flood Zone 3b (functional floodplain) essential infrastructure that must be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to: <ul style="list-style-type: none"> • Remain operational and safe for users in times of flood; • Result in no net loss of floodplain storage; • Not impede water flows and not increase flood risk elsewhere.

7 Flood Risk from the Development

The potential impacts of the Site on flood risk to others is a key consideration.

7.1 Fluvial Flood Risk

The proposed development has potential to divert fluvial flood waters which may in turn divert flood risk to others. However, given there is no planned development within Flood Zone 3 and there are defences situated along Wesley Brook which provide protection of up to 1 in 100 year, it is considered the risk would be low. As such, there is unlikely to be any requirement for compensatory flood storage within Flood Zone 3. However, this will be subject to detailed confirmation as development progresses which should include a consideration of the impacts of climate change on Flood Zone 3 extents.

7.2 Surface Water Flood Risk

There is a potential increase in surface water run-off rate and volume from the development due to the consequential increase in impermeable area and areas of new hardstanding. In addition to this, building within areas that are at risk of surface water flooding has the potential to divert flood risk elsewhere.

7.3 Reservoir Flood Risk

The proposed development has potential to divert reservoir flood waters which may in turn divert flood risk to others. However, given this is a very low probability event, the risk to others is low. Detailed assessment is required to confirm the impacts to and from building within the flood extent and assist with further development of the Site.

7.4 Groundwater Flood Risk

Based on the available information, there are no risks of increased groundwater flooding anticipated from the development post-construction. Further assessments and should be undertaken to ensure any underground structures do not impact on groundwater flow, which could result in a reduction of supply to the local aquifer / SPZ.

8 Future Recommendations

8.1 Fluvial Flood Risk

Provided that there is no planned development within the Flood Zone 3a & 3b area of the Site, there is no need to assess impacts of the new development on floodplain volume loss or any related compensatory storage requirements.

It is recommended the updated hydrological and hydraulic modelling of Wesley Brook should be undertaken prior to further development of the Mater Plan and at the point of planning application. This would confirm the extent of the Flood Zones throughout the Site and the level of protection the flood defences of Wesley Brook provide to the Site. Climate change is expected to increase fluvial flood risk across the Site both in terms of extent and frequency, and this should also be considered in further detailed assessments.

8.2 Pluvial Flood Risk

There is a potential increase in surface water run-off from the development due to the consequential increase in impermeable area. A surface water drainage strategy should be prepared and should comply with LLFA policy and national SuDS guidance where feasible to minimise impacts of the development.

The SFRA⁶ states that for areas underlain by a bedrock classified as Principal Aquifer, infiltration may not be a suitable SuDS technique in this area due to the permeable nature of this bedrock. Infiltration should be considered with caution within areas of possible subsidence or sinkholes. Where sites lie within or close to groundwater protection zones (SPZs) or aquifers or near areas of contaminated land / areas of former mining works, further restrictions may be applicable. As the Site is underlain by a Principal bedrock aquifer and the majority of the Site is within an area identified as a SPZ3, site-specific infiltration tests should be conducted to ensure the water table is low enough to allow infiltration and guidance should be sought from the LLFA.

Due to the surface water flood flow pathways identified in section 5.4, it is recommended that detailed hydraulic assessment is undertaken to verify the surface water flood risk. The outcome of this assessment should be considered in the development design. Climate change is expected to increase pluvial flood risk across the Site both in terms of extent and frequency, and this should also be considered in further assessments.

8.3 Sewer Flood Risk

Although the existing risk of flooding from sewerage infrastructure has been considered to be low, discussions are ongoing to understand any current performance issues and constraints within the current infrastructure, and these discussions should continue as development progresses. This would help inform construction and development design.

8.4 Reservoir Flood Risk

Although the risk of flooding from reservoirs has been identified as being low, reservoir flood flow pathways are identified in section 5.6. Due to this it is recommended that

breach modelling is undertaken to establish the potential level of impact to development within the Site and to help inform the design of the development.

8.5 Groundwater Flood Risk

Further assessment is required to understand the groundwater levels and geology across the Site. This would help inform construction and development design.

9 Conclusion

The assessment of flood risk to the Site and the risk posed by the Site has been undertaken in accordance with the NPPF and its associated PPG for flood risk and coastal change.

According to the EA's Flood Map for Planning, the majority of the Site lies within Flood Zone 1 with a section around Wesley Brook within Flood Zones 2 and 3. The SFRA maps identifies the area of the Site which is situated in Flood Zone 3 as being in Flood Zone 3b. Flood defences are located on Wesley Brook upstream of the Site and are designed to provide protection during a 1 in 100-year event. The flood defence rating is currently unknown, and this should be considered in further detail during future assessments.

There have been no reported incidents of historical flooding (from any source) affecting the Site. Modelled flood levels indicate that for an undefended 1 in 100-year flood the lower lying areas near Wesley Brook, would be affected. Development should be avoided within the area, however, prior to submission of the planning application updated hydrological and hydraulic modelling should consider existing flood defences and climate change in order to assess the future risk.

Provided that there is no proposed development within the section of the site identified as Flood Zone 3b, there is no need to assess impacts of the new development on floodplain volume loss or any related compensatory storage requirements.

The EA Flood Risk from Surface Water Map indicates most of the Site is within an area that is at very low risk of surface water flooding. However, there are areas of low to high risk which form flood flow pathways due to the topography of the Site. Detailed assessment should be undertaken in order to verify the flood risk to and from the Site from the surface water flood flow pathways. The outcome of this assessment would then help inform the design of the development.

There is a potential increase in surface water run-off from the development due to the consequential increase in impermeable area. A surface water drainage strategy should be undertaken and should comply with LLFA policy and national SuDS guidance where feasible to minimise impacts of the development. Further assessments are recommended to establish appropriate SuDS methods are utilised and appropriate underground structures are used to ensure groundwater flow is not restricted to the local aquifer / SPZ.

Although the risk of flooding from reservoir failure is considered to be a very low probability event, the consequences to the Site could be high. A detailed hydraulic assessment is recommended to understand the risk to the Site and the output of this assessment should be used to inform the development design.

It is considered that the risk of flooding from groundwater and sewer infrastructure failure is low. However, further investigation and discussions are recommended to understand the local hydrogeology and the performance of the sewerage system in the area, respectively.

Climate change is expected to increase flood risk, and in particular, fluvial and surface water flood risk, across the Site both in terms of extent and frequency. However, the impacts of the proposed development to others, and to the development are likely to be negligible if the above assessments are undertaken and used to inform the development of the design.

In conclusion, and subject to confirmation of the final design, it is currently considered that with the above-mentioned mitigation in place there will be negligible impact of flood risk to the Site or to others. Additional assessments highlighted above should be undertaken as the development progresses.

Appendix A – Information from Severn Trent Water



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 Scale: 1:1250 Date: 20/01/20 Wastewater Plan A3
 Data updated: 14/11/19 Map Centre: 374039,307835 Our Ref: 363627 - 2 Powered by digdat

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

karen.dunton@sweco.co.uk

Shifnal north



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

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

0800 783 4444 (24 hours)

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991 (a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

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

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.
4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.
10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,
14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

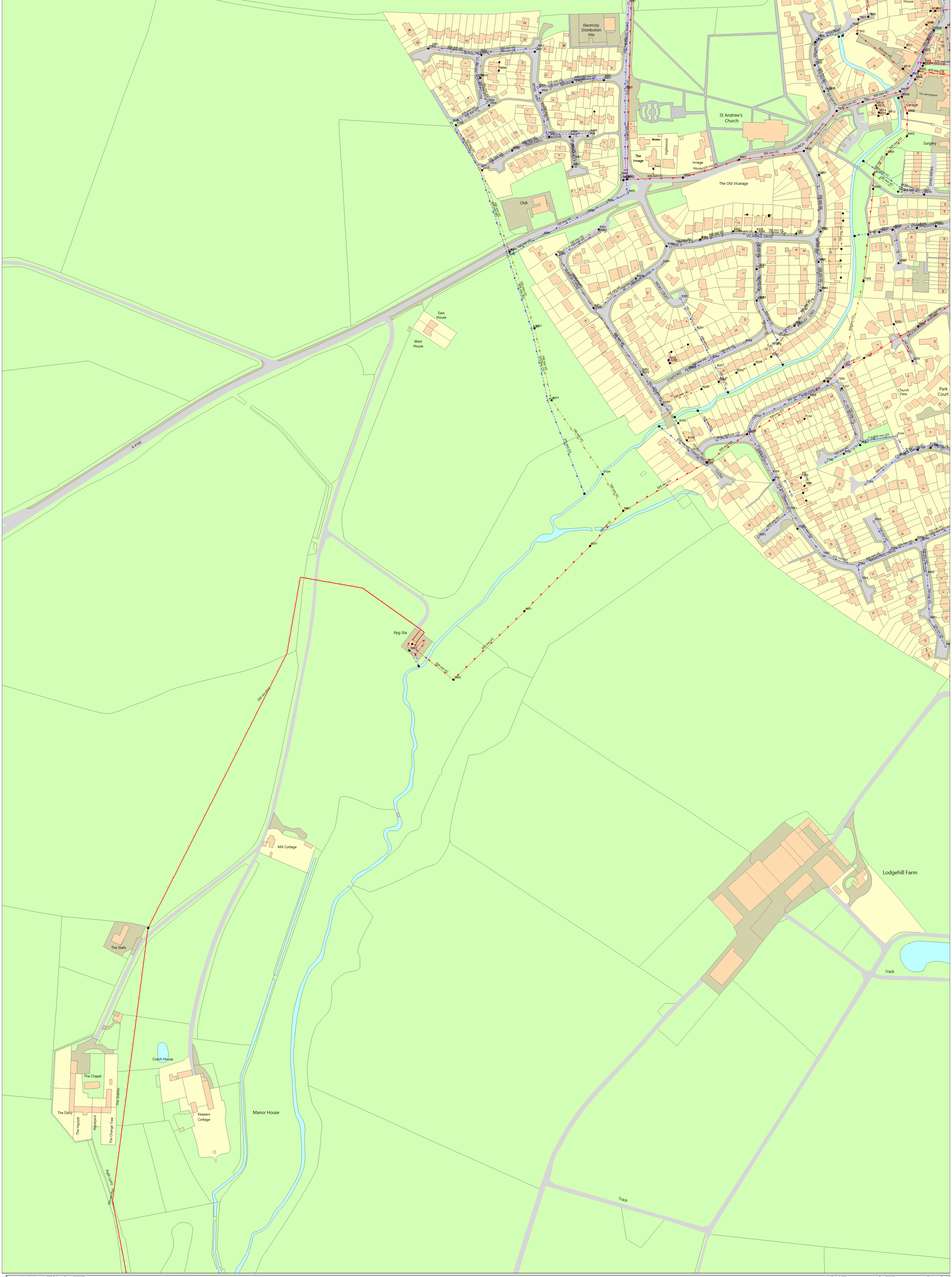
TREE PLANTING RESTRICTIONS

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

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.
16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.
17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other

STW Apparatus.

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



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 Date updated: 14/11/10

Scale: 1:250
 Map Centre: 514215, 306844
 Date: 20/11/10
 Out Ref: 90607_3
 Worksheet: Plan A3
 Produced by: dgj

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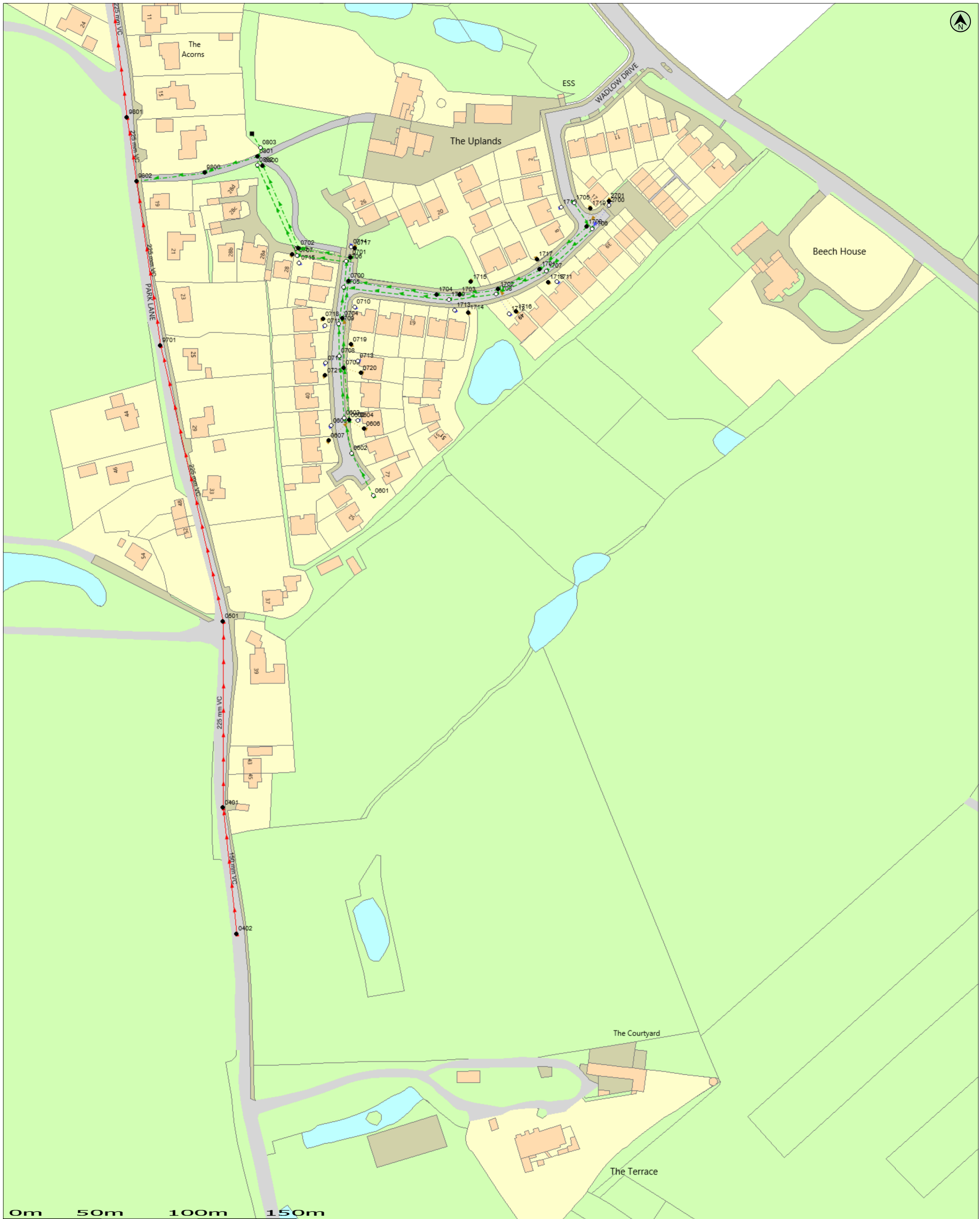
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10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
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14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

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

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.
16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.
17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.
19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.



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 Data updated: 14/11/19

Scale: 1:1250
 Map Centre: 375141.306581
 Date: 20/01/20
 Our Ref: 363627 - 1
 Wastewater Plan A2
 Powered by digdat

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

karen.dunton@sweco.co.uk

Shifnal south east



Do not scale off this Map. 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. 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. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

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

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

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991 (a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

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

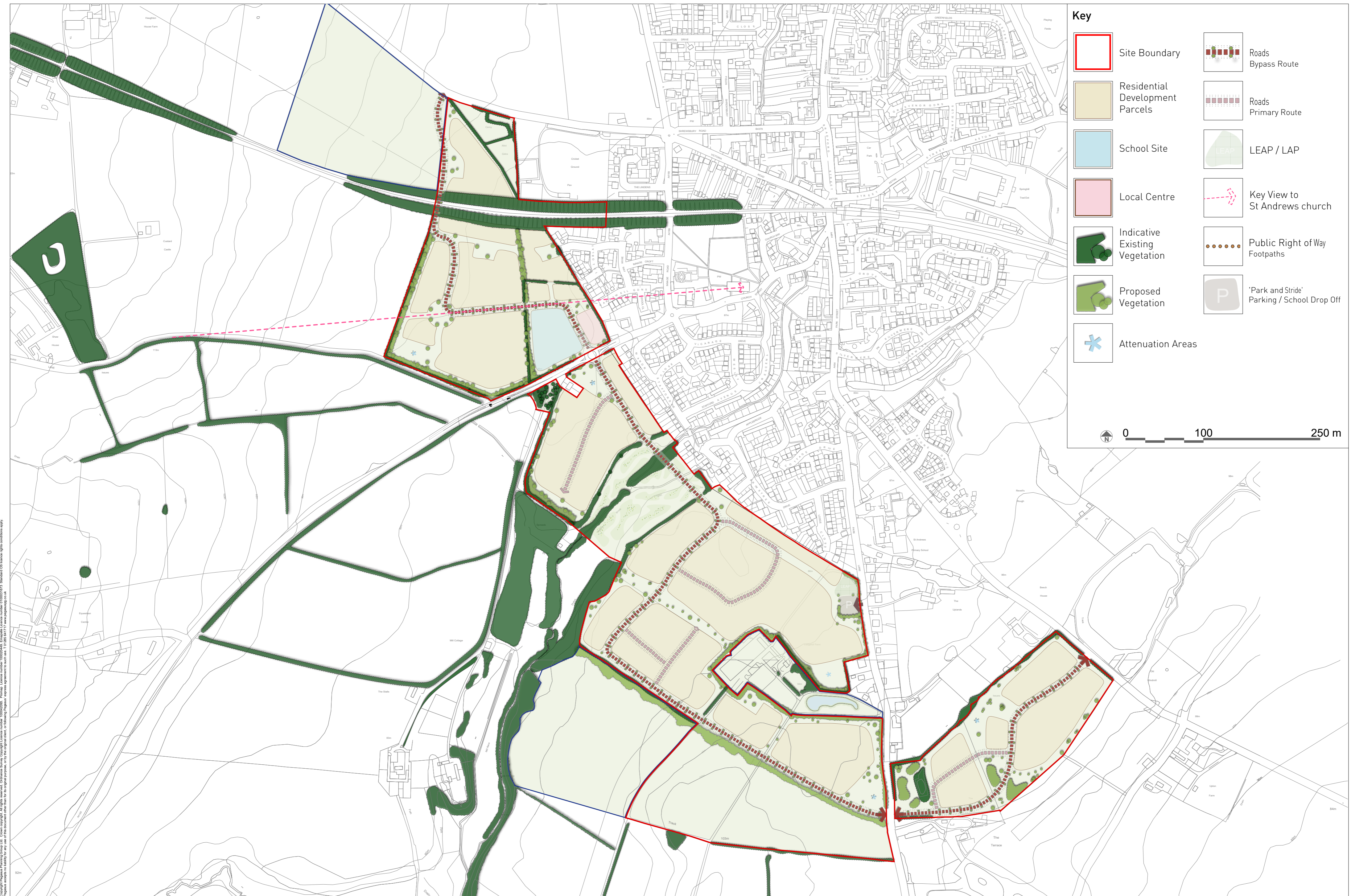
1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.
4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
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Appendix B – Information from Wallace Land Investments



Key

	Site Boundary		Roads Bypass Route
	Residential Development Parcels		Roads Primary Route
	School Site		LEAP / LAP
	Local Centre		Key View to St Andrew's church
	Indicative Existing Vegetation		Public Right of Way Footpaths
	Proposed Vegetation		'Park and Stride' Parking / School Drop Off
	Attenuation Areas		

0 100 250 m

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Appendix C – Information from the Environment Agency

Product 4 (Detailed Flood Risk Data) for Shifnal, Shropshire

Reference number: 156918

Date of issue: 24 January 2020

Model Information

The following information and attached maps contain a summary of the modelled information relevant to the area of interest. The information provided is based on the best available data as of the date of issue.

Model Name	Release Date
Wesley Brook	2003

Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring in any year for fluvial (river) flooding (Flood Zone 3). It also shows the extent of the Extreme Flood Outlines (Flood Zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The Flood Zones refer to the land at risk of flooding and **do not** refer to individual properties. It is possible for properties to be built at a level above the floodplain but still fall within the risk area.

This Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water, sewers, road drainage, etc.

To find out which flood zone a location is in please use: <https://flood-map-for-planning.service.gov.uk/>

Definition of flood zones

- **Zone 1** - The area is within the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1000 to 1 chance).

- **Zone 2** - The area which falls between the extent of a flood with an annual probability of 0.1% (i.e. a 1000 to 1 chance) fluvial and tidal, or greatest recorded historic flood, whichever is greater, and the extent of a flood with an annual probability of 1% (i.e. a 100 to 1 chance) fluvial / 0.5% (i.e. a 200 to 1 chance) tidal. (Land shown in light blue on the Flood Map).
- **Zone 3** - The chance of flooding in any one year is greater than or equal to 1% (i.e. a 100 to 1 chance) for river flooding and greater than or equal to 0.5% (i.e. a 200 to 1 chance) for coastal and tidal flooding.

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the [Strategic Flood Risk Assessment](#) when considering location and potential future flood risks to developments and land uses.

Areas Benefitting From Defences

Where possible we show the areas that benefit from the flood defences, in the event of flooding:

- from rivers with a 1% (1 in 100) chance in any given year, or;
- from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would flood. Please note that we do not show all areas that benefit from flood defences.

The associated Dataset is available here: <https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-areas-benefiting-from-defences>

Node Data/ Modelled Levels

The attached map will show a selection of 1D model node points near to your site. The fluvial levels for these node points are shown below.

Fluvial Flood Levels (m AOD)

The modelled levels are given in m AOD (N), m AOD indicates metres Above Ordnance Datum (Newlyn).

The information is taken from the model referenced above and does not include the updated climate change figures.

Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Water Levels (m AOD) (undefended)							
			20% (1 in 5)	10% (1 in 10)	4% (1 in 25)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.75% (1 in 150)	0.5% (1 in 200)
77	374521	307131	77.76	77.85	78.02	78.15	78.20	78.30	78.37	78.45
79	374455	307053	77.58	77.69	77.88	78.03	78.09	78.19	78.28	78.39
80	374381	306984	77.25	77.39	77.66	77.86	77.94	78.07	78.18	78.30
81	374313	306908	76.64	76.73	76.88	76.99	77.03	77.09	77.14	77.19
82	374309	306820	76.05	76.13	76.26	76.34	76.37	76.42	76.46	76.50
83	374291	306762	75.81	75.90	76.04	76.12	76.16	76.21	76.26	76.29
86	374281	306732	75.68	75.77	75.92	76.01	76.05	76.10	76.15	76.18
87	374240	306677	75.53	75.63	75.78	75.86	75.90	75.96	76.01	76.03
88	374239	306672	75.17	75.24	75.38	75.48	75.52	75.57	75.62	75.64
89	374224	306659	75.12	75.19	75.35	75.45	75.48	75.54	75.58	75.59
90	374194	306581	74.74	74.87	75.14	75.24	75.28	75.35	75.40	75.41
91	374177	306484	74.52	74.73	75.07	75.18	75.22	75.29	75.35	75.36

Modelled Flood Extents

Available modelled flood outlines produced as part of the detailed modelling have been provided to you in GIS format. These show modelled flood extents, not/taking into account flood defences. Climate change will increase flood risk due to overtopping of defences.

<https://ea.sharefile.com/d-s2f4d2ce0d004b5ba>

Climate Change

The '[Flood Risk Assessments: Climate Change Allowances](#)' are published on gov.uk. This is in replacement of previous climate change allowances for planning applications. The data provided in this product does not include the new allowances. You will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding. The climate change factors are now more complex and a single uplift percentage across England cannot be justified.

The Environment Agency will incorporate the new allowances into future modelling studies. For now it remains the applicant's responsibility to demonstrate through their proposal and flood risk assessments that new developments will be safe in flood risk terms for its lifetime.

Recorded Flood Outlines

Following examination of our records of historical flooding we have no record of flooding in the area. The absence of coverage for an area does not mean that the area has never flooded, only that we do not currently have records of flooding in this area. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances.

You may also wish to contact your Local Authority or Internal Drainage Board, to see if they have other relevant local flood information.

Flood Defences

Flood defences do not completely remove the chance of flooding. They can be overtopped by water levels which exceed the capacity of the defences.

If flood defences are located in your area, you can access this data here:

<https://data.gov.uk/dataset/spatial-flood-defences-including-standardised-attributes>

Planning developments

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments. You can also request pre application advice:

<https://www.gov.uk/planning-applications-assessing-flood-risk>
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Supporting Information

Surface Water

Managing the risk of flooding from surface water is the responsibility of Lead Local Flood Authorities. The 'risk of flooding from surface water' map has been produced by the Environment Agency on behalf of government, using information and input from Lead Local Flood Authorities.

You may wish to contact your Local Authority who may be able to provide further detailed information on surface water.

It is not possible to say for certain what the flood risk is but we use the best information available to provide an indication so that people can make informed choices about living with or managing the risks. The information we supply does not provide an indicator of flood risk at an individual site level. Further information can be found on the Agency's website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Flood Risk from Reservoirs

The Flood Risk from Reservoirs map can be found on the Long Term Flood Risk Information website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=Reservoirs>

Flood Alert & Flood Warning Area

We issue flood alert/warnings to specific areas when flooding is expected. If you receive a flood warning you should take immediate action.

You can check whether you are in a Flood Alert/Warning Area and register online using the links below:

<https://www.gov.uk/check-flood-risk>

<https://www.gov.uk/sign-up-for-flood-warnings>

If you would prefer to register by telephone, or if you need help during the registration process, please call Floodline on 0345 988 1188.

The associated dataset for flood warning areas is available here:

<https://data.gov.uk/dataset/flood-warning-areas3>

The associated dataset for flood alert areas is available here: <https://data.gov.uk/dataset/flood-alert-areas2>

Flood Risk Activity Permits

We now consider applications for works, which may be Flood Risk Activities, under Environmental Permitting Regulations. This replaces the process of applying for a Flood Defence Consent. You may need an environmental Permit for flood risk activities if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

Please go to this website to find out more about how to apply:

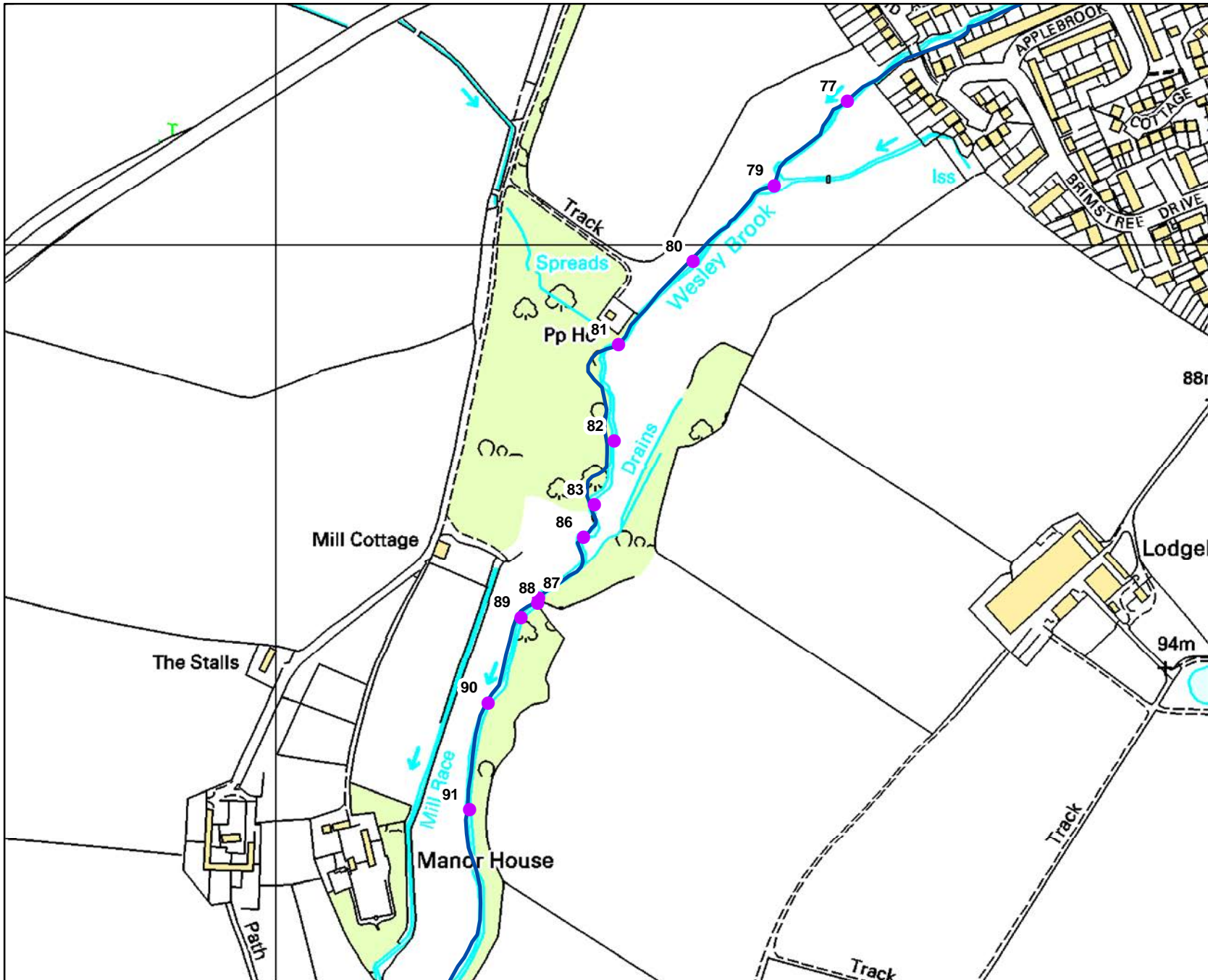
<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>.

Please be aware that Bespoke and Standard Rules permits can take up to 2 months to determine and will incur a charge.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>



Wesley Brook Model Node Point Map for South West Shifnal created 23/01/2020 [our ref. 156918]



1: 5000



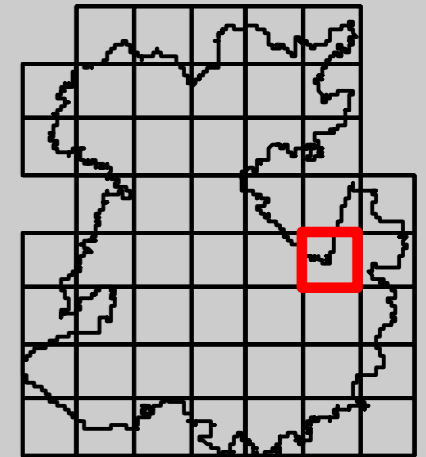
Legend

-  Main River
-  Wesley Brook Model Node Point

Appendix D – Information from Shropshire County Council

SHROPSHIRE LEVEL 1 STRATEGIC FLOOD RISK ASSESSMENT

APPENDIX A: FLOOD RISK MAPPING INDEX GRID: E6



Note: All layers are turned off by default. Click the box next to the layer of interest to turn on.

Authority Information

- Council Boundary
- Main Rivers
- Detailed River Network

Surface Water

- RoFfSW 3.3% AEP
- RoFfSW 1% AEP
- RoFfSW 0.1% AEP

Potential NFM

- Riparian Woodland
- Catchment Woodland
- Floodplain Woodland
- Floodplain Reconnection
- Attenuation 3.3% AEP
- Attenuation 1% AEP

Climate Change

- Climate Change Lower
- Climate Change Central
- Climate Change Upper
- Indicative Flood Zone 2

Areas Susceptible to Groundwater Flooding

- >= 75%
- >= 50% <75%
- >= 25% <50%
- < 25%

Flood Zones

- Flood Zones 3b
- Indicative Flood Zones 3b
- Flood Zones 3a
- Flood Zones 2

Defences

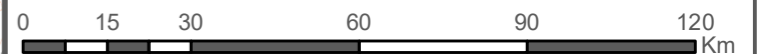
- Demountable Defence
- Embankment
- Flood Gate
- Flood Wall

Emergency Planning

- Flood Warning Areas
- Flood Alert

Reservoir Flooding

- Reservoir Flooding



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