From:	[redacted]
To:	
Cc:	
Subject:	Sheffield Plan Consultation: Draft Allocation ES25
Date:	20 February 2023 12:01:53
Attachments:	Bawtry Road Pub Draft Reps Feb 23.pdf ES25 Bawtry Road FRA compressed.pdf ES25 Bawtry Road Preliminary Ecological Appraisal.pdf Reg_19_Consultation_Form_BAWTRY ROAD ES25.pdf Reg_19_Consultation_Form_POLICY AS1.pdf Reg_19_Consultation_Form_POLICY ES1.pdf Reg_19_Consultation_Form_POLICY NC3.pdf Reg_19_Consultation_Form_POLICY NC4.pdf Reg_19_Consultation_Form_POLICY NC8.pdf

---

Hello

I'm pleased to attach comments on the draft Plan from Barratt Sheffield. These support draft allocation ES25 and offer some observations on several DM policies, which would make them more flexible and better support the overall objectives of the Plan.

Hopefully this is all self-explanatory, but please feel free to get in touch if helpful.

Thanks

Matthew

Matthew Sheppard
Director
Sheppard Planning
[redacted]
W: www.sheppardplanning.co.uk

Sheffield Plan Publication Draft

Representations on behalf of:

Barratt and David Wilson Homes Sheffield

Land North of Bawtry Road, Sheffield (Site ES25)

February 2023

Sheppard Planning

Contents

1. Introduction

1.1 This Representation is submitted on behalf of Barratt and David Wilson Homes Sheffield (Barratt). They are the UK's largest housebuilder based on the number of new homes they deliver nationally each year. Furthermore, they have a track record of delivering high quality private and affordable housing across Yorkshire.

1.2 This representation supports the allocation of land north of Bawtry Road, Sheffield (Ref ES25). It considers the following matters:

- The evidence supporting the draft Allocation
- The accessibility of the site to services and facilities
- Environmental constraints
- Deliverability of the site

1.3 Barratt support the proposed allocation of this site and consider that it is a sensible allocation, which can deliver much needed housing without affecting the open countryside. This site is considered to be an important part of the wider strategy to meet housing need.

1.4 Barratt have some detailed concerns about several of the Draft Development Management Policies. They offer their comments on these in an attempt to ensure that they do not unnecessarily hinder the delivery and density of new housing in the City.

1.5 It is anticipated that concerns will be raised by participants in the Plan making process about the amount of housing being provided, and the locational strategy chosen by the Council. However, in respect of draft allocation ES25, Barratt is very clear that:

(a) Any strategy approach will necessarily start with examining the existing urban brownfield and un-used open space within the urban area. These locations are the first tier of locations which should be explored to meet needs. Urban sites should be the starting point for site selection.

(b) If that urban resource is not thoroughly explored, and if best use is not made of existing urban sites, it will be difficult to demonstrate the exceptional circumstances needed to justify the release of land from the Green Belt.

(c) If further need is identified, which can't be met on the existing urban resource, then a wider exploration of options to meet needs may be required.

1.6 Therefore, regardless of the position taken on Green Belt releases, Barratt consider that site ES25 is an inevitable allocation regardless of the wider strategy choices made.

1.7 This site is a well located, urban greenfield site that is a logical early release option- which should be pursued irrespective of any strategy choices made in the Publication Draft Plan. Indeed, if changes in strategy are needed during the course of the EIP, site ES25 will still be a logical early release.

1.8 Draft allocation ES25 is a suitable and deliverable site:

1) It contributes nothing to the wider need for open space. It has not been used for a very considerable period of time, is in private ownership and, therefore, is not a necessary part of the open space supply.

2) It is well located and accessible to a range of service and facilities.

3) It is deliverable and available for early development- contributing to the supply of new housing in the early part of the Plan Period.

4) It can deliver a "traditional" family housing approach. This will help to balance the provision of dense, apartment based, supply which is anticipated in the central area of the City on previously developed land. Whilst that form of development is considered to be necessary, it will have a limited appeal for many of the home buying public.

1.9 This representation also re-iterates the site's social, environmental and economic benefits, and confirms that there are no technical constraints to delivering development in the early part of the Plan Period.

2. Site Location and Description

2.1 The site is located to the eastern area of the City and is bounded by existing residential development on three sides, with sports facilities to the south.

2.2 The site is around 6km from Sheffield City Centre, and just over 1km from Meadowhall. It is in a highly accessible location.

2.3 The Bawtry Road local centre is around 450m walking distance from the site entrance. It comprises a number of local facilities, including a pharmacy; post office; opticians; public house; church; community centre, bakery and various take aways. The Council's assessment of the site conforms that the site is within walking distance of local shops and facilities and that development here would support the vitality of that local centre. Barratt agree with that assessment.

2.4 There is also good local school provision within the site catchment area. Tinsley Meadows Primary Academy is around a 1km walk to the north west. The Brinsworth Academy is around 1.3km walk to the south east. The Council's assessment also confirms that there is capacity in the local primary and secondary schools in the catchment of the site.

2.5 The site is located on Bawtry Road, which is directly served by the Service 208 Bus. Bus stops are around 30m from the site entrance, and so within a very easy walk of the entire site. Service 208 runs to the Sheffield Interchange in the City Centre, within easy walk of the main rail station. The bus also stops at Meadowhall.

2.6 There is a Supertram stop at Meadowhall and a number of other bus services operate from the Meadowhall Interchange, close to the route of Service 208.

2.7 The site, therefore, has excellent access to a range of local services and facilities, and the means to access UK wide public transport services from a point within 30m of the site entrance.

2.8 The site is some 5.6Ha, with an identified net development area of 4.2Ha. The Plan proposes to allocate it for 147 homes, which is a density of around 35dph. That density is considered to be appropriate for a well-located urban site, with a desire to provide urban family housing.

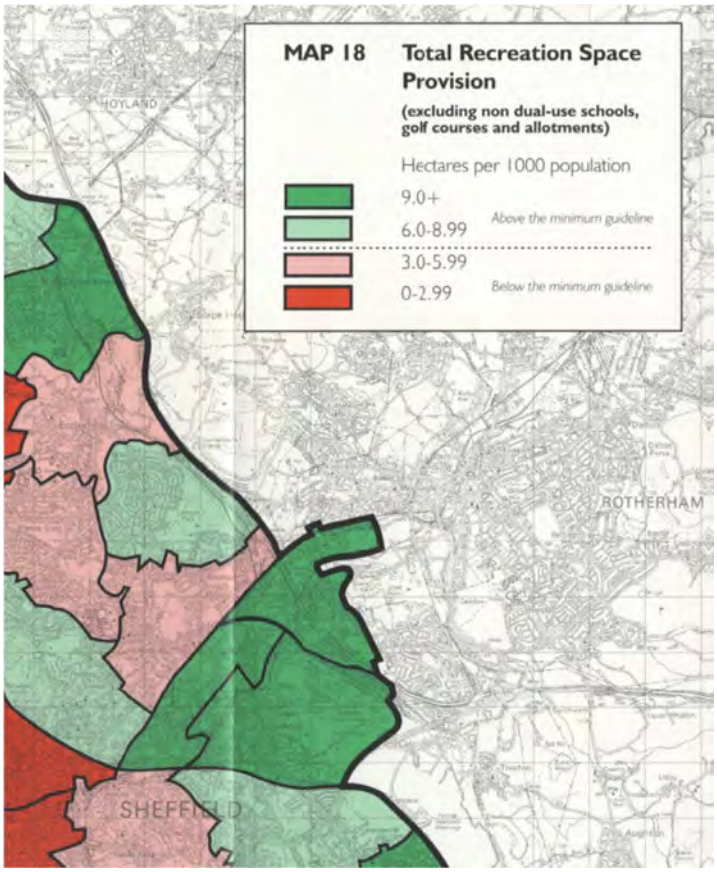
3. Open Space Issues

3.1 The site is currently designated as open space in the UDP, a designation which continued into the now abandoned City Plan of 2013. The site is the former Tinsley Social Club and has signage indicating that it was a Rotherham United Training Ground- although it is understood that the site was not actually used by Rotherham United.

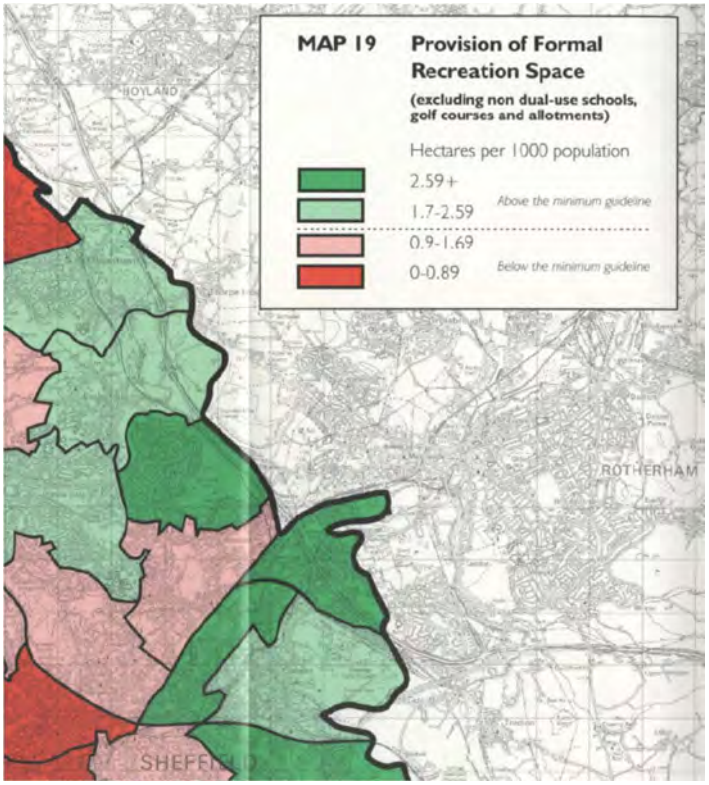
Historic Supply of Open Space and Sports Provision

3.2 This eastern area of the City has a long running surplus of open space.

3.3 The UDP Leisure and Recreation Chapter included a Map which shows "Total Recreation Space Provision" (Map 18). This shows that the area in which the site is located had nine hectares or more of open space per 1000 population- which is specifically noted as being "above the minimum guideline". The Map is extracted below:



3.4 Formal Recreation Space provision, again in Ha per 1000 population, was shown on the UDP Map 19. The site is in a location which has 2.59+ Ha per 1000 population, which is again "above the minimum guideline". The Map is extracted below:



3.5 This data is now considerably out of date, as it informed the preparation of the UDP- which was adopted in March 1998. However, the loss of open space to development has been a difficult planning proposition for this entire period, and so the current supply has not been significantly eroded since that time.

3.6 The 2011 PPS is also now very dated, but the key recommendations / findings from that study for the East Area were:

- To establish development plans for Mather Road Recreation Ground, Tinsley Green and Waverley Lane.
- A surplus in senior football pitches was just sufficient to offset deficiencies in youth and mini soccer. Some sites were to be explored for re-designation.

3.7 The Bawtry Road site was considered in the 2011 PPS as the "Avesta Sports and Social Club" with Pitch provision noted as 1 cricket pitch. That was noted as being of good quality, but in private ownership.

3.8 The 2011 PPS noted that

"*There are currently no deficiencies, in theory, in cricket provision across the City*"[1]

3.9 But also considered that:

[1] 2011 Scott Wilson Playing Pitch Strategy page 2, Cricket Summary

"*Overall there are deficiencies in the quality of facilities…..The areas rated the lowest for quality are the South East and South West. The North East and East assembly areas have the best rating for cricket pitch quality.*"

3.10 Therefore, in 2011, the evidence noted sufficient capacity and good quality provision for cricket in the East area of the City.

Current Evidence on Open Space and Sports Provision

3.11 The evidence backing the draft Plan[2] confirms that in the Eastern Area, shortfalls exist in the following typologies:

- Allotments (-0.07ha/1000 population)
- Play Space (Youth) (-0.06ha/1000 population)
- Play Space (Child) (-0.04ha/1000 population)
- Park and Recreation Grounds (-0.01Ha/1000 population)

3.12 The evidence base[3] identifies the site as being in the "Outdoor Sport (Private)" category. There is no standard or requirement set for this category[4]. The Open Space Assessment 2022 Main Report notes that sites in this category have limited access and are not considered further in the Open Space Assessment. However, it is notable that where there are deficiencies in the Eastern Area- especially play space- the development of the site could bring new land into public access for that purpose. This would be a benefit, given the current shortage of facilities in those typologies.

3.13 The Playing Pitch Strategy April 2022 does not consider the site in detail. However, it notes numerous actions for various sports. It makes the general recommendation that playing field sites are protected[5], including sites not marked out as pitches at the time of the assessment.

3.14 However, the site is proposed for allocation in the Plan, despite having been previously used for sports uses.

Use and Status of the Site

3.15 The site was previously used for recreation and sports purposes, but historic aerial photography regression suggests that the site has not been laid out, or used as, a playing pitch for over a decade. Appendix 1 provides the historic aerial photography.

3.16 This shows that the fields seemed well maintained and used in 2009. However, by 2015 the aerial photography shows no pitches marked out, and the site appeared less well maintained. This suggests that there has not been an active sports use on this site for at least 8 years.

[2] Sheffield Open Space Study (Part 2): East Area Profile, Table 1
[3] Ibid Figure 3
[4] Ibid, Table 1 and page 49 of the Main Report
[5] Recommendation G1

3.17 Buildings associated with the sports use had been demolished by late 2018 / 2019. A prior notification application from July 2018 included photographs which show that the grass pitch area was mown- but was very rough and was unlikely to be suitable for a formal sports use (see Appendix 1). The application form for the prior notification of demolition stated that:

"We would like to demolish the former Sports and Social club building as well as the gym"

"There has been vandalism to both properties and neither building has been used for over six years"

3.18 This offers a publicly available data source which provides evidence that the site hasn't actually been used for sports uses since 2012.

3.19 The aerial photography and planning history evidence fits well with anecdotal evidence from the site vendors, who advise that they purchased the site in 2011 and have never used the site for sports or recreation purposes.

Current Provision of Open Space

3.20 The 2022 PPS doesn't suggest a standard for private outdoor sports sites. However, the 2022 Open Space Assessment[6] shows that, across Sheffield, there are 93 such sites, covering 664.94Ha of land, amounting to 1.13Ha of space per 1000 population.

3.21 The Open Space Assessment also breaks this down into areas. The East area, where the site is located, has 94.9Ha of land in this typology[7], which amounts to 1.93Ha/1000 population[8]. The East area therefore has more than the City average in this typology.

3.22 The report notes that the FIT Guidance[9] recommends 1.2Ha/1000 population for Playing Pitches, and 1.6Ha / 1000 population for all outdoor sports. The East area exceeds the "all outdoor sports" standard by 0.33Ha per 1000 population.

3.23 There is, therefore, a very good supply of sites of this nature in the area.

Open Space Conclusions

3.24 This brief review of the evidence base suggests that:

i. There has historically been a surplus of open space in this area of the City;

ii. There were no deficiencies related to cricket in the last PPS; and there was alternative good quality provision for that sport in the East;

iii. The site has not had public access or any formal sports use for well over a decade;

[6] Table 7
[7] Table 8
[8] Table 9
[9] Para 6.4, page 62 quoting The Fields in Trust (FIT) Guidance for Outdoor Sport and Play report 'Beyond the Six Acre Standard' (2018)

iv. Shortages are identified for various typologies in the Open Space Assessment, but not in the Outdoor Sport (Private) typology;

v. The development of the site would bring new space into public access, in typologies where there is a current deficiency;

vi. The PPS recommends protecting all current, historic and potential open sites for potential future sports uses- despite there being a surplus of sites in this area of the City. This is a generic position adopted in many PPS documents.

3.25 In practical terms, the loss of sports uses from this site occurred so long ago that the development of this site would result in no practical effects on:

(a) the local community,

(b) sports clubs or

(c) the availability of genuinely valued sports uses in this area of the City.

3.26 Whilst the conclusions of the PPS are noted, the call to protect all possible sites that may- or may not- be used for sports in the future is clearly a generic conclusion, most likely resulting from the narrow focus of that study.

3.27 Protecting any and all open sites, on a "just in case" basis, is not justified and does not reflect the challenging decisions that have to be made in identifying suitable urban sites to address housing needs in the City. The site will not be made available for sports uses after lying dormant for over a decade, and the Council must now make efficient use of the urban land resource in order to meet development needs.

3.28 It is not feasible or likely that this privately owned, abandoned site will revert to a sports use and so it's protection for that putative use would simply divert 147 houses from this site into the Green Belt.

3.29 We therefore consider that the allocation of this site would have no practical implications for the supply or open space in this area of the City.

4. Site Development Guidelines

4.1 The draft Plan suggests the following guidelines for development on this site:

- *Open space should be provided in accordance with Policy NC15.*
- *Connective ecological corridors/areas (including buffers) shown on the Local Nature Recovery Strategy and combined natural capital opportunity maps are to be maintained on site and removed from the developable area. Biodiversity Net Gain should be delivered on site within the connective ecological corridor/area.*
- *A staged archaeological evaluation and/or building appraisal should be undertaken prior to the submission of any planning application; the application should be supported by the results of this evaluative work.*
- *This site is identified as impacting on a Heritage Asset and due consideration should be given to the impact of any proposal at the planning application stage.*

4.2 These points are all noted by Barratt and accepted to be appropriate guidance for any future applications on the site.

4.3 The future development of this site is not unduly constrained by these points, as set out below. A working draft layout plan is provided at Appendix 2, which illustrates the currently proposed form and nature of development.

Open Space

4.4 Policy NC15 requires developments of over 100 dwellings to provide 10% of the site as Open Space; and provide play space for children on site.

4.5 The working draft layout at Appendix 2 shows the provision of a LEAP and an appropriate proportion of open spaces designed to meet the requirements of this policy.

Ecology

4.6 A Preliminary Ecological Appraisal has been prepared by BSG Ecology to consider the current nature of the site and any constraints that may need to be dealt with. This is provided separately and alongside this representation.

4.7 The report concludes that:

- No direct or indirect impacts are anticipated on designated ecological sites.
- The woodland on site does not meet the criteria to be a habitat of principle importance, but these habitats should be retained and protected.
- An ecological management and monitoring plan (EMMP) should be prepared.
- Grassland on the site is species poor and has been intensively managed in the past. The loss of grassland is not a significant constraint.

- Areas of former hard standing and built structures are of negligible ecological value.
- Trees which have bat roosting potentials should be retained where possible.
- The site boundaries provide foraging potential and commuting opportunities for bats.
- No evidence of Badgers was identified during the survey and the habitats are sub optimal.
- The clearance of vegetation is unlikely to impact significantly on amphibian species.
- Some of the habitats has potential to support breeding birds and any removal should be undertaken outside the breeding season.
- There are areas of invasive plant species, including Japanese knotweed and Cotoneaster. These should be removed in a controlled manner.

4.8 The site therefore does not present any major ecological constraints and should be suitable for development in the future.

4.9 An arboricultural survey has also been undertaken which demonstrates that there are several trees which need to be removed for safety reasons. However, the majority of trees are on the site boundaries and could be retained within the future development of the site. Trees are, therefore, not a major constraint to development in the future.

4.10 The Draft Plan does not seem to include Local Nature Recovery Strategy or Natural Capital Opportunity Maps. However, the independent work undertaken by Barratt suggests that the site boundaries have the most ecological value. These are proposed to be retained and should serve to maintain connectivity within and around the site to surrounding habitats, post development.

4.11 It is considered that there is no ecological constraint to allocating this land and that any remaining issues are capable of being controlled through the Development Management process.

Archaeology

4.12 Site SO1230 "Land Off Bawtry Road, Tinsley" is identified in the "Table 1 Archaeology Recommendations Options Table", and states:

Agricultural land in C19 & C20, now scrub/open. No evidence for later ground disturbance; potential for buried remains is predicted to be moderate to good. No known remains but potential for earlier remains cannot be ruled out.

4.13 The conclusion noted in Table 2 is "*Uncertain Importance*".

4.14 The archaeology of the site is therefore unclear- although that is common for any sites which have not been subject to significant modern disturbance.

4.15 There is no known archaeological resource and the some of the site has been subject to modern disturbance. However, the potential for further finds cannot be ruled out. This level of archaeological potential is suitable to be considered through a detailed programme of archaeological works- to be undertaken at the Development Management stage.

4.16 There is no evidence that archaeology is a constraint which should hinder the allocation of the site.

Heritage

4.17 The site is relatively close to the Grade II Listed Church of St Lawrence, a Parish Church dating to 1879, with additions in 1925. It is a stone and ashlar gothic revival style church. The associated Lych Gate and boundary walls are also Grade II Listed and are constructed in matching materials.

4.18 These structures are some 160m from the closest boundary of the site. The Church Yard, which is clearly a part of the setting of these assets, forms the majority of that intervening space.

4.19 However, between the church yard and the site are several mid-20th Century houses, accessed off Maplebeck Road. There is considerable domestic clutter and informal structures in the closest c.40m of house and garden that sits between the site and the Church.

4.20 The relationship between the site and these assets is shown on the aerial photography extract below:

4.21 Whilst intervisibility is not always a good indicator of setting effects, the intervening development, existing landscaping and landscaped buffer area (indicated on the draft layout

at Appendix 2) suggests that the development of the site is not likely to have significant effect on the integrity or interpretation of the architectural or historic importance of these Listed assets.

4.22 This issue will require detailed assessment at the Development Management stage, but heritage considerations should not hinder the allocation of the site.

Site Development Guidelines Conclusions

4.23 It is considered that the site development guidelines are appropriate, and that the issues listed do not indicate a significant reason which suggests that the allocation of this site would be inappropriate, or that the future development unachievable.

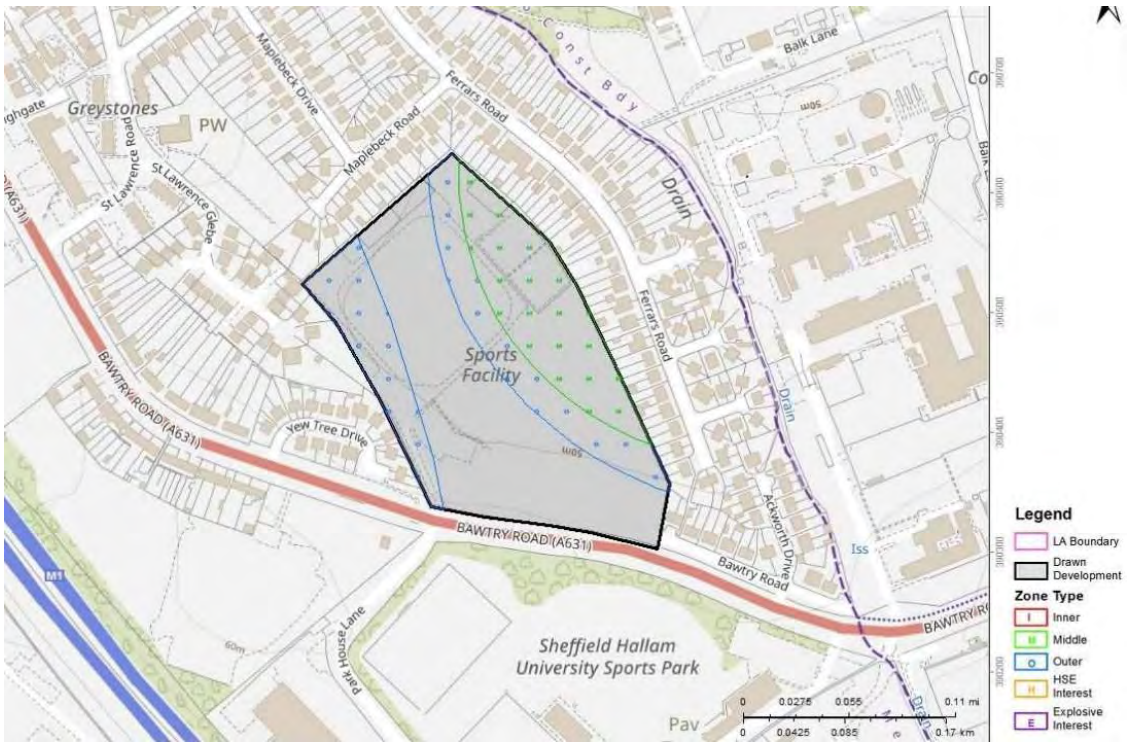
5. Environmental and Technical Constraints

5.1 This section of our representations considers the environmental constraints on this site. As a draft allocation, this is one of the less constrained sites in Sheffield. The key issues which are not addressed in other sections of this representation are considered to be:

- Health & Safety
- Flood Risk and Drainage
- Ground Conditions

Health & Safety

5.2 The site lies within the consultation distances of both the BOC site at Brinsworth (north east of the site) and the Outokumpu Stainless site (south west of the site), as show below



5.3 The risks associated with these hazardous installations was the subject of a meeting between Barratt and the HSE in July 2022. This meeting confirmed that:

- 24 dwellings would be within the middle zone of the BOC site (green "M" area above)
- These are less than 40dph density
- The housing in the higher risk area is, therefore, below the threshold for advising against development

- The location of the LEAP and open space in the middle zone is acceptable as long as fewer than 100 people are present at any one time.

5.4 The HSE letter at Appendix 3 confirms that HSE would not advise against development of this site on safety grounds.

Flood Risk and Drainage

5.5 A Flood Risk Assessment is provided separately and alongside this representation. This shows that the site is within Flood Zone 1 and is not at significant risk of flooding.

5.6 It proposes to locate an open attenuation pond at the low point of the site which will accommodate on site run off and discharge it at a restricted rate. This will occur at the greenfield rate, with an allowance for climate change. The development of the site will not result in a greater risk of flooding within the wider river catchment area.

5.7 The hierarchy of surface water disposal has been considered, but due to the presence of impermeable ground conditions, solutions such as soakaways and swales are unlikely to be achievable.

5.8 Foul sewage will discharge by gravity to an existing public sewer crossing the site. This approach has been agreed by Yorkshire Water. The line of the sewer has been taken into account in the draft site layout, but part may need to be diverted within the site.

5.9 The technical work indicates that there are no issues with flooding or drainage which should result in the site not being allocated for development.

Ground Conditions

5.10 A geo-environmental appraisal has been prepared by Groundtech Consulting. This is not appended due to file sizes, but concludes that:

- There is made ground beneath the site, to a maximum depth of 1.2 metres below ground level.
- There are no recorded mine entries on or close to the site, and the Site is not affected by mining activity- although is above deep mining, which was last worked in 1943 and therefore any ground settlement should already have occurred.
- No radon protection would be required in this area.
- There are moderate risks to human health from potential made ground.
- Traditional strip foundations should be acceptable on the site.
- Soil percolation tests indicated that SUDs drainage is not feasible on the site.
- Elevated levels of heavy metals and hydrocarbons were found in the northern area of the site, and some asbestos was detected in one trial pit, with a moderate to high risks to human health without remediation.

5.11 The geo-technical work, therefore, suggests that Some remediation work will need to be undertaken. However, there are no issues with ground conditions which should result in the site not being allocated for development.

6. Deliverability

6.1 The Glossary in the NPPF defines a "deliverable" site. It considers that sites for housing should be:

- Available now,
- Offer a suitable location for development now,

and be

- Achievable- with a realistic prospect that housing will be delivered on the site within five years.

6.2 Barratt consider this site to be deliverable. Our reasoning is set out below.

Availability

6.3 The site is a draft allocation in the draft Plan. There are no legal or ownership constraints as Barratt Homes have secured their interest in the site. Barratt consider this to be a logical allocation and given it's high levels of accessibility, Barratt are considering a planning application in the short term.

6.4 The site is, therefore, available for development now.

Suitability

6.5 The site is located in a suitable location for residential development. The Council evidently concur with this assessment, as it is a proposed allocation.

6.6 The site has excellent access to a range of services and facilities. It is also accessible to public transport, which provide access to nearby major centres of activity. A suitable access can be provided from the existing highway.

6.7 Our assessment of environmental constraints has shown that there are no technical matters which suggest that the site couldn't be developed for residential purposes in the short term.

6.8 Therefore, this is a suitable site for development.

Achievability

6.9 A residential development of the site is achievable. Barratt have considered the local market needs, the viability of the development and the need for the type and scale of development proposed in the area. This exercise has not highlighted any abnormal costs, or issues that suggest that a viable development could not be achieved.

6.10 It is therefore considered that the site is achievable for residential development in the short term.

Deliverability

6.11 This site is considered to be deliverable as defined in the NPPF. There is no technical impediment to its allocation.

6.12 Barratt consider that the site is suitable for development now and, subject to pre-application discussions, are aiming to submit a planning application during 2023. An application on this site could, therefore, be determined by late 2023. This would enable a start on site during 2024 and enabling housing delivery on site to start in the middle of 2024.

6.13 It is likely that the site will have a single "outlet" due to its size, and therefore would deliver some 30 homes per annum. To assist with the Council's trajectory for the Plan, the following table indicates the number of homes that could be delivered from this site following adoption:

Year (indicative)	Cumulative Housing delivery (indicative)	Cumulative Affordable Housing delivery (indicative at policy compliant levels)
2024	30	3
2025	60	6
2026	90	9
2027	120	12
2028	147	15

6.14 This level of delivery is considered to represent a major benefit for the local area, especially through the amount of affordable housing expected to be provided in the East areas of Sheffield.

Delivery Conclusions

6.15 This site is considered to be deliverable as defined by the NPPF, and it would deliver considerable benefits to the local area, and contribution to meeting both District and National housing need.

7. Benefits

7.1 The development of this site will deliver a number of benefits, which should be considered in the overall balance when drafting the next stage of the Local Plan. These are:

- Contributions to maintaining the services and facilities local to the site, including public transport patronage, which will help to ensure that the area maintains the services that make this a sustainable location.

- Contributing to the settlement, District and UK market housing need. This site will:

    - Deliver new homes that help sustain the local community facilities,

    - Help meet Sheffield's objectively assessed need for new housing development, and also

    - Assist with Sheffield's contribution to meeting the UK requirement for 300,000 homes to be delivered per annum.

    - This latter point is important to securing the housing futures of younger generations, addressing homelessness and overcrowding and ensuring that everyone can afford a decent home.

- Provide existing and potential residents of the District the opportunity to live in the houses and locations they desire, through the provision of appropriate levels of affordable housing, and providing family housing in an accessible location.

- Whilst not strictly planning matters, the development will also generate new homes bonus and annual Council Tax payments, which could also contribute to addressing the ongoing strategic issues being faced in the City.

- New capital expenditure from the development would also create substantial direct and indirect employment opportunities. 70% of the benefits from Barratts development are usually retained in the local area, and the development would provide opportunities for new jobs, apprenticeships and supporting local suppliers.

- The development will also attract new residents which will assist the City's labour market.

- Providing homes with space for home working, good access to the countryside and green spaces, within walking distances of local shops and facilities. This is increasingly important to home purchasers since Covid and are aspects that the Council need to ensure are provided within the wider supply, as the city centre homes are not likely to provide these opportunities to the same extent[10].

7.2 The draft allocation will deliver 147 much needed homes, across a mix of 2, 3 and 4 bedroom homes ranging from 830sq.ft to 1434sq.ft. The 2 bedroom units, at 830 sq.ft, include a

[10] See for example https://placealliance.org.uk/research/research-home-comforts/

separate study/potential 3rd single bedroom, thereby offering the potential to adapt to changing purchaser needs for home working space.

7.3 All homes will be compliant with the Part L Building regulation changes requiring a 31% net carbon reduction for all new homes. Barratt's strategy to achieve this includes the following measures:

- 100mm wide cavity with blown bead insulation
- PV (at least 2 panels)
- Wastewater heat recovery
- Heat recovery on condenser boiler

7.4 The development will include 3.04 acres/1.23 hectares of amenity greenspace area (not including the surface water basin), in line with Policy NC15 and as shown on the draft layout plan at Appendix 2. This area will provide an on-site Locally Equipped Area of Play (LEAP) with the appropriate stand-off requirements from proposed new houses.

7.5 The proposed access into the site is by way of a simple priority T junction, with the access point being formed between two existing trees located on the southern site boundary. This has been informed by Optima Highways and represents a better solution than utilising the currently gated access on the south western boundary of the site due to this being located directly opposite the Park House Lane junction.

7.6 A surface water basin area measuring 0.67 acres/0.27 hectares has been designed, to accommodate Yorkshire Water's required 3.5 l/s discharge rate. This will provide sufficient storage for the development and indeed the introduction of a positive drainage system on the site will provide betterment to the prevailing site drainage arrangements.

7.7 The site is likely to support the employment of 455 people, including 5 apprentices; and could generate £1.7m in tax revenue and around £166,000 in local council tax generation[11].

7.8 The proposed development of this site will therefore generate considerable benefits which weigh in favour of the allocation of this site.

[11] According to the HBF housing calculator HBF Housing Calculator

8. Comments on Policies

8.1 Barratt generally support the Development Management policies proposed in Part 2 of the draft Plan. However, they wish to make observations on several of the draft Development Management policies as follows:

Policy AS1

8.2 This draft policy requires development on allocated sites to cover at least 80% of the site area. It is expected that the purpose of this policy is to ensure that any secondary or ancillary uses do not begin to dominate the overall allocation of. The site and thus dilute the delivery expectations set out in the draft plan.

8.3 However, Barratt wished to note that 80% of draft site allocation ES25 cannot be devoted to net developable housing area, due to the requirement to retain landscaping, provide open space and balancing provision, and also to address issues around safety- caused by the proximity of the consultation distance to the BOC site at Brinsworth.

8.4 In this case, 69% of the proposed site can be developed, due to site constraints and the need to deliver wider objectives, including wildlife connectivity and BNG.

8.5 It is suggested that the wording of the policy could be improved to make it clear that this is not a density policy, but rather is concerned about controlling potential secondary uses in particular policy zones.

Policy ES1

8.6 This draft policy requires knew dwellings to reduce regulated carbon emissions by 75% from the 1st of January 2025 and be net zero from January 2030.

8.7 Future homes standard is due to be introduced by building regulations on the 1st of June 2025. Barratt consider that this policy should align with the time scales in the Legislation, and the date for reducing regulated carbon emissions by 75% should be amended to 1st of June 2025. This would help to avoid confusion.

8.8 Barratt also consider that the standard required by this future policy should be based on the requirement in force at the time of delivering the units, rather than at the grant of planning permission. The standard to be achieved could be set by conditions and impose a requirement based on implementation date.

8.9 Barratt are concerned in more general terms about the comments in the supporting text which indicate that, as the National Grid is unlikely to be net zero by 2030, developments taking place after that point will need to generate their own renewable energy or connect to a district energy network.

8.10 While urban sites, such as draft allocation ES25, may have such neighbourhood infrastructure available by 2030, other more remote opportunities for development, post 2030, may not benefit from such infrastructure. The policy should be amended to be flexible

enough to allow deviations, where this is reasonable and justified by either practical or viability concerns.

Policy NC3

8.11 Barratt are concerned that Part b) of the policy may be too prescriptive about the acceptable tenure mix for affordable housing. Para 11a) of NPPF seeks flexibility in policies, and the Plan period is 17 years (2022-2039), over which time the needs of the population in Sheffield may change.

8.12 It is suggested that Part b) is amended to say that the indicated proportions are a starting point for negotiations, and to add a reference to the (then current) SHMA to inform any discussion. This approach would better accord with national policy and allow for suitable updates to the basic guidance that informs applications during the Plan Period.

8.13 This approach would better recognise Government's drive to increase home ownership and, as a more flexible policy approach, would not exclude a higher proportion of affordable rental properties should this be needed and justified in the area.

8.14 Barratt also wish to be clear that the Council should permit open market tenders for Registered Providers operating in Sheffield and should avoid prescribed transfer values.

8.15 Whilst this detailed point is not a prescribed part of the policy as drafted, allowing flexibility on the means of transfer- and the potential to secure best value for transferred properties- has potential to reduce concerns around viability in some situations. Adopting this more flexible approach will allow the Council to achieve greater affordable housing delivery than might otherwise be the case.

8.16 Whilst no particular policy changes are suggested to address this point, this feedback ought to be passed on to the affordable housing team within the Council, to ensure that policies are applied in a flexible manner during the development management process.

Policy NC4

8.17 Category two accessible and adaptable dwellings (M4(2)) are an optional requirement in the Building Regulations.

8.18 Barratt are one of the largest house builders in the UK, and many of their house types are adaptable and accessible. They also support continued innovation in the sector and are keen to ensure that their customers are able to benefit from the improved accessibility and longevity of their houses throughout their life cycle.

8.19 However, requiring 100% of properties on smaller sites to be M4(2); and on larger sites altering this to 98% M4(2) with 2% M4(3)- considerably exceeds both the current legislative requirements and also best practice demonstrated in other major Metropolitan areas. Using a local example, the current adopted policy in Leeds requires 30% accessible and adaptable housing, and 3% wheelchair accessible.

8.20 Barratt consider that those lower proportions offer a sensible balance between improving the accessibility and longevity of the housing stock, without generating potential issues around viability and the reduced densities that come with the extra space required to meet those standards.

8.21 NPPG offers guidance[12] on what evidence to consider, and Barratt suggest that this need, with suitable flexibilities included, is further examined before particular amounts and types of provision are specified in Policy. Indeed, NPPG advises that:

Planning policies for accessible housing need to be based on evidence of need, viability and a consideration of site specific factors[13]

8.22 The current policy sets a requirement for 2% of all larger housing sites to meet M4(3), when the demand for this standard may not exist.

8.23 The general approach of the policy would not accord with NPPF guidance on flexibility in plan making, nor could it reasonably be based on a consideration of viability of any particular site, nor any other site specific factors, given that it is a blanket policy approach.

8.24 In the context of the current draft Sheffield Plan, it is considered that best use ought to be made of the urban land resource. Policies, such as this, which will inevitably reduce the density achievable for family housing in the urban area, will also inevitably result in increased pressure on Green Belt sites to meet housing needs.

8.25 Barratt wholeheartedly support the initiative to improve housing to deliver independent and supported living. However, achieving this wider societal aim needs to be balanced with other factors relevant to the long-term planning of housing needs in the City.

8.26 Barratt consider that reducing the proportions in the policy criteria would offer a sensible balance, whilst still achieving the aim of improving the accessibility of the housing stock.

Policy NC8

8.27 Barratt are concerned that the current draft of Policy NC8 doesn't work positively with the density ambitions set in policy NC9.

8.28 Requiring compliance with the optional NDSS standards is acknowledged to be beneficial for ensuring that future residents have adequate living space, to ensure their amenity. However, requiring compliance with any fixed standard reduces flexibility during the development management stage- and potentially hinders the ability of developers to meet the housing density guidelines set in policy NC9.

8.29 Using draft allocation ES25 as an example, the density requirement set in policy NC9 would be to achieve between 40 and 70 dwellings per hectare. The density of draft allocation ES25 is around 35dph on the net developable area[14]. This site is within easy walking distance of high frequency bus routes and is in a highly accessible area of the city, close to services and

[12] See Para 005 NPPG on housing for older and disabled people
[13] Para 009 NPPG on housing for older and disabled people
[14] 147 homes in a net developable area of 4.2Ha

facilities. However, the allocation is at the lower end of the density expectations, even for rural areas of Sheffield.

8.30 Barratt have managed to achieve the target housing numbers from this draft allocation. However, the use of larger house types could reduce the overall density to well below the minimum set within policy NC9 for this location.

8.31 Whilst that is only one example- and there are specific health and safety constraints to take into account on this particular site- the point remains that if the urban area is to deliver anything like the density expected by Policy NC9, then developers must have the flexibility to alter their house types.

8.32 All of Barratt's house types are considered to offer a suitable amount of internal space. Non-compliance with the specific numbers set out in NDSS is not a true indicator of whether the House proposed offers an acceptable standard of amenity for future residents.

9. Conclusions

9.1 Barratt welcome the allocation of this site in the Draft Plan and support it's continued allocation.

9.2 This draft allocation offers a number of benefits that weigh in favour of its continued allocation. These are:

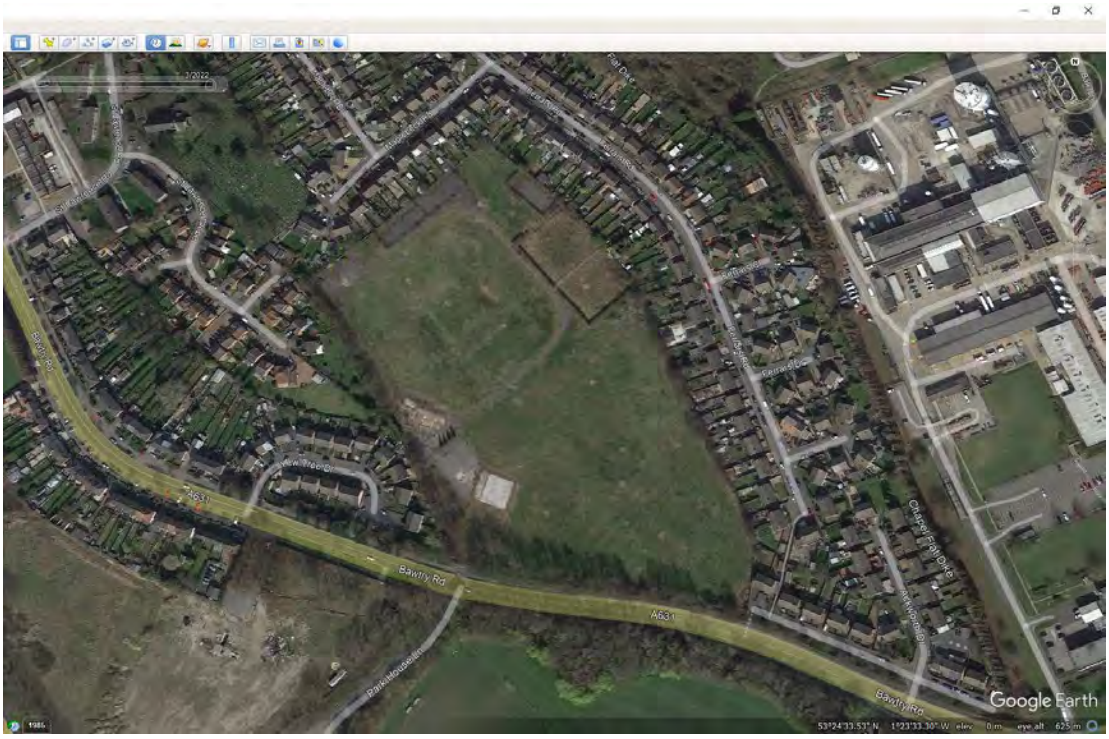
1. It is deliverable.
2. There are no notable environmental constraints.
3. It has not performed any role as open space for well over a decade and there is a general surplus of space in this area of the City.
4. It will create jobs and apprenticeships during the construction phase, as well as improve the City's labour force overall.
5. It represents a major investment in the local economy, and will contribute to maintaining and supporting the growth of local services and facilities.
6. It will make a significant contribution to meeting local housing need, including both market and a suitable level of affordable housing that will benefit local people wishing to stay in the area.
7. It is located in the urban area in a highly accessible location.

9.3 This site is a suitable, available and deliverable site, with a range of local and wider benefits that supports its release for housing development. Barratt consider that, regardless of the strategy adopted in the draft Plan, this site is within the first tier of potential development sites which should be released to meet housing needs.

9.4 We therefore ask that it be retained as an allocation in the next stage of the Plan process.

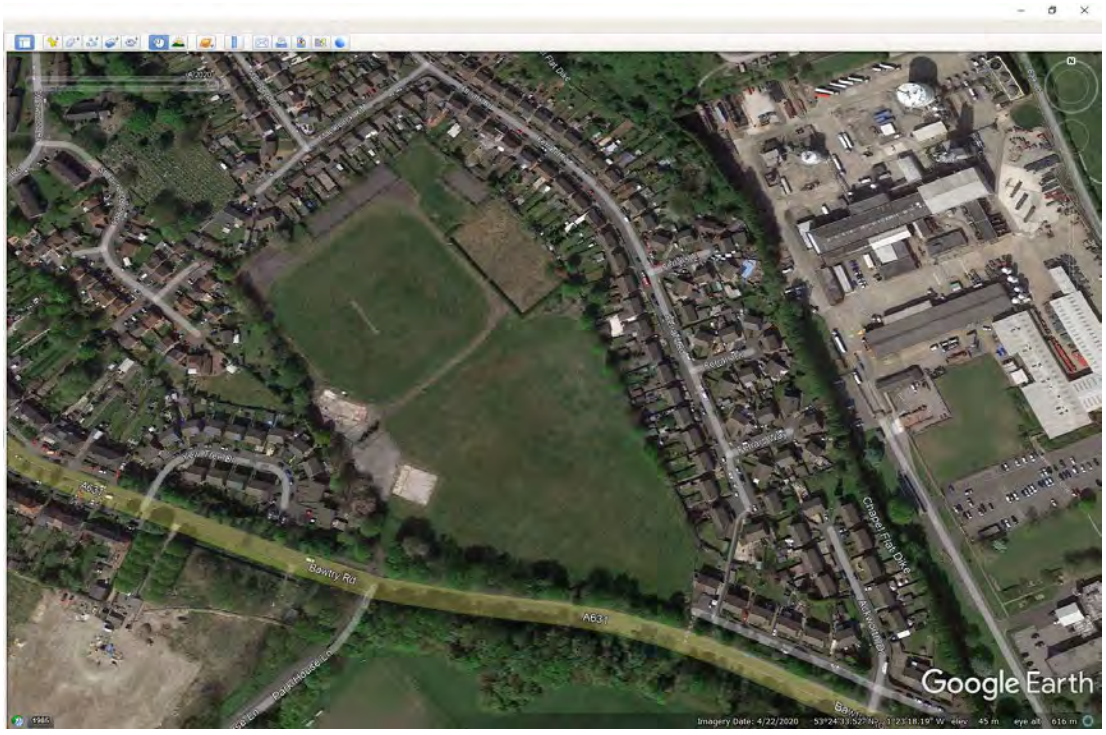
Appendix 1 - Site History

March 2022



Buildings demolished, no pitches marked out, grass unmanaged.

April 2020



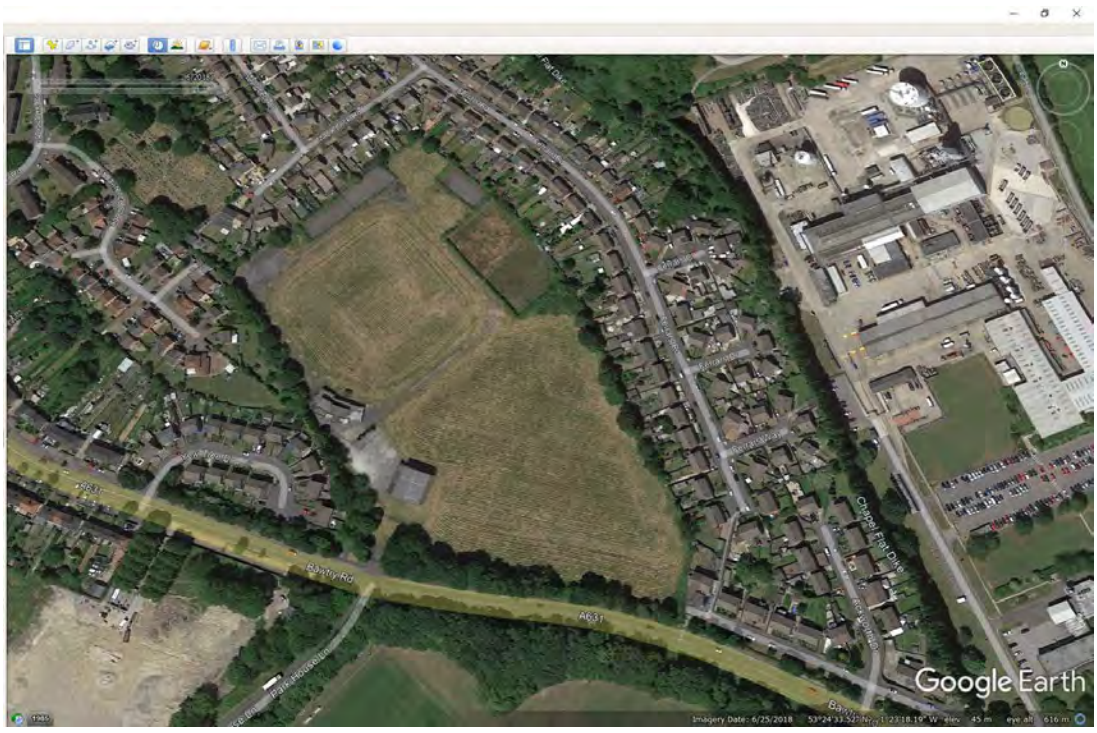
Buildings demolished, no pitches marked out, grass unmanaged.

Mid 2018:

The following photograph accompanied 18/02132/DPN – a prior approval for demolition of the buildings, which was granted on 24 July 2018.

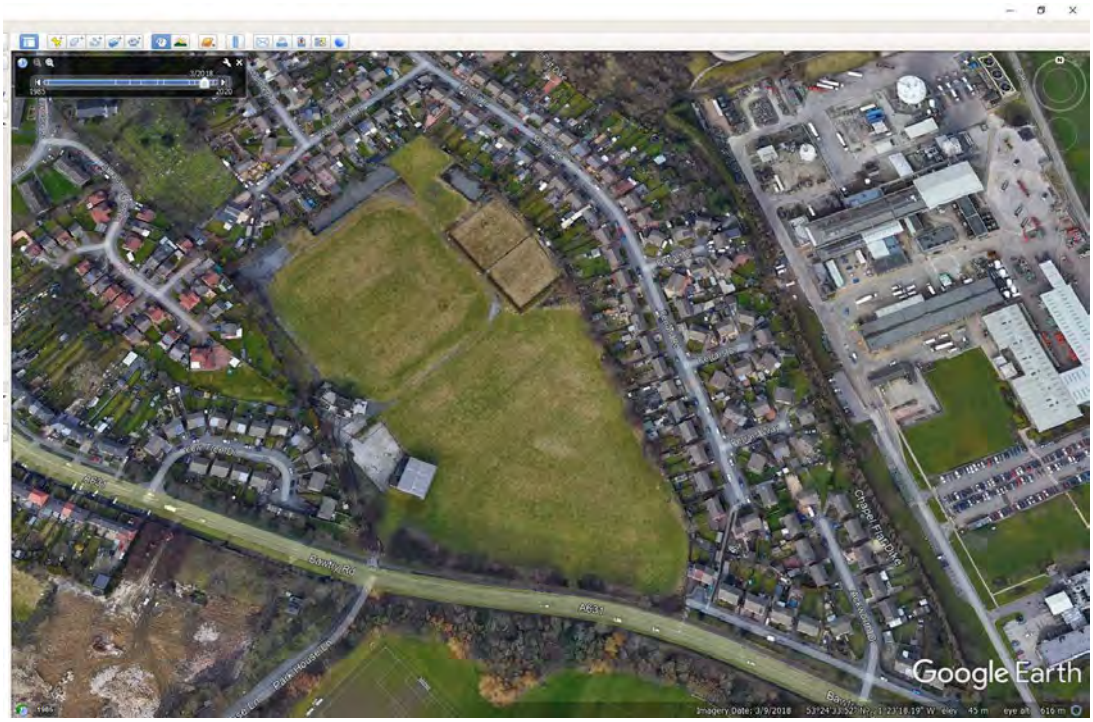
The primary purpose of the photo appears to have been to show the erection of site notices. However, the condition of the grass beyond the building is visible. It appears to be roughly mown, and not maintained in a state that is suitable for a sports pitch.

June 2018



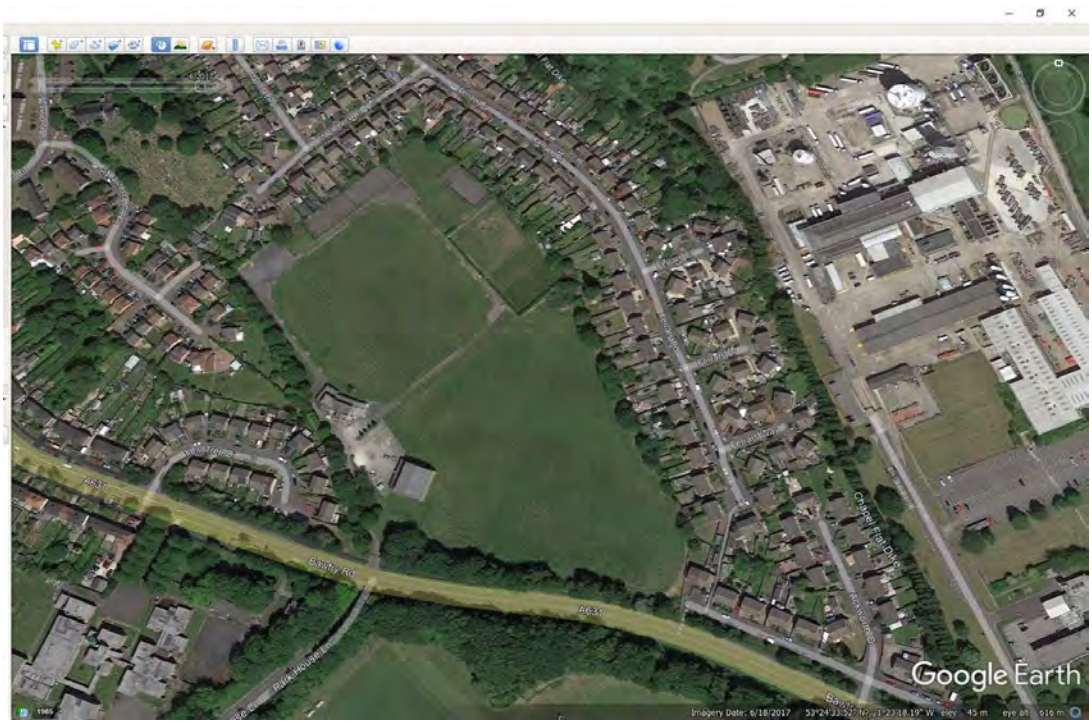
Grass mown but no pitches evident, buildings intact, paths overgrown, bowling greens overgrown, hardstanding not marked out.

March 2018



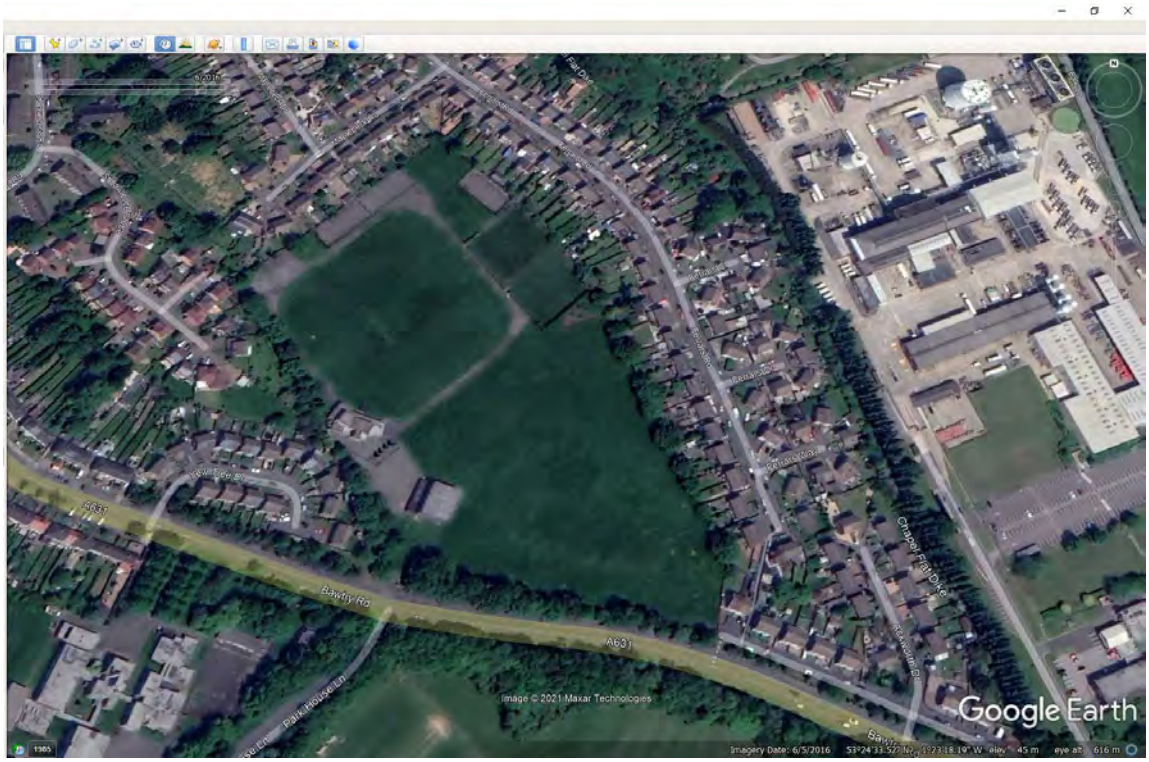
Grass mown but no pitches evident, buildings intact, paths overgrown, bowling greens overgrown, hardstanding markings faded.

June 2017



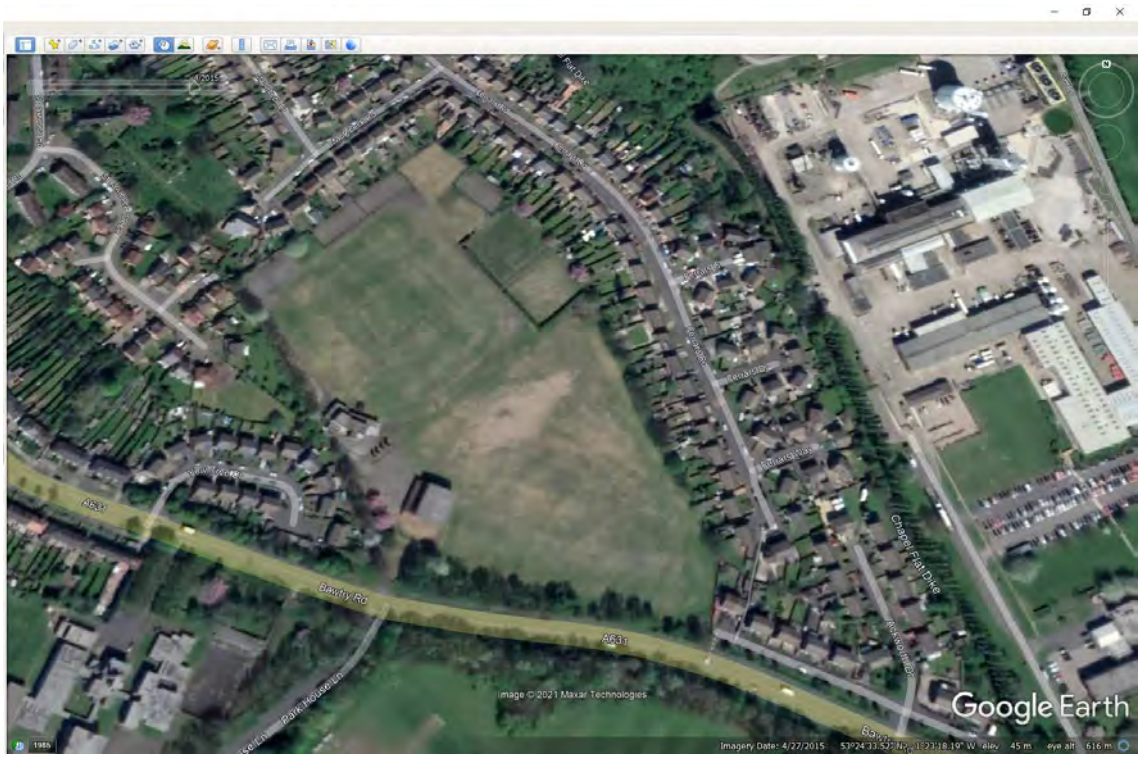
Grass mown but no pitches evident, buildings intact, paths overgrown, bowling greens overgrown, hardstanding markings faded. Materials around buildings indicate possible internal works?

June 2016



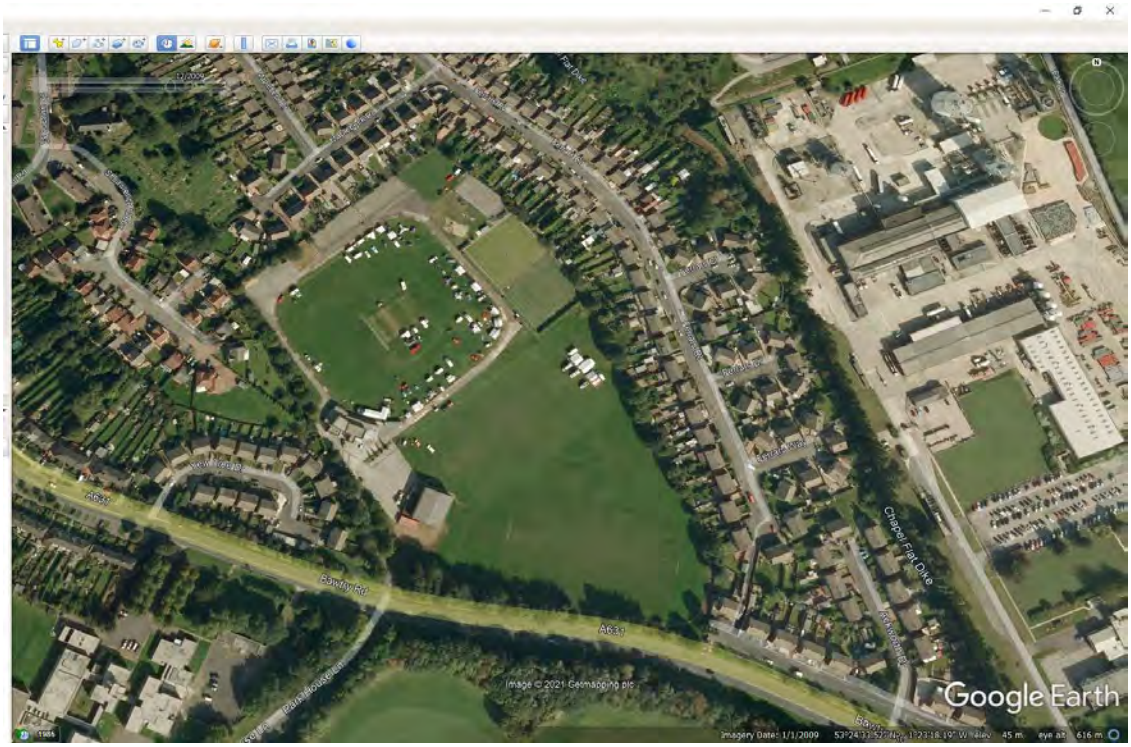
Grass mown but no pitches evident, buildings intact, parking appears laid out but hardstanding courts not clearly marked out.

April 2015



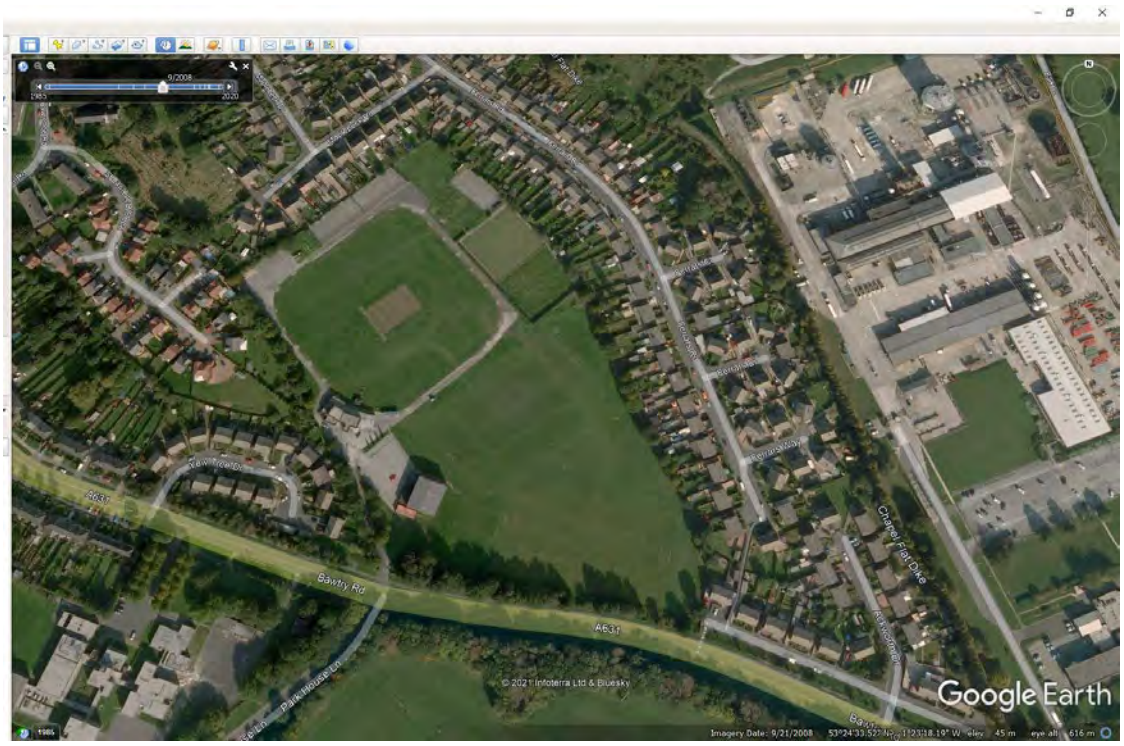
Grass mown but no pitches evident, buildings intact, parking appears laid out but hardstanding courts not clearly marked out.

December 2009



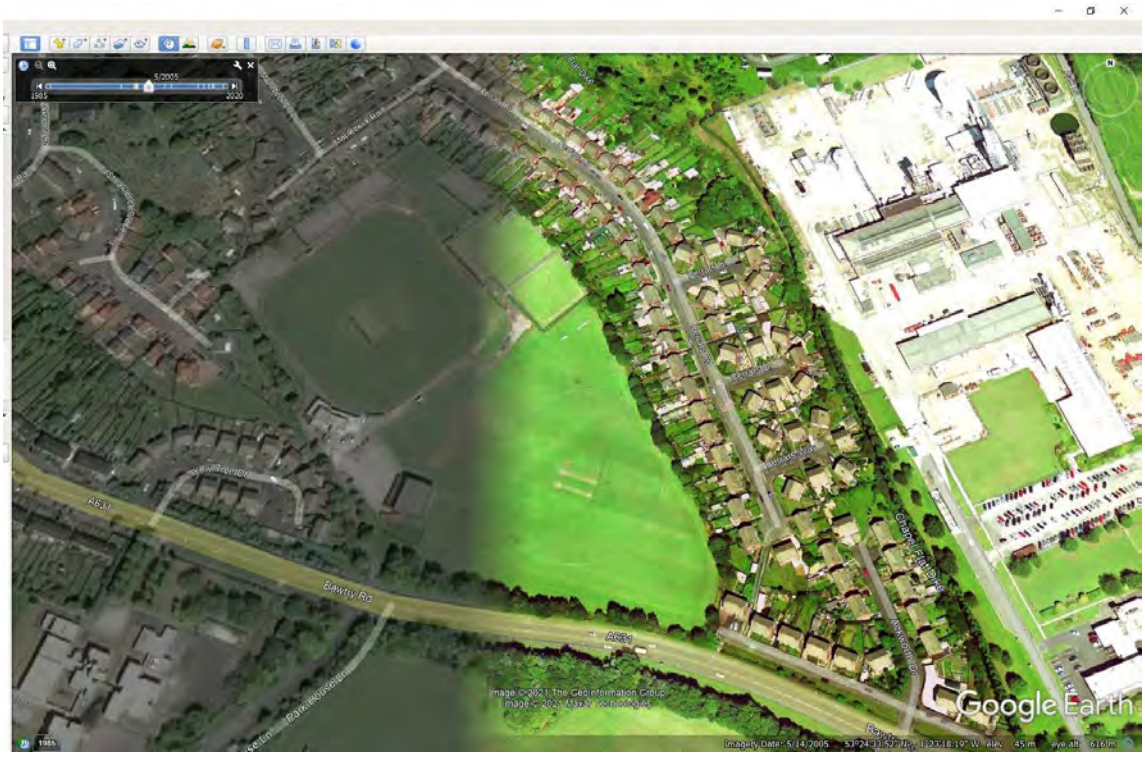
Pitches clearly marked out, site evidently in use as car boot sale / fair or similar. Bowling greens appear overgrown. 2 football pitches are evident, as is a cricket square. Bowling green appear unmanaged.

September 2008



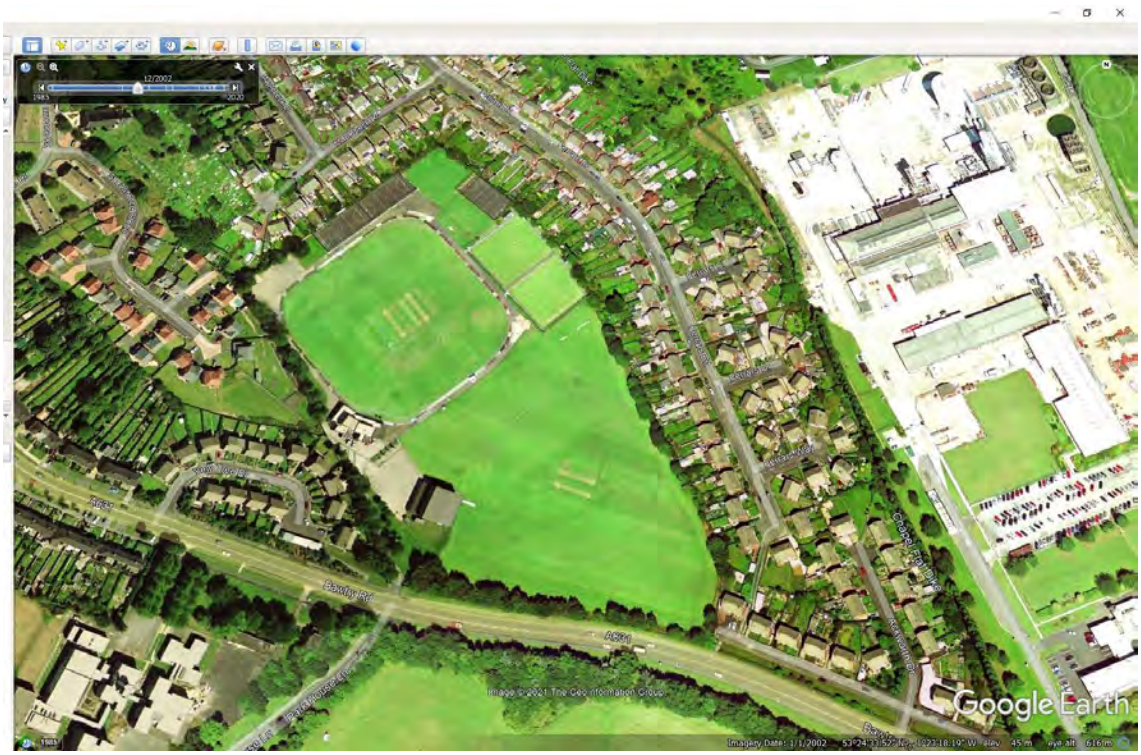
Pitches clearly marked out for football, cricket, and junior football. Bowling greens appear overgrown.

May 2005



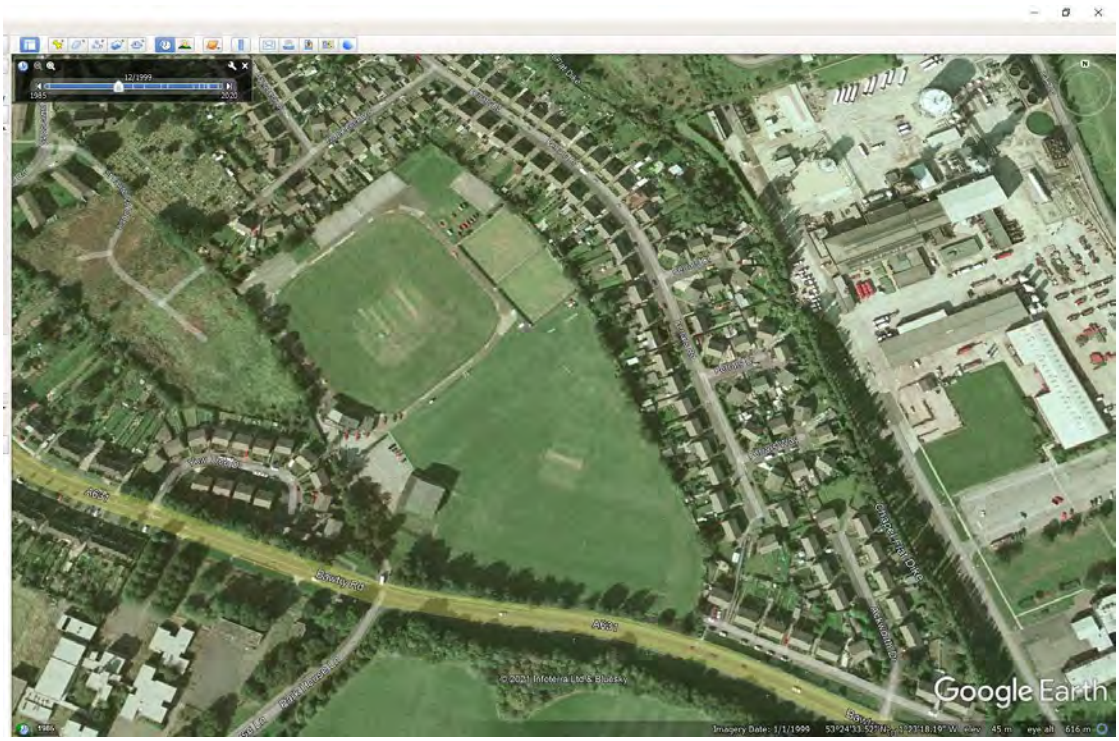
Grass marked out for cricket, bowling greens appear unmanaged. No football uses evident.

December 2002



Grass marked out for cricket, bowling greens appear unmanaged. No football uses evident. MUGA / Tennis appear well maintained.

December 1999



Grass marked out for cricket, bowling greens appear unmanaged. 2 football pitches. MUGA / tennis appear well maintained.

Appendix 2- Draft Site Layout

Sheppard Planning

Appendix 3 – HSE Advice

HSE

Health and Safety Executive

(By email)
Stewart Thomson
Barratt Homes

Science Division

Kathryn Deakin

Statutory and Commercial
Land Use Planning Advice
HSE, Harpur Hill
Buxton
Derbyshire
SK17 9JN

lupenquiries@hse.gov.uk

http://www.hse.gov.uk/

Head of Team
Stuart Reston

HSL Ref: D1609

Date: 25 July 2022

Dear Mr Thomson,

Land Use Planning Consultation with the Health and Safety Executive
Proposed Residential Development at Bawtry Road, Sheffield

Further to our meeting on the 14th July 2022 we agreed to provide you with a brief summary of the meeting and HSE's advice so far, in respect of your proposed development.

Present:
Stewart Thomson – Barratt Homes
Dave Hudson – Barratt Homes
Kathryn Deakin – Land Use Planning Team, HSE
Richard Lomax - Land Use Planning Team, HSE

Introductions and Background
Following our introductions HSE provided an explanation of our advisory role in the land use planning process. This included a brief explanation of the HSE Consultation Distances (CD) and some historical background to events and legislation which have led to the formulation of HSE's Land Use Planning (LUP) Methodology (https://www.hse.gov.uk/landuseplanning/methodology.htm). HSE advised that the proposed development site was located within HSE's CD of two major hazard sites:

- H0207 – BOC Ltd, Brinsworth
- H3083 – Outokumpu Stainless Ltd

The major hazard sites hold hazardous substances consent to store up to specified quantities of various hazardous substances under the Planning (Hazardous Substances) Act 1990 and the Planning (Hazardous Substances) Regulations 2015.

Development Proposal

The proposed site located at Bawtry Road, Sheffield is for the development of approximately 147 residential dwellings, a small play area and landscaping. You had provided HSE with a draft layout for the proposal which can be seen in Appendix 1 (Draft Layout SK05 March 2022).

HSE have overlaid the HSE consultation zones for both major hazard sites on to the draft layout, and this can be seen in Appendix 2.

The proposed site falls within the middle and outer HSE consultation zones for BOC Ltd, Brinsworth (H0207) and within the outer HSE consultation zone for Outokumpu Stainless Ltd (H3083).

Residential Development

The draft layout shows that housing will be located within the HSE middle and outer zones, as well as outside the CD.

In circumstances such as this, where a development type lies within two or more zones of the same major hazard, the methodology applies Rule 1a – 'the straddling rule' – to determine the zone in which the development type should be treated as lying within. In applying Rule 1a, the housing development will be considered as being in the innermost zone to the major hazard, which in this case is the middle zone of BOC Ltd, unless:

- either less than 10% of the total housing development site area marked lies inside the middle zone, or
- only car parking, landscaping (including gardens of housing), open spaces and access roads etc. associated with the development are in the middle zone.

In this case, more than 10% of the total housing development site area, and some of the dwelling units, lies within the middle zone, so this development type will be treated as lying within the middle zone.

As more than 30 dwelling units will lie within the CD, the sensitivity level (SL) of the housing development would be SL3. HSE would advise on safety grounds against the granting of planning permission for a SL3 development located within the middle zone.

Very exceptionally, there are cases where the application of HSE's codified land use planning methodology alone is inappropriate and HSE will provide further advice after taking account the specific circumstances of a proposed development. In this case, the proposed layout and its position in relation to HSE's zones present a specific set of circumstances and it is sensible to take account of these outside of the methodology – see paragraph 10 of HSE's Land Use Planning (LUP) Methodology.

HSE's advice is that, in general, significant housing should be prevented from being built in the inner zone and only a limited number of houses, at a low density, should be built in the middle zone. Pragmatically, 30 dwellings at a density of no more than 40 dwellings per hectare, in the middle zone of HSE's land use planning consultation zones, is taken as the limit at which HSE would not advise against planning permission. Beyond the middle zone, HSE does not advise against the granting of planning permission for housing development. The overall objective is to maintain the separation of incompatible development from the major hazard.

As outlined above, HSE's methodology considers housing developments to determine their sensitivity level and the zone within which the development is located. The combination of these two factors gives HSE's land use planning advice. However, HSE has taken into account the following specific circumstances and considerations in determining its advice in this case:

- The development proposes that approximately 24 dwelling units will be located wholly or partly within the middle zone of BOC Ltd, with the remainder located within the outer zones and outside the CD;
- The housing density of the overall proposed development within the middle zone will be less than 40 dwelling units per hectare.

Consequently, HSE would not advise against the granting of planning permission for the housing development type.

Play Area (LEAP) and landscaping

There is public open space with play provision and landscaping located within the middle zone of BOC Ltd. HSE would not advise against the granting of planning permission for these areas as long as less than 100 people are likely to be present at any one time.

Summary

Having taken account of the specific set of circumstances relating to the proposed housing development of this pre-application enquiry, **HSE would not advise, on safety grounds, against the granting of planning permission for the proposed development.**

This is the response which HSE would provide should the development proposal be submitted for formal consultation in its present form. However, HSE's advice in response to a subsequent planning application may differ should HSE's policy, the methodology which it uses, or the development details, have changed by the time an application is submitted.

HSE has provided planning authorities with access to the HSE Planning Advice Web App, an online software decision support tool, to consult HSE on planning applications. However, as HSE has taken into account the specific circumstances of the proposed development in providing this pre-application advice, should a planning application for the proposed development be submitted, then Sheffield Council should consult HSE directly for advice on the application, instead of using the HSE Planning Advice Web App.

Yours sincerely

Kathryn Deakin

Land Use Planning Advice Team
Science Division

Appendix 1 – Draft Layout SK05 March 2022

Appendix 2 – Combined HSE Consultation Zones overlaid on the Draft Layout

Sheppard Planning

Eastwood&Partners
CONSULTING ENGINEERS

FLOOD RISK ASSESSMENT

BAWTRY ROAD, TINSLEY

FOR

BARRATT & DAVID WILSON HOMES

46616-001 **22 March 2022**

Eastwood & Partners, St Andrew's House, 23 Kingfield Road, Sheffield, S11 9AS
[redacted] [redacted] **www.eastwoodandpartners.com**

Eastwood&Partners
CONSULTING ENGINEERS

E&P

FLOOD RISK ASSESSMENT

BAWTRY ROAD, TINSLEY

FOR

BARRATT & DAVID WILSON HOMES

Job No. : 46614

Report Status : Interim report

Document Date : 22 March 2022

Approved :

Chris Hodge

CONTENTS

APPENDICES

1)		Location plan
2)	Met Geo Environmental	Topographical survey (P21-01555)
3)	Environment Agency	Online flood mapping
4)	Sheffield City Council	SFRA map
		Email correspondence
		Sewer asset plan
5)	DEFRA	Historic flood map
6)	Yorkshire Water	Sewer assets plan
		Pre-planning enquiry
7)	Eastwood and Partners	FEH Greenfield runoff rates
		SuDS checklist
		Attenuation calculations

Interim report: *22 March 2022*

EXECUTIVE SUMMARY

The project comprises the proposed development of a 5.58-hectare greenfield site for residential use.

The Environment Agency's Flood Map for Planning shows the site to lie within Zone 1. The site is not at significant risk of flooding from any source. In accordance with current Planning Practice Guidance 'Flood Risk and Coastal Change', sequential testing is not required.

The majority of the site is at a very low risk of surface water flooding. There is a low risk surface water flow routes generated in the north-west and southern corner of the site flowing easterly towards a large area of surface water ponding comprised of low to high surface water flood risk at the site low point in the eastern portion of the site. There is also an isolated area at high risk corresponding to a localised low point at the base of the steep embankment on the south-western corner of the site.

The attenuation structure will be located at the site low point which will accommodate onsite runoff and discharge it at a restricted rate (see Section 3.7) removing the current surface water flood risk.

Surface water disposal is considered in accordance with the drainage hierarchy in Building Regulations Part H 2010 and Planning Practice Guidance 'Reducing the causes and impacts of flooding', paragraph 80.

Infiltration type SuDS such as soakaways are unlikely to be possible due to the expected presence of impermeable ground conditions (mudstone and clay).

Surface water will discharge via gravity to the 450 mm public surface water sewer in Ferrars Road, east of the site, subject to approval from Yorkshire Water. Existing connections will need surveying to determine their suitability to reuse. Surface water discharge will be restricted to the minimum practical rate of 3.5 l/s, as stipulated by Yorkshire Water. Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change.

Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 3586 m^3, subject to detailed design.

Foul effluent will discharge via gravity to the 225 mm public combined sewer crossing the site, as agreed by Yorkshire Water. Existing connections may be available to utilise.

Both the foul and surface water drainage systems will be offered for adoption by Yorkshire Water.

1.0 THE DEVELOPMENT AND NATIONAL PLANNING POLICY

1.1 Introduction

This Flood Risk Assessment has been prepared in accordance with current National Planning Policy Framework[1] and Planning Practice Guidance 'Flood Risk and Coastal Change'[2] on the instruction of Barratt & David Wilson Homes. Any other parties using the information in this report do so at their own risk, unless previously approved in writing.

The project comprises the development of a 5.58-hectare greenfield site for residential use.

1.2 Site location and description

The site is located within Tinsley, to the north-east of Sheffield city centre and is centred on coordinates 440695E, 390478N (Appendix 1).

The site is bounded by Bawtry Road to the south with residential dwellings to the east, north and west.

The majority of the site is currently occupied by grass with multiple concrete/ asphalt parking areas and small existing buildings in the south-west.

The site falls easterly from the north western and south western corners of the site (Appendix 2).

The south west corner of the site falls down a steep bank from approximately 56.53 mAOD to 53 mAOD at an average gradient of 1 in 5 before continuing from approximately 53 mAOD to 47 mAOD on the eastern boundary at an average gradient of 1 in 28. The north western corner of the site falls from approximately 50.66 mAOD to 47 mAOD at an average gradient of 1 in 69.

Proposals are for approximately 150 household properties with access from Bawtry Road.

[1] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change

1.3 Environment Agency - Flood Map for Planning

The Environment Agency's Flood Map for Planning (Figure 1 and Appendix 3) shows that the site lies within Zone 1 (low risk); land having a less than 1 in 1,000 annual probability of river flooding.

Figure 1: Environment Agency's Flood Map for Planning

1.4 Sheffield City Council Strategic Flood Risk Assessment

The Sheffield City Council's Strategic Flood Risk Assessment flood map is based on the Environment Agency flood map and records the site to be within Flood Zone 1 (Appendix 4).

1.5 National Planning Policy Framework

The National Planning Policy Framework (July 2021) sets out the principles for assessing the suitability of sites for development, in relation to flood risk, as part of the planning process.

1.5.1 Sequential Test

Initially a Sequential Test is applied to the allocation of land suitable for development. The test is required for any development proposed in Flood Zone 2 or 3 (and occasionally also in Flood Zone 1 where there are flood risks present which are not identified on the Environment Agency's Flood Maps for Planning).

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development, in areas with a lower probability of flooding.

The site lies within Zone 1 and this report confirms that the site is not at significant risk of potential flooding from any source, therefore the sequential test is not required.

1.5.2 Climate change

An issue emphasised in the Planning Policy Guidance is the requirement to take account of potential climate change effects. New development is generally accepted as having a 100 year design life for flood risk purposes. The Environment Agency's report 'Flood risk assessments: climate change allowances'[3], published in February 2016, recommends a 20 to 40% increase in peak rainfall intensity is taken into account for small and urban catchments for design horizons up to 2115. For the purposes of this Flood Risk Assessment, a 30% increase in peak rainfall intensity has been used for assessing storage requirements; 30% being an average between the 'central' and 'upper end' of the data range given in the report. It is recommended that the potential effects of a peak rainfall increase of 40% are considered in detailed design.

[3] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-2

2.0 FLOOD RISK

2.1 Potential sources of flooding

The Environment Agency and Strategic Flood Risk Assessment maps are intended for general guidance on flood risk and it is also necessary to consider other, more detailed, sources in relation to local factors.

2.1.1 Fluvial

The nearest watercourse is an ordinary watercourse (Chapel Flat Dike) located approximately 90 m north-east of the site. There is an unnamed ordinary watercourse located 900 m west of the site, converging with the River Don at a point approximately 935 m north-west of the site. Flood risk from this source is assessed as negligible.

2.1.2 Surface water

The Environment Agency surface water flood risk map (Figure 2 and Appendix 3) shows the majority of the site is at very low risk of surface water flooding. Very low risk corresponds to the unshaded areas of the map. There is a low risk surface water flow route generated in the north-west and southern corner of the site flowing easterly towards a large area of surface water ponding comprised of low to high surface water flood risk at the site low point in the eastern portion of the site. There is also an isolated area at high risk corresponding to a localised low point at the base of the steep embankment on the south-western corner of the site.

Very low risk refers to land having less than a 1 in 1,000 annual exceedance probability of flooding (0.1% AEP). Low risk refers to land having between a 1 in 1,000 and 1 in 100 annual exceedance probability of flooding (0.1% - 1% AEP). Medium risk refers to land having between 1 in 100 and 1 in 30 annual exceedance probability of flooding (1% - 3.33% AEP). High risk refers to land having a greater than 1 in 30 annual exceedance probability of flooding (>3.33% AEP).

The majority of surface water flood depths for extreme rainfall events between the 1in100 and 1in1000 year rerturn period range from below 300 mm along the overland flow routes increasing to 300 – 900 mm in the ponding area with a small area over 900mm at the lowest point near the eastern boundary. Surface water ponding near the south western corner of the site is shown to be less than 300 mm.

Figure 2: Environment Agency – Risk of surface water flooding map

2.1.3 Groundwater

Groundwater is a potential flood risk to areas which are low lying and on permeable ground or, occasionally, to areas of higher ground in the vicinity of springs. There is no public record of any flood risk to the site associated with groundwater.

2.1.4 Sewerage

The surrounding public sewer network is owned and maintained by Yorkshire Water. There is no public record of any flood risk to the site associated with these sewers.

2.2 Historic Flooding

The DEFRA historic flood map records the site to be outside the historical flood outline (Appendix 5).

2.3 Residual flood risk

The majority of the site is at a very low risk of surface water flooding. There is a low risk surface water flow routes generated in the north-west and southern corner of the site flowing easterly

towards a large area of surface water ponding comprised of low to high surface water flood risk at the site low point in the eastern portion of the site. There is also an isolated area at high risk corresponding to a localised low point at the base of the steep embankment on the south-western corner of the site.

This is not a development constraint and will be managed on the site within the surface water drainage strategy and by the mitigation measures in Section 2.4.

2.4 Flood Mitigation Measures

The attenuation structure will be located at the site low point which will accommodate onsite runoff and discharge it at a restricted rate (see Section 3.7) removing the current surface water flood risk.

.

3.0 DRAINAGE STRATEGY

3.1 Existing drainage

Yorkshire Water sewer records (Appendix 6) shows a 225 mm public combined sewer crossing the centre of the site connecting into a 450 mmm public combined sewer in Ferrars Road, east of the site. There is also a 450 mm public surface water sewer in Ferrars Road. To the west of the site in St Lawrence Glebe, there is a 150 mm public foul sewer and a 225 mm public surface water sewer.

Small existing buildings are currently located in the south-western portion of the site. Existing connections may therefore be available to utilise. A plan received from Sheffield City Council (Appendix 4) shows an onsite 225 mm private sewer connecting into the 450 mm public surface water sewer in Ferrars Road. A survey will be required to determine the condition of existing connections.

3.2 Yorkshire Water consultation

Pre-planning advice has been received from Yorkshire Water (Appendix 6); their letter reference Y001171 dated 13th February 2022. The main points of the advice are summarised below.

- There is a 225 mm public combined sewer crossing the site. No buildings or other obstructions are to be erected within 3 m or trees to be planted within 5 m of the sewer centreline. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer.
- Development should take place with separate systems for foul and surface water drainage on site.
- Foul water domestic waste can discharge to the 225 mm public combined sewer crossing the site.
- The surface water drainage hierarchy should be followed.
- It is understood that a highway drain/ culverted watercourse crosses the south-eastern portion of the site, and drains to the Chapel Flat Dike. This appears to be the obvious place for surface water disposal.

- As a last resort discounting other surface water discharge methods, surface water may discharge to the 450 mm public surface water sewer recorded in Ferrars Road.
- Surface water discharge should be restricted to 3.5 l/s. Further restrictions may be imposed by other parties.

3.3 Sheffield City Council (LLFA) consultation

Sheffield City Council was contacted to determine the LLFA restrictions and requirements for developing the site. A response received 23rd February is summarised below (Appendix 4):

General advice:

- Surface water disposal must follow the SuDS hierarchy and evidence must be provided if the site is not suitable for infiltration.
- Discharge to watercourse should only be discounted for this site if it can be demonstrated that the levels/routes are not feasible. It is noted that Bawtry Road service road may provide a suitable route for a pipe out to Chapel Flat Dike.
- A brownfield rate based on the existing impermeable area for a 1 in 1 year event with a 30% reduction would be acceptable providing a full detailed survey demonstrating an existing connection to the proposed discharge point is provided. Alternately, where a positive connection cannot be proved from existing impermeable areas the greenfield runoff rate (based on QBar) should be used.
- Sheffield LLFA promote drainage systems which incorporate the four SuDS pillars of Quality, Biodiversity, Amenity and Quantity. It is advised that the following SuDS features are considered; permeable/porous paving, swales, detention basins and ponds etc to allow the movement of surface water on or near the surface.

Site specific advice:

- BGS infiltration screening indicates that the site may be suitable for infiltration.
- There is a highway drain in the south-eastern portion of the site that then drains to Chapel Flat Dike. This drain originally discharged into an open ditch, which was then piped when Ferrars Road was built. Consequently, this pipe is defined as a highway drain rather than a watercourse.
- There is a history of flooding issues downstream on this piped section of the highway drain and consequently it is unlikely to be suitable for discharge from the site (unless an existing established connection from the site can be demonstrated and discharge

agreed with SCC highways).

- There is a private drain from MH3 into the public SW sewer on Ferrars Road. It is unclear what this serves, but likely to be a land drainage system for the sports ground. This system should be investigated further.

3.4 Ground conditions

The British Geological Survey map has no records of superficial soil deposits at the site. Bedrock geology is recorded as mudstone, siltstone and sandstone of the Pennine Middle Coal Measures Formation. Bedrock geology across the northern portion of the site is recorded as sandstone of the Pennine Middle Coal Measures Formation.

A historical borehole log (ID: SK4924B) located approximately 170 m east of the site records 0.3 m of topsoil, 1.7 m of clay overlying 0.8 m of clay with fragments of red grit. Groundwater was not recorded in the borehole log.

3.5 Greenfield Calculations

Greenfield runoff is calculated using the ReFH2.3 statistical rainfall-runoff method with FEH 2013 rainfall data using the default catchment characteristics (Appendix 7). Table 1 below summarises the runoff rates for varying return periods. These figures relate to the whole 5.58 hectares and flow per unit area (hectares).

Greenfield runoff				
Catchment	**Return period**			
	1 in 1 yr	**1 in 2 yr**	**1 in 30 yr**	**1 in 100 yr**
Humber	15.402 l/s	17.542 l/s	40.658 l/s	56.136 l/s
	2.760 l/s/ha	3.144 l/s/ha	7.286 l/s/ha	10.060 l/s/ha

Table 1: Greenfield runoff rates

3.6 Drainage hierarchy

Surface water disposal should be in accordance with the drainage hierarchy in Building Regulations Part H 2010[4] and Planning Practice Guidance 'Reducing the causes and impacts

[4] https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h

of flooding', paragraph 80 reference ID 7-080-20150323. Disposal via SuDS methods should be considered as the first option. Disposal to the public sewer should be considered only when SuDS methods and disposal to the watercourse are shown to be unsuitable.

3.6.1 Sustainable Drainage Systems (SuDS)

SuDS methods include water infiltration systems such as soakaways, basins and filter strips, together with swales, pervious pavements, detention basins, ponds and other wetland solutions. The various methods are considered in detail in The SuDS Manual (CIRIA C753).

Infiltration type SuDS such as soakaways are unlikely to be possible due to the expected presence of impermeable ground conditions (mudstone and clay).

Other SuDS methods may be applicable and their use is summarised in the appended SuDS checklist (Appendix 7).

3.6.2 Watercourse

The nearest watercourse is an ordinary watercourse (Chapel Flat Dike) located approximately 90 m north-east of the site. There is an unnamed ordinary watercourse located 900 m west of the site which converges with the River Don at a point approximately 935 m north-west of the site. These watercourses are separated by third party land therefore disposal to watercourse is discounted.

3.6.3 Public sewer

There is a 450 mm public surface water sewer in Ferrars Road, east of the site. Discharge to the sewer will require a request for new connection.

3.7 Proposals for surface water disposal

The final disposal strategy for surface water run-off requires detailed consideration and approval during the design phase of the project. The final design will need the approval of the relevant statutory bodies but will broadly follow these principles:

- Surface water disposal will be via gravity to the 450 mm public surface water sewer located in Ferrars Road, east of the site, subject to approval from Yorkshire Water. Existing connections will need surveying to determine their suitability to reuse.
- Surface water discharge will be restricted to 3.5 l/s as a minimum practicable rate as stipulated by Yorkshire Water.
- Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 3586 m^3, subject to detailed design. Attenuation calculations are provided in Appendix 7.
- The surface water drainage system will be offered for adoption to Yorkshire Water.

3.8 SuDS Maintenance

Maintenance of the SuDS systems proposed for this site will be in accordance with the recommendations within The SuDS Manual (CIRIA C753, 2015) as stipulated in Table 2, along with any recommendations provided by suppliers and product specifications.

SuDS SYSTEM	**ACTION**	**FREQUENCY**
Sub-surface storage	Remove debris from catchment surface where it may affect performance	Monthly
	If the system allows rainfall infiltration from above, check filter surface for blockages. Remove and replace infiltration material if deemed necessary.	Annually
	Remove sediment from pre-treatment structures	Annually or as required
	Inspect inlets, outlets, vents and overflows to ensure they are operating as designed	Annually

	Remedial work to repair inlets, outlets, overflows and vents	As required
	Survey inside of storage area for sediment build up. Remove sediment if required.	As required

Table 2: SuDS Maintenance

3.9 Proposals for foul disposal

Foul effluent will discharge via gravity to the 225 mm public combined sewer crossing the centre of site, subject to approval from Yorkshire Water. Existing connections may be available to utilise.

The foul drainage system will be offered for adoption to Yorkshire Water.

3.10 Residual flood risk

There is a potential flood risk to site occupiers and to others from surface water runoff as a result of developing the site. The residual risk can be managed by the general flood mitigation measures outlined in Section 3.11.

3.11 Mitigation measures

The proposed surface water drainage system is designed to current best practice and to the standards laid out in the publication 'Design and Construction Guidance for foul and surface water sewers' and Building Regulations Part H 2015.

In the event of surface water exceedance during extreme rainfall events the site is laid out so that surface water runoff is directed away from houses, including those on neighbouring streets.

4.0 CONCLUSIONS

1. The site is within Flood Zone 1 with a low probability of fluvial flooding.

2. The majority of the site is at a very low risk of surface water flooding. There is a low risk surface water flow routes generated in the north-west and southern corner of the site flowing easterly towards a large area of surface water ponding comprised of low to high surface water flood risk at the site low point in the eastern portion of the site. There is also an isolated area at high risk corresponding to a localised low point at the base of the steep embankment on the south-western corner of the site.

3. The attenuation structure will be located at the site low point which will accommodate onsite runoff and discharge it at a restricted rate (see Section 3.7) removing the current surface water flood risk.

4. Infiltration type SuDS such as soakaways are unlikely to be possible due to the expected presence of impermeable ground conditions (mudstone and clay).

5. Surface water disposal will be via a pumped system to the 450 mm public surface water sewer located in Ferrars Road, east of the site, subject to approval from Yorkshire Water. Existing connections will need surveying to determine their suitability to reuse.

6. Surface water discharge will be restricted to 3.5 l/s as a minimum practical rate, as stipulated by Yorkshire Water.

7. Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 3586 m^3, subject to detailed design.

8. Foul water will discharge via a pumped system to the 225 mm public combined sewer crossing the site, subject to approval from Yorkshire Water. Existing connections may be available to utilise.

9. Both the surface water and foul drainage systems will be offered for adoption to Yorkshire Water.

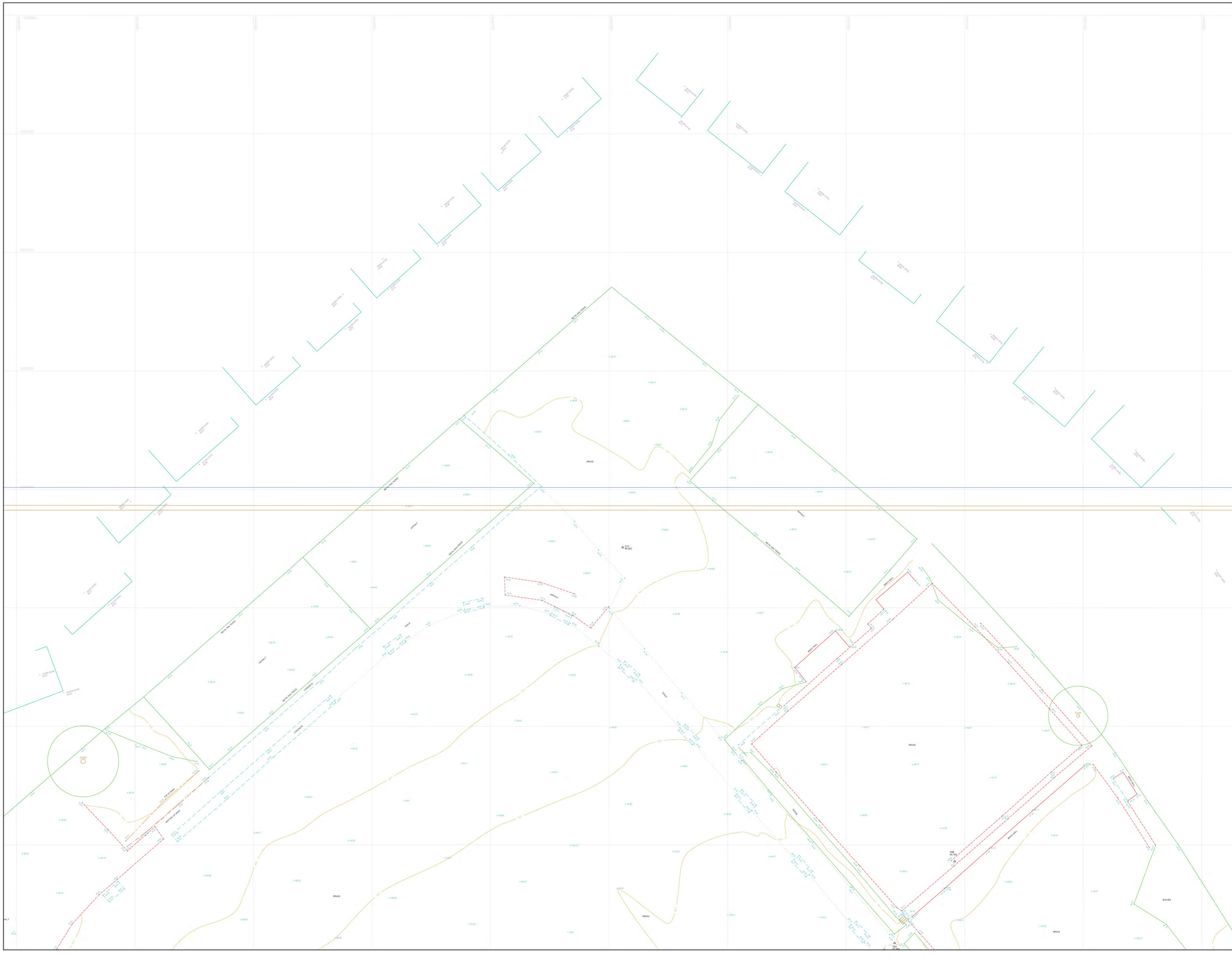
10. The level of risk and safeguards available are considered appropriate to this class of development.

APPENDICES

APPENDIX 1

Site location plan

APPENDIX 2



N

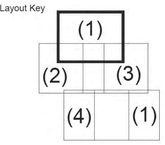
Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	440656.640	390329.879	56.741
S2	440836.157	390299.794	54.998
S3	440647.132	390391.388	50.614
S4	440708.862	390346.275	52.113
S5	440771.905	390332.700	51.807
S6	440819.827	390321.915	51.879
S7	440788.575	390372.073	49.552
S8	440741.193	390440.378	47.122
S9	440639.796	390514.869	48.666
S10	440662.302	390590.188	49.902
S8A	440708.173	390523.402	47.944
S8B	440718.311	390537.205	48.706

Layout Key



KEY

AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BIN	BIN	MANHOLE (CIRCULAR)	MH
BOLLARD	BOL	MANHOLE (RECTANGULAR)	MH
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
BRITISH TELECOM COVER	BT	MARKER POST	MKR
BUS STOP	BUS	GULLY	GU
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIGN
COLUMN	COL	TELECOM COVER	TC
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	THR
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	PIT
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IC		
COVER LEVEL	CL	CHAMBER BASE LEVEL	b.L
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	U/R	UNABLE TO MEASURE	U/M
GIRTH OF TRFT TRUNK	G	DIAMETER OF TRFT TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI-STEM TREE	M

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

Met GEO ENVIRONMENTAL
Southgate House
Pontefract Road
Stourton
Leeds
West Yorkshire
LS10 1SW
T: +44 [0] 1132 008 900
F: +44 [0] 1132 008 901
E: admin@metgeoenvironmental.com
W: www.metgeoenvironmental.com

Client
BARRATT & DAVID WILSON HOMES

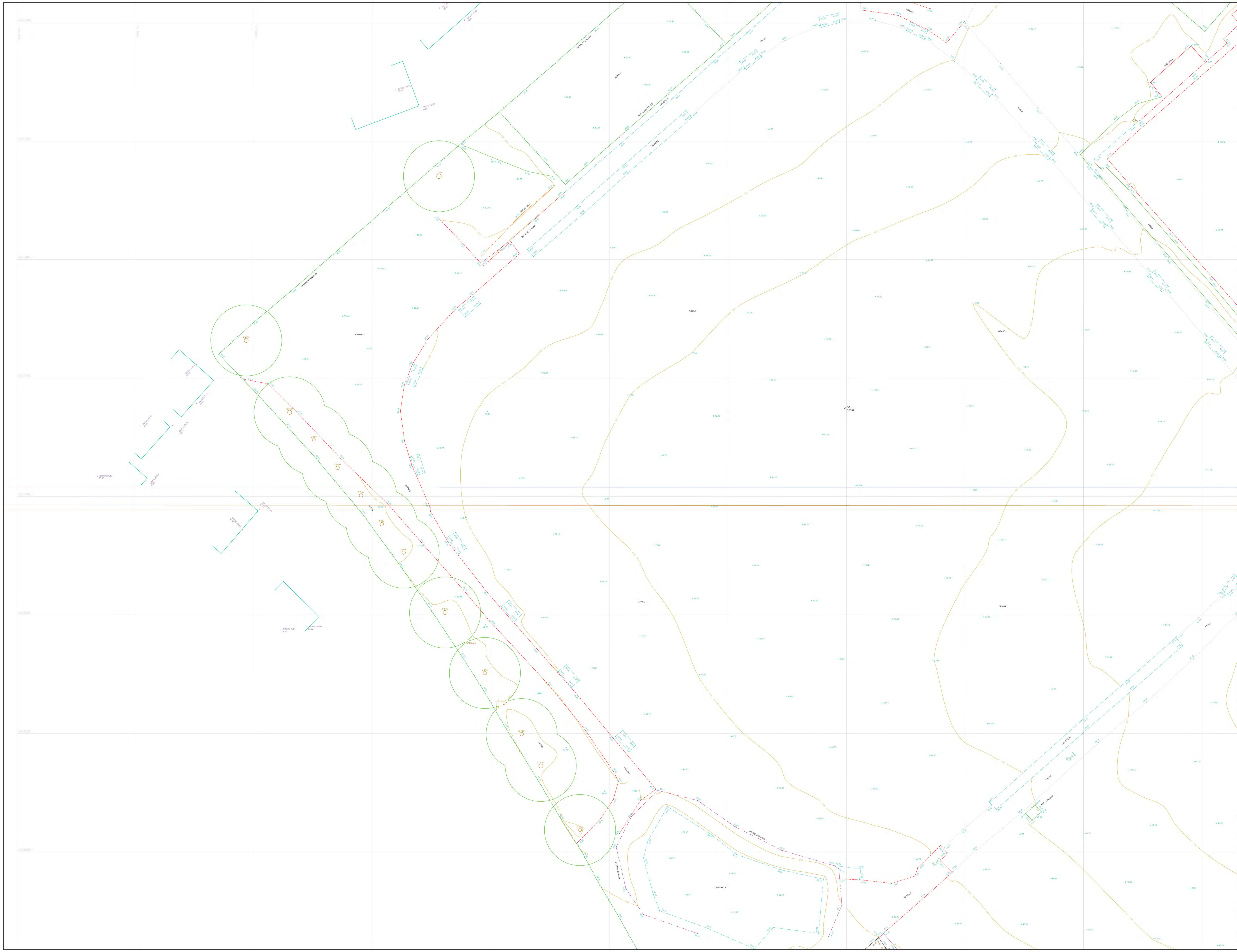
Site
BAWTRY ROAD, TINSLEY
SHEFFIELD, S9 1WF

Title
TOPOGRAPHICAL
SURVEY

Surveyed	RD, AH	Drawn	AH
Check	DA	Date	18/01/2022
Scale 1:200	Job No P21-01555	Sheet Size A0	Rev 01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01555	MET	EXT	XX	TOP	M2	G	001



Notes

This drawing and the information contained therein is Issued in confidence and is the copyright of Met Geo Environmental Limited. Disclosure of this information to Third Parties and unauthorised copying or replication of this data without approval is forbidden.

N

Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	440656.640	390329.879	56.741
S2	440836.157	390299.794	54.998
S3	440647.132	390391.388	50.614
S4	440708.862	390346.275	52.113
S5	440771.905	390332.700	51.807
S6	440819.827	390321.915	51.879
S7	440768.575	390372.073	49.552
S8	440741.193	390440.378	47.122
S9	440639.796	390514.869	48.666
S10	440662.302	390590.188	49.902
S8A	440708.173	390523.402	47.944
S8B	440718.311	390537.205	48.706

Layout Key

(1) (2) (3) (4) (5)

KEY

AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BIN	BIN	MANHOLE (CIRCULAR)	MH
BOLLARD	BOL	MANHOLE (RECTANGULAR)	MH
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
BRITISH TELECOM COVER	BT	MARKER POST	MKR
BUS STOP	BUS	GULLY	GU
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIGN
COLUMN	COL	TELECOM COVER	TEL
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	THL
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	PIT
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	SC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	SV
INSPECTION COVER (RECTANGULAR)	IC		
COVER LEVEL	CL	CHAMBER BASE LEVEL	h.L
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UTM
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK	
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE	M

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

Met GEO ENVIRONMENTAL

Southgate House
Pontefract Road T: +44 [0] 1132 008 900
Stourton F: +44 [0] 1132 008 901
Leeds E: admin@metgeoenvironmental.com
West Yorkshire W: www.metgeoenvironmental.com
LS10 1SW

Client
BARRATT & DAVID WILSON HOMES

Site
BAWTRY ROAD, TINSLEY
SHEFFIELD, S9 1WF

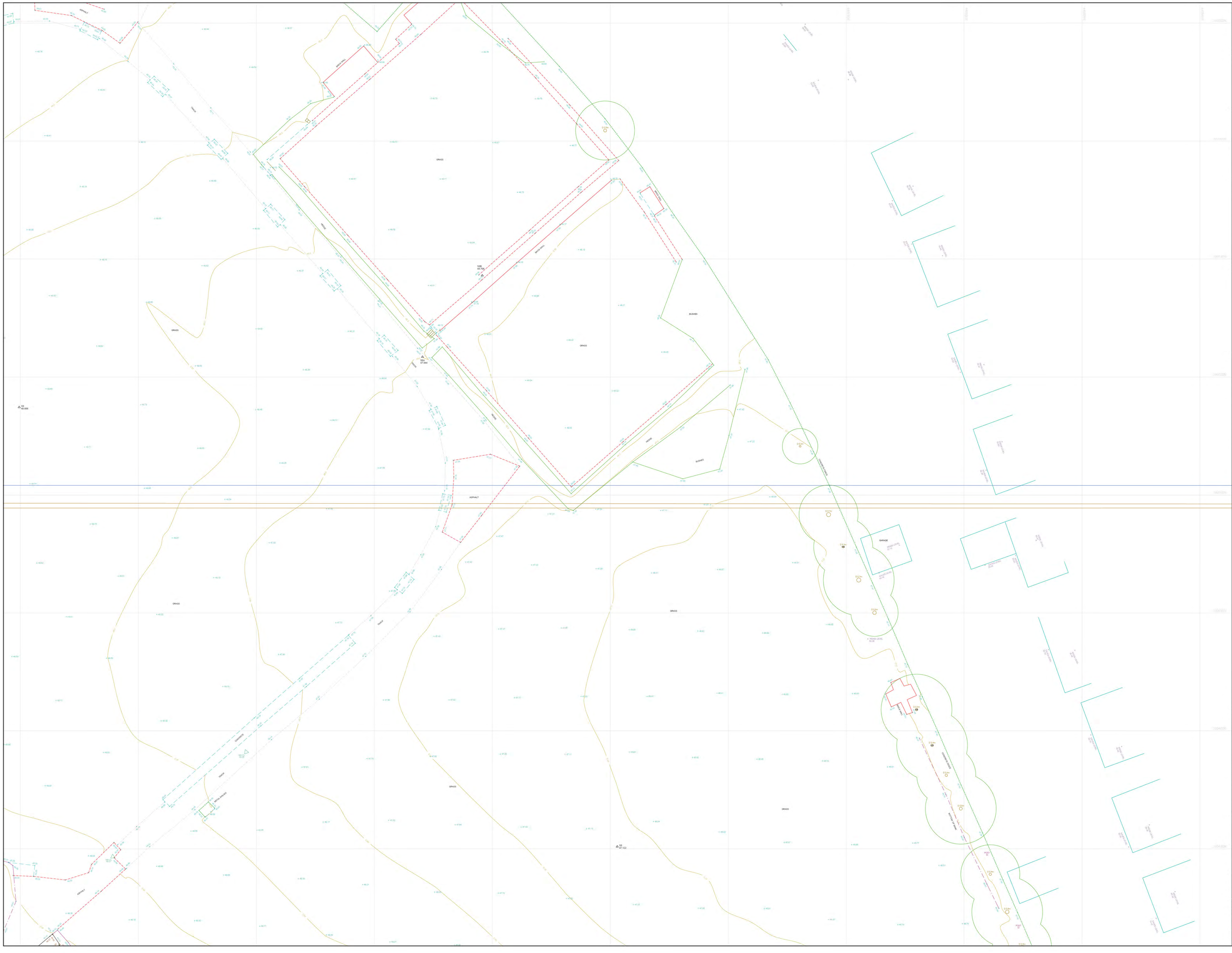
Title
TOPOGRAPHICAL SURVEY

Surveyed	RD, AH	Drawn	AH
Check	DA	Date	18/01/2022

Scale	Job No	Sheet Size	Rev
1:200	P21-01555	A0	01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01555	MET	EXT	XX	TOP	M2	G	002



Notes

N

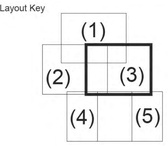
Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S3

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	440656.640	390329.879	56.741
S2	440836.157	390299.794	54.998
S3	440647.132	390391.388	50.614
S4	440708.862	390346.275	52.113
S5	440771.905	390332.700	51.807
S6	440819.827	390321.915	51.879
S7	440788.575	390372.073	49.552
S8	440741.193	390440.378	47.122
S9	440639.796	390514.869	48.666
S10	440662.302	390590.188	49.902
S8A	440708.173	390523.402	47.944
S8B	440718.311	390537.205	48.706

Layout Key



KEY

AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BIN	BIN	MANHOLE (CIRCULAR)	MH
BOLLARD	BOL	MANHOLE (RECTANGULAR)	MH
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
BRITISH TELECOM COVER	BT	MARKER POST	MKR
BUS STOP	BUS	GULLY	GU
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIGN
COLUMN	COL	TELECOM COVER	TB
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	THR
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	PIT
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WV
INSPECTION COVER (RECTANGULAR)			
COVER LEVEL	CL	CHAMBER BASE LEVEL	b.L
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UTM
GIRTH OF TRFT TRUNK	G	DIAMETER OF TRFT TRUNK	D
HEIGHT TO TOP OF TREE CANOPY	H	MULTI-BOLE TREE	M

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

Met GEO ENVIRONMENTAL
Southgate House
Pontefract Road
Stourton
Leeds
West Yorkshire
LS10 1SW
T: +44 [0] 1132 008 900
F: +44 [0] 1132 008 901
E: admin@metgeoenvironmental.com
W: www.metgeoenvironmental.com

Client
BARRATT & DAVID WILSON HOMES

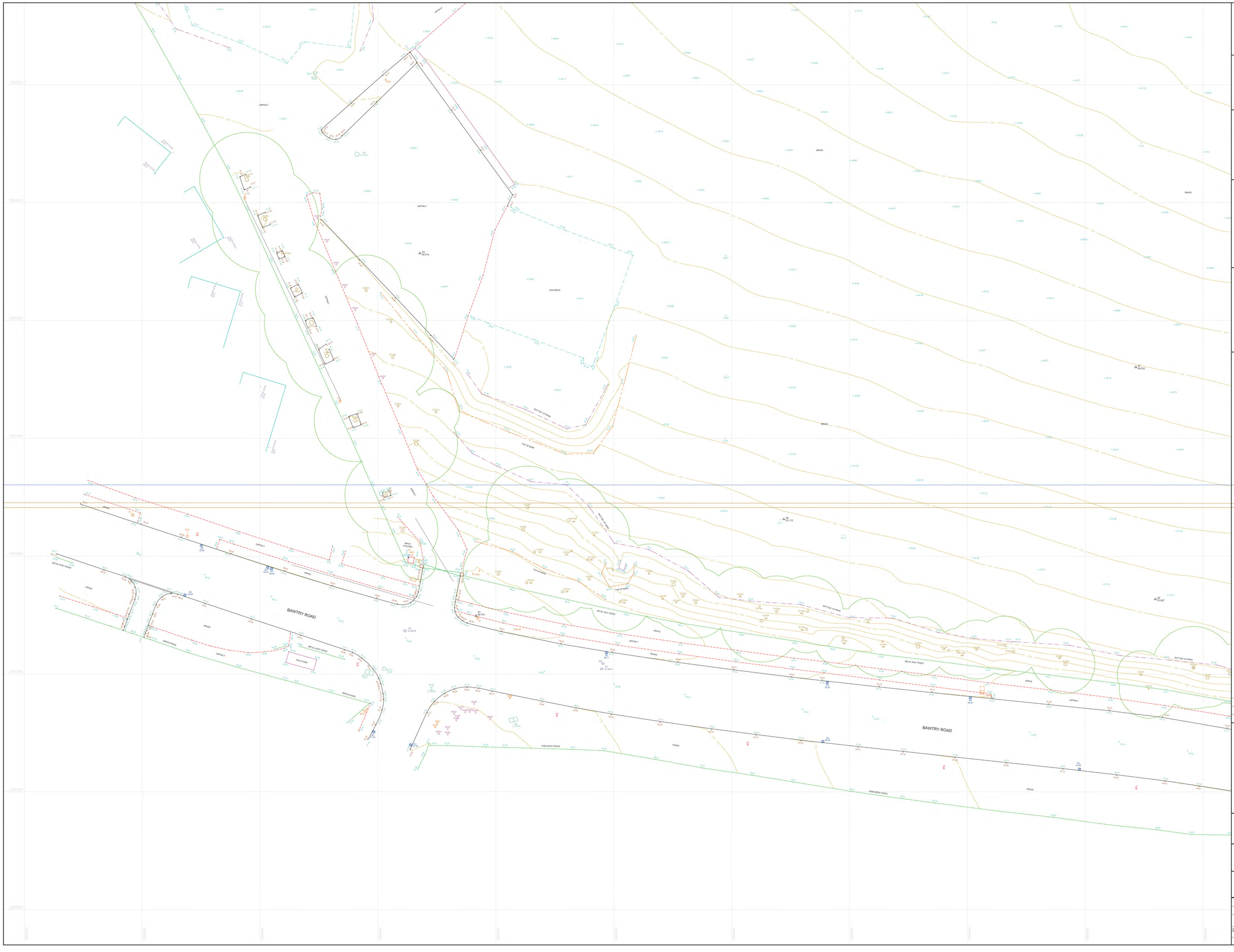
Site
BAWTRY ROAD, TINSLEY
SHEFFIELD, S9 1WF

Title
TOPOGRAPHICAL
SURVEY

Surveyed	RD, AH	Drawn	AH
Check	DA	Date	18/01/2022
Scale 1:200	Job No P21-01555	Sheet Size A0	Rev 01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01555	MET	EXT	XX	TOP	M2	G	003



Notes

N

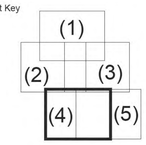
Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	440656.640	390329.879	56.741
S2	440836.157	390299.794	54.998
S3	440647.132	390391.388	50.614
S4	440708.862	390346.275	52.113
S5	440771.905	390332.700	51.807
S6	440819.827	390321.915	51.879
S7	440788.575	390372.073	49.552
S8	440741.193	390440.378	47.122
S9	440639.796	390514.869	48.666
S10	440662.302	390590.188	49.902
S8A	440708.173	390523.402	47.944
S8B	440718.311	390537.205	48.706

Layout Key



KEY

AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BIN	BIN	MANHOLE (CIRCULAR)	MH
BOLLARD	BOL	MANHOLE (RECTANGULAR)	MH
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MH
BRITISH TELECOM COVER	BT	MARKER POST	MKR
BUS STOP	BUS	GULLY	GU
CABLE TV COVER	CATV	RODDING EYE	RE
CABLE TV SUPPLY	CA	SIGN POST	SIGN
COLUMN	COL	TELECOM COVER	TB
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	ER	THRESHOLD LEVEL	THR
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	PIT
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GAS	WATER METER	WM
GATE		WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IC		

COVER LEVEL	CL	CHAMBER BASE LEVEL	b.l.
INVERT LEVEL	IL	WATER SURFACE LEVEL	WL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE	UTM
GIRTH OF TRFT TRUNK	G	DIAMETER OF TRFT TRUNK	
HEIGHT TO TOP OF TREE CANOPY	H	MULTI-SOLO TREE	M

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

Met GEO ENVIRONMENTAL
Southgate House
Pontefract Road
Stourton
Leeds
West Yorkshire
LS10 1SW
T: +44 [0] 1132 008 900
F: +44 [0] 1132 008 901
E: admin@metgeoenvironmental.com
W: www.metgeoenvironmental.com

Client
BARRATT & DAVID WILSON HOMES

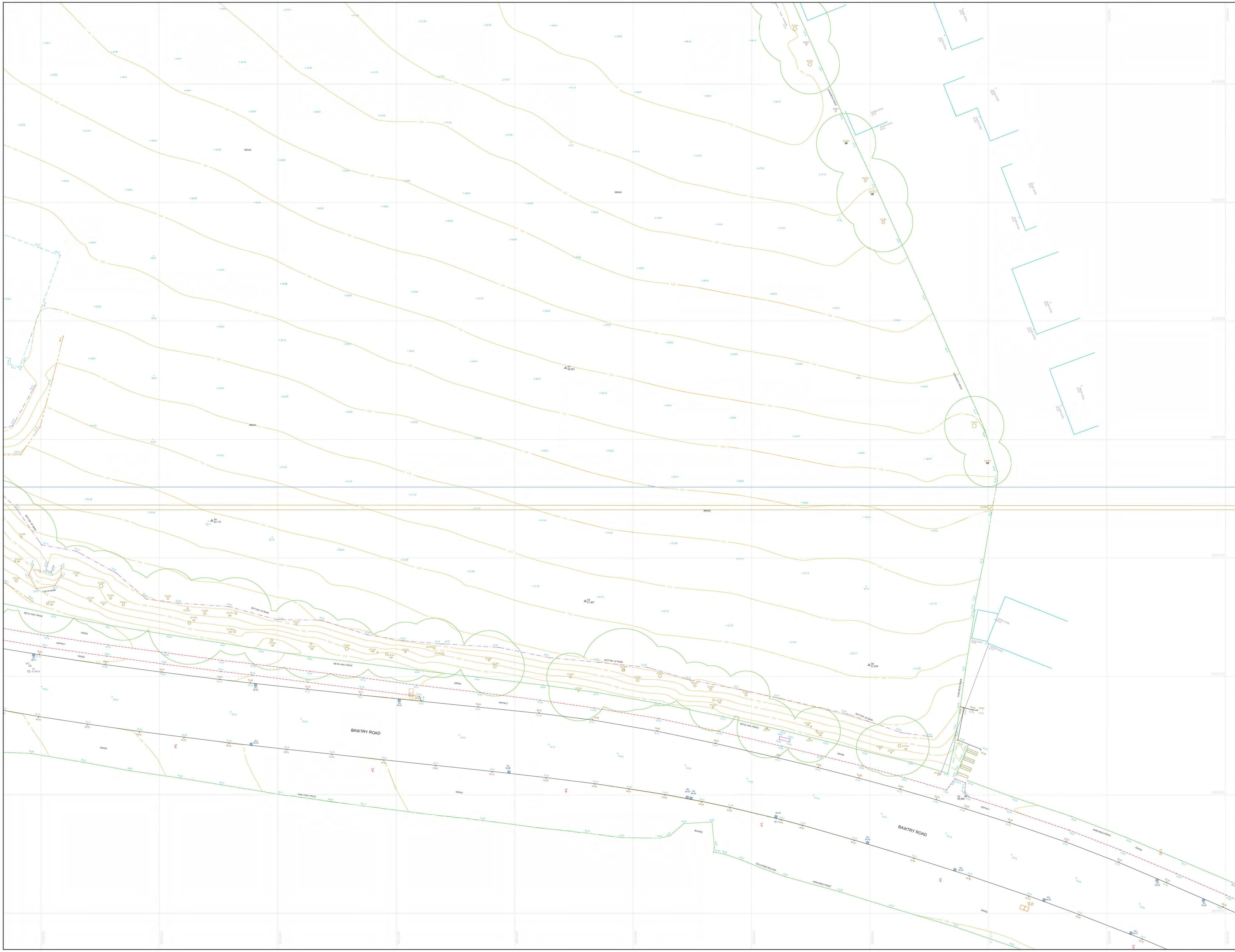
Site
BAWTRY ROAD, TINSLEY
SHEFFIELD, S9 1WF

Title
TOPOGRAPHICAL
SURVEY

Surveyed	RD, AH	Drawn	AH
Check	DA	Date	18/01/2022
Scale 1:200	Job No P21-01555	Sheet Size A0	Rev 01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01555	MET	EXT	XX	TOP	M2	G	004



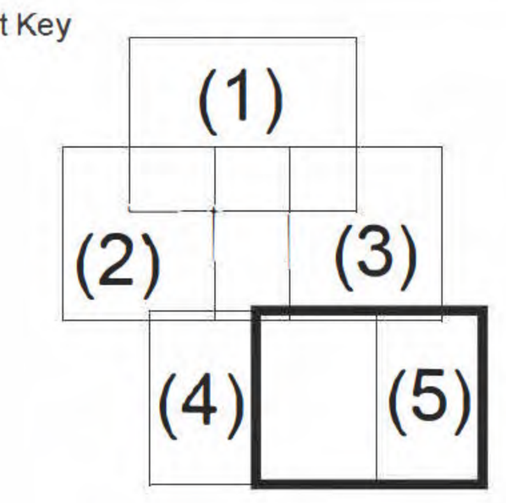
Grid : OS National Grid.
Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1

Datum : OS Level Datum.
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	440656.640	390329.879	56.741
S2	440836.157	390299.794	54.998
S3	440647.132	390391.388	50.614
S4	440708.862	390346.275	52.113
S5	440771.905	390332.700	51.807
S6	440819.827	390321.915	51.879
S7	440768.575	390372.073	49.552
S8	440741.193	390440.378	47.122
S9	440639.796	390514.869	48.666
S10	440662.302	390590.188	49.902
S8A	440708.173	390523.402	47.944
S8B	440718.311	390537.205	48.706

Layout Key



KEY

Rev	Date	Drawn	Description	Check
-	--/--/----	--	--	--

GEO ENVIRONMENTAL
Southgate House
Pontefract Road
Stourton
Leeds
West Yorkshire
LS10 1SW
T: +44 [0] 1132 008 900
F: +44 [0] 1132 008 901
E: admin@metgeoenvironmental.com
W: www.metgeoenvironmental.com

Client
BARRATT & DAVID WILSON HOMES

Site
BAWTRY ROAD, TINSLEY
SHEFFIELD, S9 1WF

Title
TOPOGRAPHICAL
SURVEY

Surveyed	RD, AH	Drawn	AH
Check	DA	Date	18/01/2022

Scale	Job No	Sheet Size	Rev
1:200	P21-01555	A0	01

DWG Ref

Project Number	Origin	Zone	Level	Desc	Type	Role	Sheet
P21-01555	MET	EXT	XX	TOP	M2	G	005

APPENDIX 3

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**440656/390485**	**24 Jan 2022 16:49**

Your selected location is in flood zone 1, an area with a low probability of flooding.

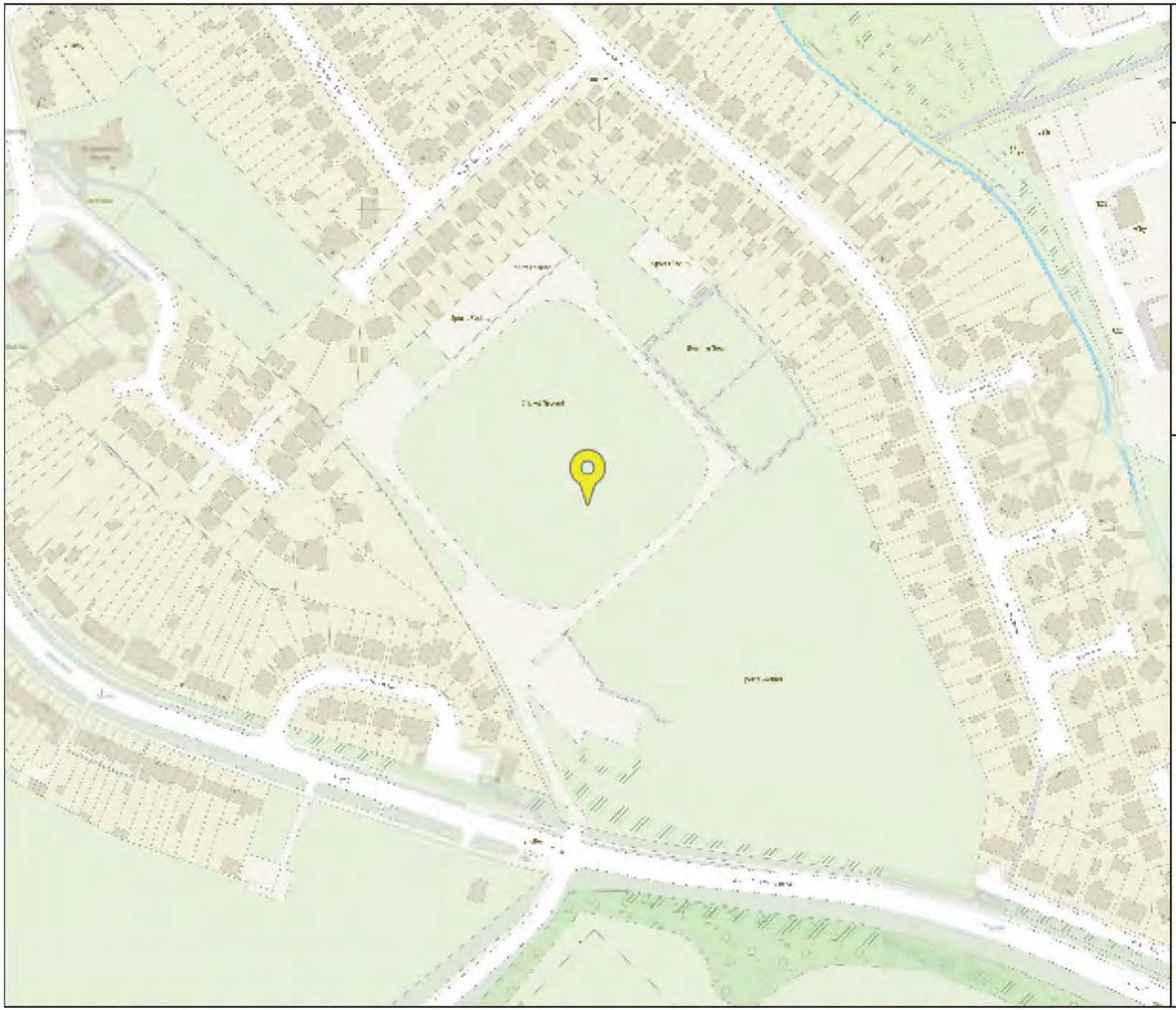
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
440656/390485

Scale
1:2500

Created
24 Jan 2022 16:49

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Flood risk

Extent of flooding

Location

S9 1WF

Extent of flooding from surface water

High Medium Low Very low

Flood risk

Medium risk: depth

Location

S9 1WF

Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm

Flood risk

Medium risk: velocity

Location

S9 1WF

Surface water flood risk: water velocity in a medium risk scenario

Flood velocity (metres/second)

Over 0.25 m/s Less than 0.25 m/s Direction of water flow

Flood risk

Low risk: depth

Location

S9 1WF

Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm

Flood risk

Low risk: velocity

Location

S9 1WF

Surface water flood risk: water velocity in a low risk scenario

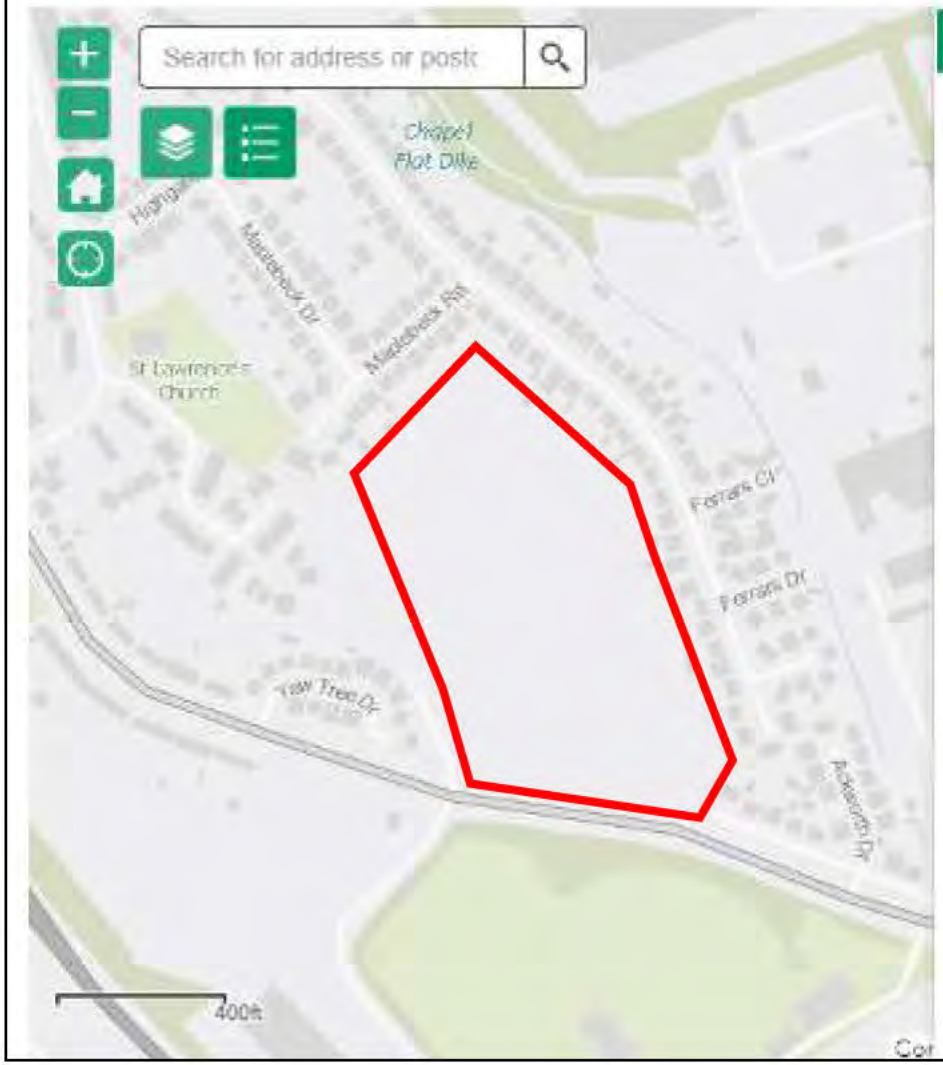
Flood velocity (metres/second)

Over 0.25 m/s Less than 0.25 m/s Direction of water flow

APPENDIX 4

Sheffield City Council

Show Map of Flood Zones



Legend

Flood Zones

- 3b Functional Floodplain
- 3a(i) - Developed Floodplain
- 3a - High Probability
- 2 Medium Probability

Raised Flood Defences

- Environment Agency
- Local Authority
- Private

Culvert Maintenance Issue

Culvert Capacity Issue

Sheffield City Boundary

[redacted]

From: [redacted]
Sent: 23 February 2022 09:00
To: [redacted]
Cc: [redacted]
Subject: 46614: Bawtry Road, Tinsley - FRA [Filed 23 Feb 2022 09:01]
Attachments: 180410_338 Ferrars Rd. S9 1WR.pdf; File1406.pdf; File1411.pdf; SK4090SE MH3.JPG; SK4090SE MH4.JPG; 289.14SW extract.JPG; Site location plan.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

[redacted]

I'd also recommend that you contact SCC highways, regarding the highway drain that crosses the site, in line with Building Regulation H4 0.3.

If this was a watercourses we would recommend no build-overs (unless absolutely unavoidable in line with Sheffield Development Framework CS67 d.) and a standoff of 3m each side of the centreline of the pipe to allow for future maintenance/replacement. SCC Highways may wish to impose similar conditions.

Helen,

I'm copying you in to make you aware of the presence of an off-highway highway drain on this proposed development site.

Regards

Ben Harding CEng MICE
Flood & Water Development Officer
Strategic Transport and Infrastructure
Sheffield City Council

✉ Howden House, 1 Union Street, Sheffield, S1 2SH
[redacted]
[redacted]
Please don't print this e-mail unless you really need to

make yourself at home Sheffield

From: [redacted]
Sent: 22 February 2022 15:09
To: [redacted]
Cc: [redacted]
Subject: RE: 46614: Bawtry Road, Tinsley - FRA

Hi [redacted]

For a site of this size it would be usual to seek Preapp advice from the LPA, rather than an informal approach.

General LLFA requirements

Sheffield CC planning policy Policy CS 63
Action to adapt to expected climate change will include:

- locating and designing development to eliminate unacceptable flood risk
- giving preference to development of previously developed land where this is sustainably located
- adopting sustainable drainage systems

Sheffield CC planning policy Policy CS 67
Flood Risk Management
The extent and impact of flooding will be reduced by:

- requiring that all developments significantly limit surface water run-off;
- requiring the use of Sustainable Drainage Systems or sustainable drainage techniques on all sites where feasible and practicable;

The outline/full applications for all the sites should include an FRA, drainage strategy/SuDS statement, layout plans and design details for drainage in line with Non-Statutory Technical Standards for Sustainable Drainage Practice Guidance (2016) to enable appropriate comments to be raised.

Pre-app	Outline	Full	Reserved	Discharge	Document submitted
✓	✓	✓			Flood Risk Assessment/Statement (checklist)
✓	✓	✓			Drainage Strategy/Statement & sketch layout plan (checklist)
	✓				Preliminary layout drawings
	✓				Preliminary "Outline" hydraulic calculations
	✓				Preliminary landscape proposals
	✓				Ground investigation report (for infiltration)
	✓	✓			Evidence of third party agreement for discharge to their system (in principle/ consent to discharge)
		✓		✓	Maintenance program and on-going maintenance responsibilities
		✓	✓		Detailed development layout
		✓	✓	✓	Detailed flood & drainage design drawings
		✓	✓	✓	Full Structural, hydraulic & ground investigations
		✓	✓	✓	Geotechnical factual and interpretive reports, including infiltration results
		✓	✓	✓	Detailed landscaping details
		✓	✓	✓	Discharge agreements (temporary and permanent)
		✓	✓	✓	Development Management & Construction Phasing Plan

A SUDS statement is required for this site setting out what SUDs systems will be used.

Existing Drainage

The applicant must carry out sufficient investigations to understand the existing ground conditions and drainage systems to establish a suitable drainage strategy for the site and ensure that existing drainage regimes/systems are not compromised by the development. For this site there are multiple existing drainage systems known to be present however there may be other uncharted or land drainage systems present.

Discharge routes and rates

The surface water runoff must be managed by implemented measures to sustainably manage surface water on site including the use of Sustainable Drainage Systems or sustainable drainage techniques on all sites unless it can be demonstrated that they are not suitable.

Discharge of surface run off be as high up the hierarchy of drainage options as reasonably practicable (NPPF Planning Practice Guidance "Reducing the causes and impacts of flooding", paragraph 080):

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

Surface water to infiltration:
LLFA accept that sites may not be suitable for infiltration but the reason for not using infiltration must be adequately evidenced in the SUDs statement with technical evidence (such as site investigation or specialist technical advice) provided to evidence that the site is unsuitable for infiltration.

Surface water to watercourse:

Discharge to watercourse should not be discounted because there is no watercourse within the site boundary. Discharge to watercourse should only be discounted for this site if it can be demonstrated that the levels/routes are not feasible. It is noted that Bawtry Road service road may provide a suitable route for a pipe out to Chapel Flat Dike.

Surface water to existing drainage system:
Discharge rates need to be assessed on an individual catchment basis for sites comprising more than one existing or proposed catchment.
A brownfield rate based on the existing impermeable area for a 1 in 1 year event with a 30% reduction would be acceptable providing a full detailed survey demonstrating an existing connection to the proposed discharge point is provided. Alternately, where a positive connection cannot be proved from existing impermeable areas the greenfield runoff rate (based on QBar) should be used. For permeable areas a greenfield rate (Qbar) should be used. Maximum discharge rate for each discharge point to be either greenfield rate or an existing brownfield rate, SCC do not accepted hybrid or blended rates for mixed catchments.
Should the applicant wish to utilise existing site drainage systems connected to public sewer, it is recommended that the applicant consult with Yorkshire Water.

SuDS recommendations
General
This site needs to utilise SuDS techniques in order to provide robust treatment of surface water as well as control of discharge. Detention basins have been proposed. These should provide treatment as well for example sediment forebays. Source control techniques should be used to provide a full management train, for example lined permeable paving (where storage for controlling discharge can also be provided), bio-retentions areas to provide road water treatment as well as greening, swales where levels allow for treatment and conveyance.
Sheffield favour designing systems that are not reliant on single point controls – instead development drainage should be designed in sub-catchments with control or a degree of control within each one. Although this may create more points for management we believe this creates a more resilient SUDs system with risk spread across a number of features. This means run-off is managed to mimic a natural state in being distributed and flows are safely managed across the site rather than conveying uncontrolled flows to a single point. It also means appropriate capture and treatment of flows can take place. Surface flow options are preferred due to their visibility, simplicity of maintenance/operation, water quality contribution, biodiversity and amenity values.

Water Quality
Sheffield LLFA promote drainage systems which incorporate the four SuDS pillars of Quality, Biodiversity, Amenity and Quantity. It is advised that including the use of permeable/porous paving, swales, detention basins and ponds etc to allow the movement of surface water on or near the surface using full SuDS train techniques are recommended. The use of underground tank/piped storage as a sole means of surface water management is not recommended as it only addresses the quantity element of SUDs design practice.
Sheffield LLFA expect demonstrable consideration/assessment of water quality by the SUDs manual methods as part of the SUDS statement for the site. Appropriate mitigation measures for this site should be assessed as part of the SUDs design process (see Chapter 26 and table 26.3 of C753 the SUDs Manual

SUDs Considerations
The following specific design considerations are relevant:

- approach for street hierarchy and how different SuDs techniques would be included – swales, bioretention, permeable paving.
- Car parking and how source control is being dealt with
- Open spaces and how SuDS form a positive part of their functionality.
- How the management trains work connecting these elements together providing for treatment and water run-off control- distributed storage from source to site and final regional control
- How the principle of water being managed on or near the surface is applied

Permeable/porous paving.
Where infiltration is possible type A/B permeable surfacing should be used.
The use of type C (lined) permeable paving in parking areas/driveways could be used for appropriate source control, treatment and flow slowing on sites with limited permeability. These could also be designed to accept roof water.

The voided stone sub-base depths can be increased to accommodate roof water and connectivity of sub-bases can be provided under impermeable surfaces.

Site Specific Advice/Archive Information

1. BGS infiltration screening indicates that the site may be suitable for infiltration.
2. There is a highway drain in the south-eastern portion of the site that then drains to Chapel Flat Dike. This drain shown on drawing 289.14 SW originally discharged into an open ditch, which was then piped when Ferrars Road was built. Consequently this pipe is defined as a highway drain rather than a watercourse. There is a history of flooding issues downstream on this piped section and consequently it is unlikely to be suitable for discharge from the site (unless an existing established connection from the site can be demonstrated and discharge agreed with SCC highways).
3. There is a private drain from MH3 (File 1411) into the public SW sewer on Ferrars Road. It is unclear what this serves, but likely to be a land drainage system for the sports ground. This system should be investigated further.

Regards

Ben Harding CEng MICE
Flood & Water Development Officer
Strategic Transport and Infrastructure
Sheffield City Council

✉ Howden House, 1 Union Street, Sheffield, S1 2SH
[redacted]
[redacted]
Please don't print this e-mail unless you really need to

From: [redacted]
Sent: 14 February 2022 09:06
To: [redacted]
Subject: RE: 46614: Bawtry Road, Tinsley - FRA

Good morning [redacted],

In addition to the request below for general LLFA requirements, please can you advise whether there are any watercourses nearby that can accept surface water discharge.

The Yorkshire Water pre-development response advises that there is a highway drain/ culverted watercourse in the south-eastern portion of the site that then drains to Chapel Flat Dike. Please can you provide further details about this and advise whether it is suitable to accept surface water discharge from the site.

Kind regards,

Jessica Stevenson-Steels
Environmental Engineer

Eastwood&Partners
CONSULTING ENGINEERS

Raising money for St Luke's Hospice. Please donate by visiting our JustGiving page
https://www.justgiving.com/fundraising/eastwood-consulting-engineers

From: [redacted]
Sent: 09 February 2022 13:57
To: [redacted]
Cc: [redacted]
Subject: RE: 46614: Bawtry Road, Tinsley - FRA [Filed 09 Feb 2022 13:57]

Hi [redacted],

Proposals are for approximately 150 household properties with access from Bawtry Road. A proposed layout is not yet available.
Please let me know if you require any further information.

Kind regards,

[redacted]
Environmental Engineer

Eastwood&Partners
CONSULTING ENGINEERS

Raising money for St Luke's Hospice. Please donate by visiting our JustGiving page
https://www.justgiving.com/fundraising/eastwood-consulting-engineers

From: [redacted]
Sent: 09 February 2022 13:23
To: [redacted]
Cc: [redacted]
Subject: RE: 46614: Bawtry Road, Tinsley - FRA

Hi [redacted]

Could you provide any information on plans for the site?

LLFA advice and requirements will depend on what's planned for the site.

[redacted]

From: [redacted]>
Sent: 09 February 2022 09:59
To: [redacted]
Subject: FW: 46614: Bawtry Road, Tinsley - FRA

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good morning,

Please can you advise when I should expect to receive a response to the enquiry below.

Kind regards,

[redacted]
Environmental Engineer

Eastwood&Partners
CONSULTING ENGINEERS

Raising money for St Luke's Hospice. Please donate by visiting our JustGiving page
https://www.justgiving.com/fundraising/eastwood-consulting-engineers

From: [redacted]
Sent: 25 January 2022 17:00
To: [redacted]
Subject: 46614: Bawtry Road, Tinsley - FRA [Filed 25 Jan 2022 17:00]

Our Ref: 46614 (Bawtry Road, Tinsley)

Good afternoon,

I am preparing a Flood Risk Assessment for a site off Bawtry Road, Tinsley (location plan attached). The site is centred on the coordinates 440695E, 390478N.

Please can you advise on any LLFA restrictions or requirements as well as any flood history records.

Kind regards,

[redacted]
Environmental Engineer

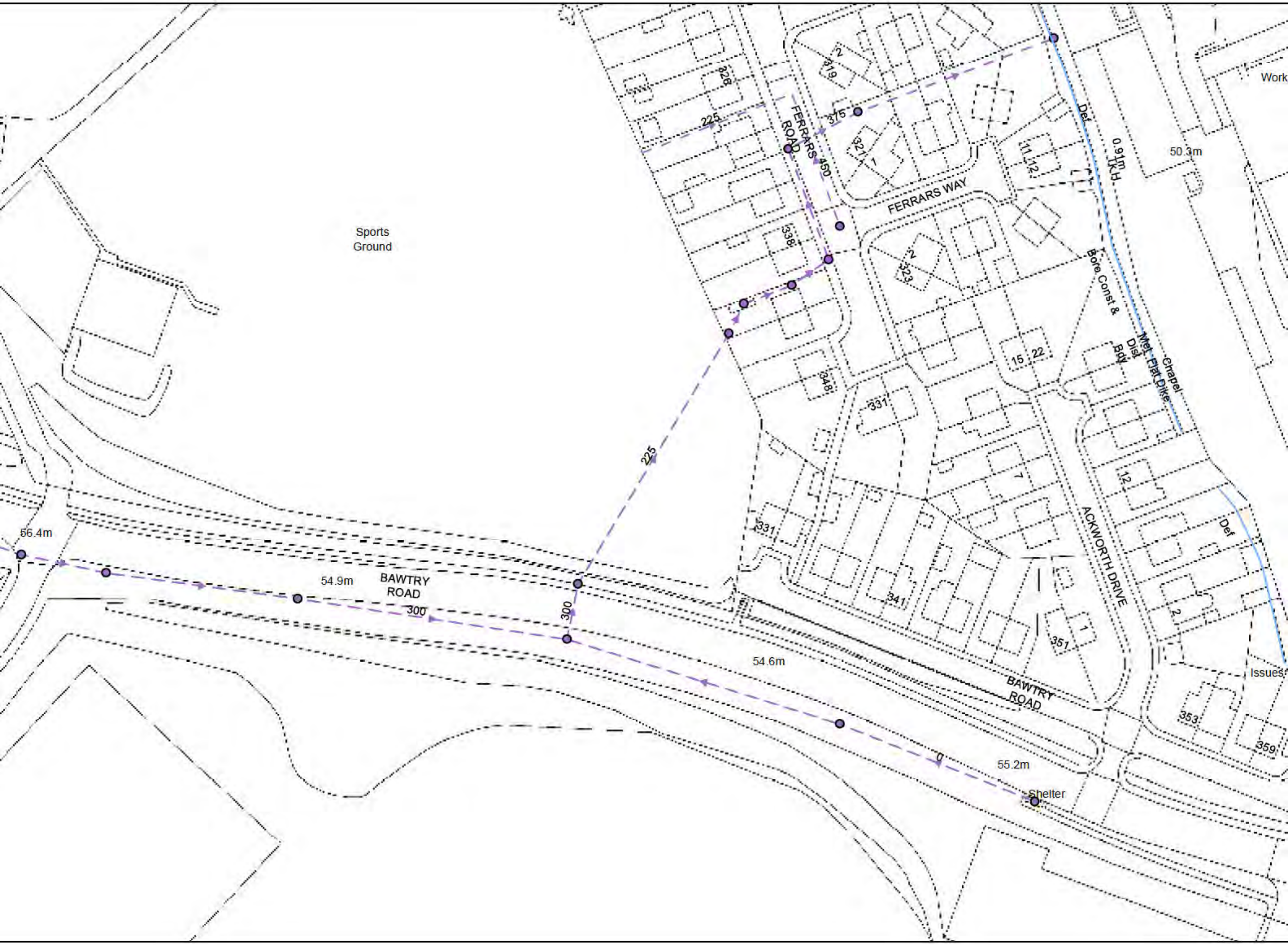
Eastwood&Partners
CONSULTING ENGINEERS

Raising money for St Luke's Hospice. Please donate by visiting our JustGiving page
https://www.justgiving.com/fundraising/eastwood-consulting-engineers

Registered office: St Andrew's House, 23 Kingfield Road, Sheffield, S11 9AS
Web: www.eastwoodandpartners.com
Tel: [redacted]

This Email, and any attachments, may contain non-public information and is intended solely for the individual(s) to whom it is addressed. It may contain sensitive or protectively marked material and should be handled accordingly. If this Email has been misdirected, please notify the author immediately. If you are not the intended recipient you must not disclose, distribute, copy, print or rely on any of the information contained in it or attached, and all copies must be deleted immediately. Whilst we take reasonable steps to try to identify any software viruses, any attachments to this Email may nevertheless contain viruses which our anti-virus software has failed to identify. You should therefore carry out your own anti-virus checks before opening any documents. Sheffield City Council will not accept any liability for damage caused by computer viruses emanating from any attachment or other document supplied with this e-mail

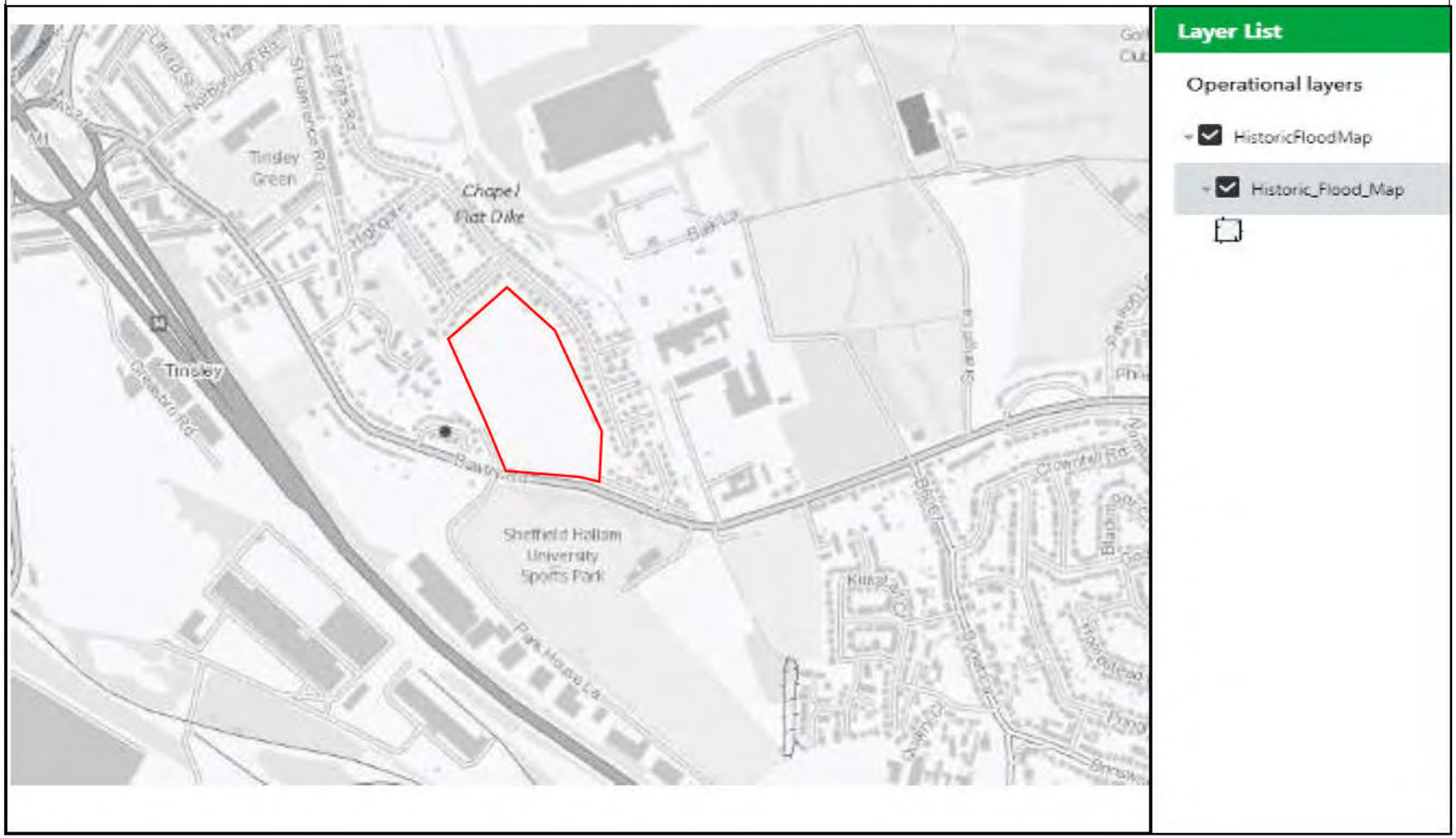

ORDNANCE SURVEY
Scale 1:2500 or 39.886 inches to 1 mile



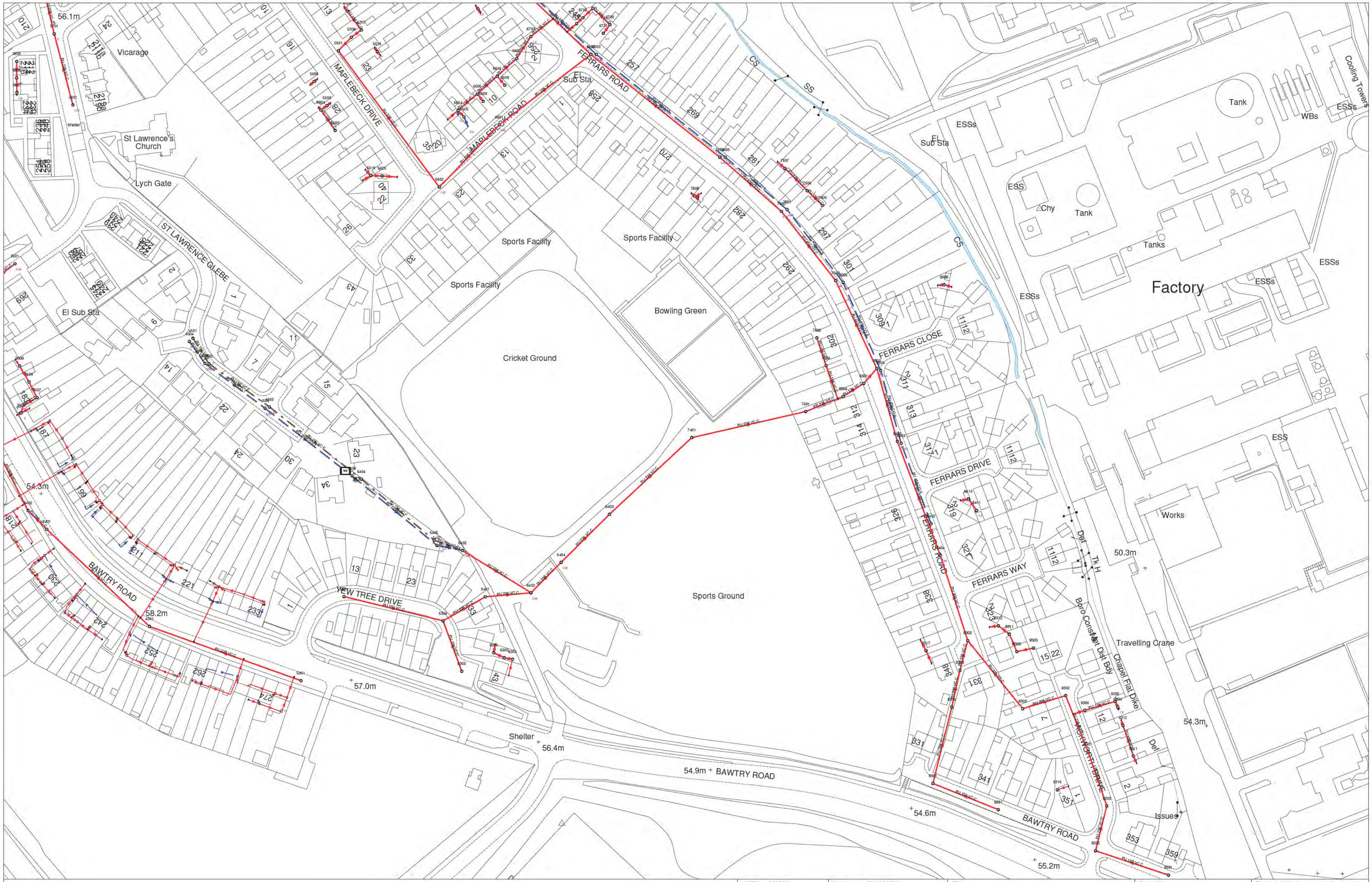
Sports
Ground
FERRARS
ROAD
FERRARS WAY
BAWTRY
ROAD
BAWTRY
ROAD
ACKWORTH DRIVE
Work
50.3m
66.4m
54.9m
54.6m
55.2m
Shelter
Issues
Bore Const &
Met. Dist. Bdy
Flat Dike
Chapel
Def
Def
0.91m
RH
225
225
375
450
300
300
0
328
319
321
338
348
331
331
341
351
353
359
323
11,12
15
22
7
12
2
1

APPENDIX 5

DEFRA: Historic flood map



APPENDIX 6



440551 : 390380	Map Name : SK4090SW	Title	Partial Key
	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582	Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
		(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432	Date Req : 13/02/2022, 14:53:51 Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Gen : 13/02/2022, 14:54:11

UPN: Undefined Originator: C ROBERTS, YorMap, 87 2582

[redacted]

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

[redacted]

Email:
[redacted]

Your Ref:
Our Ref: Y001171

[redacted]

13th February 2022

Dear [redacted],

Bawtry Road, Tinsley, S9 1WF – Pre-Planning Sewerage Enquiry U539606

Thank you for your recent enquiry. Our charge of £165.00 plus VAT will be added to your account with us, reference EPL039. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Existing Infrastructure

There is a 225 mm diameter public combined water sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 3 (three) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage on site, with a combined sewer off site.

Foul water domestic waste can discharge to the 225 mm diameter public combined sewer recorded running through the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

It is understood that a highway drain/culverted watercourse runs through the south-eastern part of the site, that in turn drains to Chapel Flat Dike. This appears to be the obvious place for surface water disposal (if SuDS are not viable).

Please note Yorkshire Water cannot provide plans of culverted watercourses or highway drains. To obtain plans please contact the Lead Local Flood Authority for more details.

As a last resort and subject to providing satisfactory evidence as to why the other methods of surface water disposal have been discounted, curtilage surface water may discharge to the 450 mm diameter public surface water sewer recorded in Ferras Road, at a point to the east of the site.

The surface water discharge from the site to be restricted to not greater than 3.5 (three point five) litres/second. This permission is not an acceptance in respect to any planning conditions imposed under the Grant of Planning Permission.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply on line or obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0345 120 84 82.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for Code for Adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the Code for Adoption 2021/22, pursuant to an agreement under Section 104 of the Water Industry Act 1991. We are happy to offer pre-development technical advice on any prospective sites that you would like to put forward for for adoption, prior to submission of your adoption application.

An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Sewer Adoption, Diversion and Requisition (telephone 0345 120 84 82) or email technical.sewerage@yorkshirewater.co.uk or visit - https://www.yorkshirewater.com/developers/sewerage/sewer-adoptions/ for further information.

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

[redacted]
Development Services Technician

APPENDIX 7

UK Design Flood Estimation

Generated on 02 February 2022 16:50:40 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 8CB4-B641

Site name: FEH_Point_Descriptors_440696_390478

Easting: 440696

Northing: 390478

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 1 year

Summary of results

Rainfall - FEH 2013 model (mm):	15.84	Total runoff (ML):	0.15
Total Rainfall (mm):	9.95	Total flow (ML):	0.56
Peak Rainfall (mm):	2.26	Peak flow (m³/s):	0.02

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:45:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	98.34	No
Cmax (mm)	372.94	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.73 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	36.28 [30.71]	Yes
BR	2.61	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.2184	0.0000	0.0576	0.0000	0.00127	0.00127
00:15:00	0.3658	0.0000	0.0969	0.0000	0.00126	0.00128
00:30:00	0.6097	0.0000	0.1622	0.0001	0.00125	0.00136
00:45:00	1.0082	0.0000	0.2704	0.0003	0.00125	0.00156
01:00:00	1.6407	0.0000	0.4459	0.0007	0.00125	0.00194
01:15:00	2.2601	0.0000	0.6261	0.0014	0.00126	0.00263
01:30:00	1.6407	0.0000	0.4631	0.0025	0.00128	0.0038
01:45:00	1.0082	0.0000	0.2881	0.0041	0.00133	0.00544
02:00:00	0.6097	0.0000	0.1756	0.0060	0.00141	0.00739
02:15:00	0.3658	0.0000	0.1058	0.0079	0.00153	0.00946
02:30:00	0.2184	0.0000	0.0633	0.0098	0.00168	0.0115
02:45:00	0.0000	0.0000	0.0000	0.0115	0.00186	0.0133
03:00:00	0.0000	0.0000	0.0000	0.0127	0.00206	0.0147
03:15:00	0.0000	0.0000	0.0000	0.0131	0.00228	0.0154
03:30:00	0.0000	0.0000	0.0000	0.0129	0.0025	0.0154
03:45:00	0.0000	0.0000	0.0000	0.0121	0.0027	0.0148
04:00:00	0.0000	0.0000	0.0000	0.0111	0.00289	0.014
04:15:00	0.0000	0.0000	0.0000	0.0100	0.00306	0.013
04:30:00	0.0000	0.0000	0.0000	0.0088	0.00321	0.012
04:45:00	0.0000	0.0000	0.0000	0.0077	0.00333	0.011
05:00:00	0.0000	0.0000	0.0000	0.0067	0.00344	0.0102
05:15:00	0.0000	0.0000	0.0000	0.0059	0.00353	0.00943
05:30:00	0.0000	0.0000	0.0000	0.0052	0.0036	0.00878
05:45:00	0.0000	0.0000	0.0000	0.0045	0.00367	0.00817
06:00:00	0.0000	0.0000	0.0000	0.0039	0.00372	0.00759
06:15:00	0.0000	0.0000	0.0000	0.0033	0.00376	0.00702
06:30:00	0.0000	0.0000	0.0000	0.0027	0.00378	0.00645
06:45:00	0.0000	0.0000	0.0000	0.0021	0.0038	0.00589
07:00:00	0.0000	0.0000	0.0000	0.0015	0.00381	0.00535
07:15:00	0.0000	0.0000	0.0000	0.0010	0.0038	0.00485
07:30:00	0.0000	0.0000	0.0000	0.0006	0.00379	0.00443
07:45:00	0.0000	0.0000	0.0000	0.0003	0.00377	0.00412
08:00:00	0.0000	0.0000	0.0000	0.0002	0.00375	0.00393
08:15:00	0.0000	0.0000	0.0000	0.0001	0.00373	0.00381
08:30:00	0.0000	0.0000	0.0000	0.0000	0.00371	0.00373

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00368	0.00368
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00365	0.00365
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
09:30:00	0.0000	0.0000	0.0000	0.0000	0.0036	0.0036
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00356	0.00356
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00351	0.00351
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00348	0.00348
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00346	0.00346
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00343	0.00343
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00341	0.00341
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00339	0.00339
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00336	0.00336
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00334	0.00334
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
12:45:00	0.0000	0.0000	0.0000	0.0000	0.0033	0.0033
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00327	0.00327
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00325	0.00325
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00323	0.00323
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00321	0.00321
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00318	0.00318
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00316	0.00316
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00314	0.00314
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00306	0.00306
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00301	0.00301
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00299	0.00299
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00297	0.00297
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00295	0.00295
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00293	0.00293
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00291	0.00291
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00283	0.00283
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00279	0.00279
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00277	0.00277
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00263	0.00263
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00261	0.00261
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00259	0.00259
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00257	0.00257
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00255	0.00255
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00254	0.00254
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00252	0.00252
22:45:00	0.0000	0.0000	0.0000	0.0000	0.0025	0.0025
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00248	0.00248
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00247	0.00247
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00245	0.00245
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00243	0.00243
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00242	0.00242
24:15:00	0.0000	0.0000	0.0000	0.0000	0.0024	0.0024
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00238	0.00238
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00237	0.00237
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00235	0.00235
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00234	0.00234
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232
25:45:00	0.0000	0.0000	0.0000	0.0000	0.0023	0.0023
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00227	0.00227
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00224	0.00224
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00221	0.00221
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00219	0.00219
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00216	0.00216
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00214	0.00214
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00212	0.00212
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00211	0.00211
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00209	0.00209
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00208
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00206	0.00206
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00205	0.00205
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00203	0.00203
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00202	0.00202
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00201	0.00201
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00198	0.00198
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00195	0.00195
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00193	0.00193
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00191	0.00191
32:45:00	0.0000	0.0000	0.0000	0.0000	0.0019	0.0019
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00186	0.00186
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00183	0.00183
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00181	0.00181
34:45:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00178	0.00178
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00177	0.00177
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00176	0.00176

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00174	0.00174
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00172	0.00172
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
36:45:00	0.0000	0.0000	0.0000	0.0000	0.0017	0.0017
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00169	0.00169
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00167	0.00167
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00165	0.00165
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00164	0.00164
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00163	0.00163
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00162	0.00162
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00161	0.00161
39:00:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00159	0.00159
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00157	0.00157
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00153	0.00153
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00151	0.00151
41:15:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00148
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00147	0.00147
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00145	0.00145
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00144	0.00144
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00143	0.00143
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00142	0.00142
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00141	0.00141
43:45:00	0.0000	0.0000	0.0000	0.0000	0.0014	0.0014
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00139	0.00139
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00137	0.00137

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00136	0.00136
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00134	0.00134
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00132	0.00132
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00131	0.00131
46:30:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.0013
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00129	0.00129
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00127	0.00127

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.47	No
BFIHOST19	0.47	No
PROPWET (mm)	0.38	No
SAAR (mm)	668	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 02 February 2022 16:50:53 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 8CB4-B641

Site name: FEH_Point_Descriptors_440696_390478

Easting: 440696

Northing: 390478

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH 2013 model (mm):	18.12	Total runoff (ML):	0.18
Total Rainfall (mm):	11.37	Total flow (ML):	0.63
Peak Rainfall (mm):	2.58	Peak flow (m³/s):	0.02

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:45:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	98.34	No
Cmax (mm)	372.94	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.73 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	36.28 [30.71]	Yes
BR	2.59	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.2497	0.0000	0.0659	0.0000	0.00127	0.00127
00:15:00	0.4183	0.0000	0.1108	0.0000	0.00126	0.00129
00:30:00	0.6972	0.0000	0.1857	0.0001	0.00125	0.00138
00:45:00	1.1527	0.0000	0.3100	0.0004	0.00125	0.0016
01:00:00	1.8760	0.0000	0.5121	0.0008	0.00125	0.00204
01:15:00	2.5843	0.0000	0.7209	0.0016	0.00126	0.00284
01:30:00	1.8760	0.0000	0.5345	0.0029	0.00129	0.00418
01:45:00	1.1527	0.0000	0.3331	0.0047	0.00135	0.00607
02:00:00	0.6972	0.0000	0.2032	0.0069	0.00144	0.00831
02:15:00	0.4183	0.0000	0.1225	0.0091	0.00158	0.0107
02:30:00	0.2497	0.0000	0.0734	0.0113	0.00175	0.013
02:45:00	0.0000	0.0000	0.0000	0.0132	0.00195	0.0152
03:00:00	0.0000	0.0000	0.0000	0.0146	0.00218	0.0168
03:15:00	0.0000	0.0000	0.0000	0.0151	0.00243	0.0175
03:30:00	0.0000	0.0000	0.0000	0.0148	0.00268	0.0175
03:45:00	0.0000	0.0000	0.0000	0.0140	0.00292	0.0169
04:00:00	0.0000	0.0000	0.0000	0.0128	0.00314	0.016
04:15:00	0.0000	0.0000	0.0000	0.0115	0.00333	0.0148
04:30:00	0.0000	0.0000	0.0000	0.0101	0.0035	0.0136
04:45:00	0.0000	0.0000	0.0000	0.0089	0.00365	0.0125
05:00:00	0.0000	0.0000	0.0000	0.0077	0.00377	0.0115
05:15:00	0.0000	0.0000	0.0000	0.0068	0.00387	0.0107
05:30:00	0.0000	0.0000	0.0000	0.0060	0.00396	0.00992
05:45:00	0.0000	0.0000	0.0000	0.0052	0.00403	0.00922
06:00:00	0.0000	0.0000	0.0000	0.0045	0.00409	0.00855
06:15:00	0.0000	0.0000	0.0000	0.0038	0.00413	0.0079
06:30:00	0.0000	0.0000	0.0000	0.0031	0.00416	0.00724
06:45:00	0.0000	0.0000	0.0000	0.0024	0.00418	0.0066
07:00:00	0.0000	0.0000	0.0000	0.0018	0.00419	0.00598
07:15:00	0.0000	0.0000	0.0000	0.0012	0.00419	0.0054
07:30:00	0.0000	0.0000	0.0000	0.0007	0.00418	0.00492
07:45:00	0.0000	0.0000	0.0000	0.0004	0.00416	0.00457
08:00:00	0.0000	0.0000	0.0000	0.0002	0.00414	0.00434
08:15:00	0.0000	0.0000	0.0000	0.0001	0.00411	0.0042
08:30:00	0.0000	0.0000	0.0000	0.0000	0.00408	0.00412

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00406	0.00406
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00403	0.00403
09:15:00	0.0000	0.0000	0.0000	0.0000	0.004	0.004
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00397	0.00397
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00395	0.00395
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00389	0.00389
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00387	0.00387
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00384	0.00384
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00381	0.00381
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00379	0.00379
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00376	0.00376
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00374	0.00374
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00371	0.00371
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00368	0.00368
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00361	0.00361
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00356	0.00356
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00351	0.00351
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00349	0.00349
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00346	0.00346
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00344	0.00344
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00339	0.00339
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00337	0.00337
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00335	0.00335
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
16:15:00	0.0000	0.0000	0.0000	0.0000	0.0033	0.0033
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00328	0.00328
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00325	0.00325
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00323	0.00323
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00321	0.00321
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00314	0.00314
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00306	0.00306
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00304	0.00304
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00302	0.00302
19:45:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00295	0.00295
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00293	0.00293
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00291	0.00291
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00284	0.00284
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00282	0.00282
22:15:00	0.0000	0.0000	0.0000	0.0000	0.0028	0.0028
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
23:30:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00265	0.00265
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00263	0.00263
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00261	0.00261
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00259	0.00259
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00257	0.00257
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00256	0.00256
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00254	0.00254
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00252	0.00252
26:15:00	0.0000	0.0000	0.0000	0.0000	0.0025	0.0025
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00249	0.00249

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00247	0.00247
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00245	0.00245
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00244	0.00244
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00242	0.00242
27:45:00	0.0000	0.0000	0.0000	0.0000	0.0024	0.0024
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00239	0.00239
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00237	0.00237
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00235	0.00235
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00234	0.00234
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00231	0.00231
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00227	0.00227
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00224	0.00224
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00221	0.00221
31:00:00	0.0000	0.0000	0.0000	0.0000	0.0022	0.0022
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00217	0.00217
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00214	0.00214
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00212	0.00212
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00211	0.00211
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00209	0.00209
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00208
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00206	0.00206
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00205	0.00205
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00204	0.00204
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00202	0.00202
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00201	0.00201
34:30:00	0.0000	0.0000	0.0000	0.0000	0.002	0.002
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00198	0.00198
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00195	0.00195
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00193	0.00193
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00191	0.00191
36:15:00	0.0000	0.0000	0.0000	0.0000	0.0019	0.0019
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00188	0.00188
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00186	0.00186
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00184	0.00184
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00181	0.00181
38:15:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00179	0.00179
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00177	0.00177
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00176	0.00176
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00174	0.00174
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00173	0.00173
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
40:15:00	0.0000	0.0000	0.0000	0.0000	0.0017	0.0017
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00169	0.00169
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00167	0.00167
41:15:00	0.0000	0.0000	0.0000	0.0000	0.00166	0.00166
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00164	0.00164
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00163	0.00163
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00162	0.00162
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00161	0.00161
42:30:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00159	0.00159
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00157	0.00157
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00155	0.00155
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00151	0.00151

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00148
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00147	0.00147
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00145	0.00145
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00144	0.00144
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00143	0.00143
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00142	0.00142
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00141	0.00141
47:15:00	0.0000	0.0000	0.0000	0.0000	0.0014	0.0014
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00139	0.00139
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00137	0.00137
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00136	0.00136
48:45:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00134	0.00134
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00132	0.00132
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00131	0.00131
50:00:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.0013
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00129	0.00129
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00127	0.00127

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.47	No
BFIHOST19	0.47	No
PROPWET (mm)	0.38	No
SAAR (mm)	668	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 02 February 2022 16:51:04 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 8CB4-B641

Site name: FEH_Point_Descriptors_440696_390478

Easting: 440696

Northing: 390478

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 10 year

Summary of results

Rainfall - FEH 2013 model (mm):	31.31	Total runoff (ML):	0.32
Total Rainfall (mm):	19.65	Total flow (ML):	1.10
Peak Rainfall (mm):	4.47	Peak flow (m³/s):	0.03

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:45:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	98.34	No
Cmax (mm)	372.94	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.73 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	36.28 [30.71]	Yes
BR	2.45	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.4315	0.0000	0.1140	0.0000	0.00127	0.00127
00:15:00	0.7229	0.0000	0.1922	0.0000	0.00126	0.00131
00:30:00	1.2048	0.0000	0.3234	0.0002	0.00125	0.00148
00:45:00	1.9921	0.0000	0.5432	0.0006	0.00125	0.00187
01:00:00	3.2420	0.0000	0.9068	0.0014	0.00126	0.00264
01:15:00	4.4660	0.0000	1.2953	0.0028	0.00128	0.00404
01:30:00	3.2420	0.0000	0.9738	0.0051	0.00134	0.0064
01:45:00	1.9921	0.0000	0.6124	0.0083	0.00144	0.00976
02:00:00	1.2048	0.0000	0.3755	0.0122	0.00161	0.0138
02:15:00	0.7229	0.0000	0.2272	0.0162	0.00183	0.018
02:30:00	0.4315	0.0000	0.1363	0.0201	0.00213	0.0223
02:45:00	0.0000	0.0000	0.0000	0.0236	0.00248	0.0261
03:00:00	0.0000	0.0000	0.0000	0.0261	0.00288	0.029
03:15:00	0.0000	0.0000	0.0000	0.0271	0.00331	0.0305
03:30:00	0.0000	0.0000	0.0000	0.0267	0.00374	0.0304
03:45:00	0.0000	0.0000	0.0000	0.0252	0.00415	0.0294
04:00:00	0.0000	0.0000	0.0000	0.0231	0.00453	0.0277
04:15:00	0.0000	0.0000	0.0000	0.0208	0.00487	0.0256
04:30:00	0.0000	0.0000	0.0000	0.0183	0.00516	0.0235
04:45:00	0.0000	0.0000	0.0000	0.0160	0.00541	0.0214
05:00:00	0.0000	0.0000	0.0000	0.0140	0.00563	0.0196
05:15:00	0.0000	0.0000	0.0000	0.0123	0.00581	0.0181
05:30:00	0.0000	0.0000	0.0000	0.0108	0.00596	0.0167
05:45:00	0.0000	0.0000	0.0000	0.0094	0.00609	0.0155
06:00:00	0.0000	0.0000	0.0000	0.0081	0.0062	0.0143
06:15:00	0.0000	0.0000	0.0000	0.0068	0.00628	0.0131
06:30:00	0.0000	0.0000	0.0000	0.0056	0.00634	0.0119
06:45:00	0.0000	0.0000	0.0000	0.0044	0.00638	0.0108
07:00:00	0.0000	0.0000	0.0000	0.0032	0.0064	0.00965
07:15:00	0.0000	0.0000	0.0000	0.0022	0.0064	0.00862
07:30:00	0.0000	0.0000	0.0000	0.0014	0.00639	0.00774
07:45:00	0.0000	0.0000	0.0000	0.0007	0.00636	0.00711
08:00:00	0.0000	0.0000	0.0000	0.0004	0.00633	0.0067
08:15:00	0.0000	0.0000	0.0000	0.0002	0.00629	0.00646
08:30:00	0.0000	0.0000	0.0000	0.0001	0.00625	0.00631

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00621	0.00622
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00616	0.00616
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00612	0.00612
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00608	0.00608
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00604	0.00604
10:00:00	0.0000	0.0000	0.0000	0.0000	0.006	0.006
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00596	0.00596
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00591	0.00591
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00587	0.00587
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00583	0.00583
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00579	0.00579
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00575	0.00575
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00571	0.00571
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00568	0.00568
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00564	0.00564
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0056	0.0056
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00556	0.00556
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00552	0.00552
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00548	0.00548
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00545	0.00545
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00541	0.00541
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00537	0.00537
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00533	0.00533
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0053	0.0053
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00526	0.00526
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00522	0.00522
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00519	0.00519
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00515	0.00515
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00512	0.00512
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00508	0.00508
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00505	0.00505
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00501	0.00501
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00498	0.00498
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00494	0.00494
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00491	0.00491
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00488	0.00488

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00484	0.00484
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00481	0.00481
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00478	0.00478
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00474	0.00474
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00471	0.00471
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00468	0.00468
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00465	0.00465
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00462	0.00462
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00458	0.00458
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00455	0.00455
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00452	0.00452
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00449	0.00449
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00446	0.00446
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00443	0.00443
21:15:00	0.0000	0.0000	0.0000	0.0000	0.0044	0.0044
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00437	0.00437
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00434	0.00434
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00431	0.00431
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00428	0.00428
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00425	0.00425
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00422	0.00422
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00419	0.00419
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00416	0.00416
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00413	0.00413
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00411	0.00411
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00408	0.00408
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00405	0.00405
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00402	0.00402
24:45:00	0.0000	0.0000	0.0000	0.0000	0.00399	0.00399
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00397	0.00397
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00394	0.00394
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00391	0.00391
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00388	0.00388
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00386	0.00386
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00383	0.00383
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00381	0.00381

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00378	0.00378
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00375	0.00375
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00373	0.00373
27:30:00	0.0000	0.0000	0.0000	0.0000	0.0037	0.0037
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00368	0.00368
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00365	0.00365
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
28:30:00	0.0000	0.0000	0.0000	0.0000	0.0036	0.0036
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00355	0.00355
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
29:30:00	0.0000	0.0000	0.0000	0.0000	0.0035	0.0035
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00348	0.00348
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00346	0.00346
30:15:00	0.0000	0.0000	0.0000	0.0000	0.00343	0.00343
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00341	0.00341
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00338	0.00338
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00336	0.00336
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00334	0.00334
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00329	0.00329
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00327	0.00327
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00325	0.00325
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00323	0.00323
32:45:00	0.0000	0.0000	0.0000	0.0000	0.0032	0.0032
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00318	0.00318
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00316	0.00316
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00314	0.00314
33:45:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00309	0.00309
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00307	0.00307
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00305	0.00305
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00301	0.00301
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00299	0.00299
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00297	0.00297

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00295	0.00295
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00293	0.00293
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00291	0.00291
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00287	0.00287
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00283	0.00283
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00279	0.00279
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00277	0.00277
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00275	0.00275
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00273	0.00273
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00271	0.00271
39:00:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00268	0.00268
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00266	0.00266
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00262	0.00262
40:15:00	0.0000	0.0000	0.0000	0.0000	0.0026	0.0026
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00259	0.00259
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00257	0.00257
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00255	0.00255
41:15:00	0.0000	0.0000	0.0000	0.0000	0.00253	0.00253
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00252	0.00252
41:45:00	0.0000	0.0000	0.0000	0.0000	0.0025	0.0025
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00248	0.00248
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00247	0.00247
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00245	0.00245
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00243	0.00243
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00241	0.00241
43:15:00	0.0000	0.0000	0.0000	0.0000	0.0024	0.0024
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00238	0.00238
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00237	0.00237
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00235	0.00235
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00233	0.00233
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	0.0023	0.0023
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00227	0.00227
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00225	0.00225
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00224	0.00224
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00222	0.00222
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00221	0.00221
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00219	0.00219
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00216	0.00216
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00213	0.00213
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00212	0.00212
48:00:00	0.0000	0.0000	0.0000	0.0000	0.0021	0.0021
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00209	0.00209
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00208
48:45:00	0.0000	0.0000	0.0000	0.0000	0.00206	0.00206
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00205	0.00205
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00203	0.00203
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00202	0.00202
49:45:00	0.0000	0.0000	0.0000	0.0000	0.002	0.002
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00198	0.00198
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00196	0.00196
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00195	0.00195
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
51:15:00	0.0000	0.0000	0.0000	0.0000	0.00192	0.00192
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00191	0.00191
51:45:00	0.0000	0.0000	0.0000	0.0000	0.0019	0.0019
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00188	0.00188
52:15:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00186	0.00186
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00183	0.00183
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
53:30:00	0.0000	0.0000	0.0000	0.0000	0.00181	0.00181

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:45:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00178	0.00178
54:15:00	0.0000	0.0000	0.0000	0.0000	0.00177	0.00177
54:30:00	0.0000	0.0000	0.0000	0.0000	0.00176	0.00176
54:45:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00173	0.00173
55:15:00	0.0000	0.0000	0.0000	0.0000	0.00172	0.00172
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
55:45:00	0.0000	0.0000	0.0000	0.0000	0.0017	0.0017
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00169	0.00169
56:15:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
56:30:00	0.0000	0.0000	0.0000	0.0000	0.00166	0.00166
56:45:00	0.0000	0.0000	0.0000	0.0000	0.00165	0.00165
57:00:00	0.0000	0.0000	0.0000	0.0000	0.00164	0.00164
57:15:00	0.0000	0.0000	0.0000	0.0000	0.00163	0.00163
57:30:00	0.0000	0.0000	0.0000	0.0000	0.00162	0.00162
57:45:00	0.0000	0.0000	0.0000	0.0000	0.00161	0.00161
58:00:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
58:15:00	0.0000	0.0000	0.0000	0.0000	0.00159	0.00159
58:30:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
58:45:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
59:00:00	0.0000	0.0000	0.0000	0.0000	0.00155	0.00155
59:15:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
59:30:00	0.0000	0.0000	0.0000	0.0000	0.00153	0.00153
59:45:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152
60:00:00	0.0000	0.0000	0.0000	0.0000	0.00151	0.00151
60:15:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
60:30:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149
60:45:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00148
61:00:00	0.0000	0.0000	0.0000	0.0000	0.00147	0.00147
61:15:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
61:30:00	0.0000	0.0000	0.0000	0.0000	0.00145	0.00145
61:45:00	0.0000	0.0000	0.0000	0.0000	0.00144	0.00144
62:00:00	0.0000	0.0000	0.0000	0.0000	0.00143	0.00143
62:15:00	0.0000	0.0000	0.0000	0.0000	0.00142	0.00142
62:30:00	0.0000	0.0000	0.0000	0.0000	0.00141	0.00141

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
62:45:00	0.0000	0.0000	0.0000	0.0000	0.0014	0.0014
63:00:00	0.0000	0.0000	0.0000	0.0000	0.00139	0.00139
63:15:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
63:30:00	0.0000	0.0000	0.0000	0.0000	0.00137	0.00137
63:45:00	0.0000	0.0000	0.0000	0.0000	0.00136	0.00136
64:00:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
64:15:00	0.0000	0.0000	0.0000	0.0000	0.00134	0.00134
64:30:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
64:45:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
65:00:00	0.0000	0.0000	0.0000	0.0000	0.00132	0.00132
65:15:00	0.0000	0.0000	0.0000	0.0000	0.00131	0.00131
65:30:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.0013
65:45:00	0.0000	0.0000	0.0000	0.0000	0.00129	0.00129
66:00:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.47	No
BFIHOST19	0.47	No
PROPWET (mm)	0.38	No
SAAR (mm)	668	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 02 February 2022 16:51:14 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 8CB4-B641

Site name: FEH_Point_Descriptors_440696_390478

Easting: 440696

Northing: 390478

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH 2013 model (mm):	41.17	Total runoff (ML):	0.43
Total Rainfall (mm):	25.85	Total flow (ML):	1.41
Peak Rainfall (mm):	5.87	Peak flow (m³/s):	0.04

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:45:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	98.34	No
Cmax (mm)	372.94	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.73 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	36.28 [30.71]	Yes
BR	2.35	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.5675	0.0000	0.1501	0.0000	0.00127	0.00127
00:15:00	0.9507	0.0000	0.2534	0.0001	0.00126	0.00132
00:30:00	1.5845	0.0000	0.4277	0.0003	0.00125	0.00155
00:45:00	2.6200	0.0000	0.7219	0.0008	0.00125	0.00207
01:00:00	4.2638	0.0000	1.2141	0.0018	0.00127	0.00309
01:15:00	5.8737	0.0000	1.7524	0.0036	0.0013	0.00495
01:30:00	4.2638	0.0000	1.3301	0.0067	0.00138	0.0081
01:45:00	2.6200	0.0000	0.8415	0.0111	0.00151	0.0126
02:00:00	1.5845	0.0000	0.5178	0.0163	0.00172	0.018
02:15:00	0.9507	0.0000	0.3139	0.0217	0.00202	0.0238
02:30:00	0.5675	0.0000	0.1885	0.0271	0.0024	0.0295
02:45:00	0.0000	0.0000	0.0000	0.0318	0.00286	0.0347
03:00:00	0.0000	0.0000	0.0000	0.0353	0.00338	0.0387
03:15:00	0.0000	0.0000	0.0000	0.0367	0.00394	0.0407
03:30:00	0.0000	0.0000	0.0000	0.0361	0.0045	0.0406
03:45:00	0.0000	0.0000	0.0000	0.0342	0.00504	0.0392
04:00:00	0.0000	0.0000	0.0000	0.0314	0.00553	0.0369
04:15:00	0.0000	0.0000	0.0000	0.0282	0.00597	0.0342
04:30:00	0.0000	0.0000	0.0000	0.0249	0.00636	0.0312
04:45:00	0.0000	0.0000	0.0000	0.0217	0.00669	0.0284
05:00:00	0.0000	0.0000	0.0000	0.0190	0.00698	0.026
05:15:00	0.0000	0.0000	0.0000	0.0167	0.00722	0.0239
05:30:00	0.0000	0.0000	0.0000	0.0146	0.00742	0.0221
05:45:00	0.0000	0.0000	0.0000	0.0128	0.00759	0.0203
06:00:00	0.0000	0.0000	0.0000	0.0110	0.00773	0.0187
06:15:00	0.0000	0.0000	0.0000	0.0093	0.00784	0.0171
06:30:00	0.0000	0.0000	0.0000	0.0076	0.00792	0.0155
06:45:00	0.0000	0.0000	0.0000	0.0060	0.00798	0.014
07:00:00	0.0000	0.0000	0.0000	0.0044	0.00801	0.0124
07:15:00	0.0000	0.0000	0.0000	0.0030	0.00801	0.011
07:30:00	0.0000	0.0000	0.0000	0.0019	0.008	0.00986
07:45:00	0.0000	0.0000	0.0000	0.0010	0.00797	0.00899
08:00:00	0.0000	0.0000	0.0000	0.0005	0.00792	0.00844
08:15:00	0.0000	0.0000	0.0000	0.0002	0.00788	0.00811
08:30:00	0.0000	0.0000	0.0000	0.0001	0.00782	0.0079

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00777	0.00779
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00772	0.00772
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00766	0.00766
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00761	0.00761
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00756	0.00756
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00751	0.00751
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00746	0.00746
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00741	0.00741
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00735	0.00735
11:00:00	0.0000	0.0000	0.0000	0.0000	0.0073	0.0073
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00725	0.00725
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0072	0.0072
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00715	0.00715
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00711	0.00711
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00706	0.00706
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00701	0.00701
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00696	0.00696
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00691	0.00691
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00686	0.00686
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00682	0.00682
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00677	0.00677
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00672	0.00672
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00668	0.00668
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00663	0.00663
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00659	0.00659
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00654	0.00654
15:15:00	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00645	0.00645
15:45:00	0.0000	0.0000	0.0000	0.0000	0.00641	0.00641
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00636	0.00636
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00632	0.00632
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00628	0.00628
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00623	0.00623
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00619	0.00619
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00615	0.00615
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00611	0.00611

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00606	0.00606
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00602	0.00602
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00598	0.00598
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00594	0.00594
18:45:00	0.0000	0.0000	0.0000	0.0000	0.0059	0.0059
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00586	0.00586
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00582	0.00582
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00578	0.00578
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00574	0.00574
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0057	0.0057
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00566	0.00566
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00562	0.00562
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00558	0.00558
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00554	0.00554
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00551	0.00551
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00547	0.00547
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00543	0.00543
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00539	0.00539
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00536	0.00536
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00532	0.00532
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00528	0.00528
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00525	0.00525
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00521	0.00521
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00518	0.00518
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00514	0.00514
24:00:00	0.0000	0.0000	0.0000	0.0000	0.0051	0.0051
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00507	0.00507
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00503	0.00503
24:45:00	0.0000	0.0000	0.0000	0.0000	0.005	0.005
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00497	0.00497
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00493	0.00493
25:30:00	0.0000	0.0000	0.0000	0.0000	0.0049	0.0049
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00486	0.00486
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00483	0.00483
26:15:00	0.0000	0.0000	0.0000	0.0000	0.0048	0.0048
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00476	0.00476

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00473	0.00473
27:00:00	0.0000	0.0000	0.0000	0.0000	0.0047	0.0047
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00467	0.00467
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00463	0.00463
27:45:00	0.0000	0.0000	0.0000	0.0000	0.0046	0.0046
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00457	0.00457
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00454	0.00454
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00451	0.00451
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00448	0.00448
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00445	0.00445
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00442	0.00442
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00439	0.00439
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00436	0.00436
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00433	0.00433
30:15:00	0.0000	0.0000	0.0000	0.0000	0.0043	0.0043
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00427	0.00427
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00424	0.00424
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00421	0.00421
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00418	0.00418
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00415	0.00415
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00412	0.00412
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00409	0.00409
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00407	0.00407
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00404	0.00404
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00401	0.00401
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00398	0.00398
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00396	0.00396
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00393	0.00393
33:45:00	0.0000	0.0000	0.0000	0.0000	0.0039	0.0039
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00387	0.00387
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00385	0.00385
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00382	0.00382
34:45:00	0.0000	0.0000	0.0000	0.0000	0.0038	0.0038
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00377	0.00377
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00374	0.00374
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00372	0.00372

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00369	0.00369
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00367	0.00367
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00364	0.00364
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00362	0.00362
36:45:00	0.0000	0.0000	0.0000	0.0000	0.00359	0.00359
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00357	0.00357
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00354	0.00354
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00352	0.00352
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00349	0.00349
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00345	0.00345
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
38:45:00	0.0000	0.0000	0.0000	0.0000	0.0034	0.0034
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00338	0.00338
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00335	0.00335
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00333	0.00333
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00331	0.00331
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00328	0.00328
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00326	0.00326
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00322	0.00322
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
41:15:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00315	0.00315
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00313	0.00313
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00311	0.00311
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00309	0.00309
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00307	0.00307
42:45:00	0.0000	0.0000	0.0000	0.0000	0.00304	0.00304
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00302	0.00302
43:15:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00294	0.00294
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
44:30:00	0.0000	0.0000	0.0000	0.0000	0.0029	0.0029

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00288	0.00288
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00286	0.00286
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00284	0.00284
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00282	0.00282
45:45:00	0.0000	0.0000	0.0000	0.0000	0.0028	0.0028
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00275	0.00275
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00273	0.00273
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00271	0.00271
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00269	0.00269
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00267	0.00267
47:45:00	0.0000	0.0000	0.0000	0.0000	0.00265	0.00265
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00263	0.00263
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00262	0.00262
48:30:00	0.0000	0.0000	0.0000	0.0000	0.0026	0.0026
48:45:00	0.0000	0.0000	0.0000	0.0000	0.00258	0.00258
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00256	0.00256
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00254	0.00254
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00253	0.00253
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00251	0.00251
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00249	0.00249
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00248	0.00248
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00246	0.00246
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00244	0.00244
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00242	0.00242
51:15:00	0.0000	0.0000	0.0000	0.0000	0.00241	0.00241
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00239	0.00239
51:45:00	0.0000	0.0000	0.0000	0.0000	0.00238	0.00238
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00236	0.00236
52:15:00	0.0000	0.0000	0.0000	0.0000	0.00234	0.00234
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00233	0.00233
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00231	0.00231
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00228	0.00228
53:30:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:45:00	0.0000	0.0000	0.0000	0.0000	0.00225	0.00225
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
54:15:00	0.0000	0.0000	0.0000	0.0000	0.00222	0.00222
54:30:00	0.0000	0.0000	0.0000	0.0000	0.0022	0.0022
54:45:00	0.0000	0.0000	0.0000	0.0000	0.00219	0.00219
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00217	0.00217
55:15:00	0.0000	0.0000	0.0000	0.0000	0.00216	0.00216
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00214	0.00214
55:45:00	0.0000	0.0000	0.0000	0.0000	0.00213	0.00213
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00211	0.00211
56:15:00	0.0000	0.0000	0.0000	0.0000	0.0021	0.0021
56:30:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00208
56:45:00	0.0000	0.0000	0.0000	0.0000	0.00207	0.00207
57:00:00	0.0000	0.0000	0.0000	0.0000	0.00206	0.00206
57:15:00	0.0000	0.0000	0.0000	0.0000	0.00204	0.00204
57:30:00	0.0000	0.0000	0.0000	0.0000	0.00203	0.00203
57:45:00	0.0000	0.0000	0.0000	0.0000	0.00201	0.00201
58:00:00	0.0000	0.0000	0.0000	0.0000	0.002	0.002
58:15:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
58:30:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197
58:45:00	0.0000	0.0000	0.0000	0.0000	0.00196	0.00196
59:00:00	0.0000	0.0000	0.0000	0.0000	0.00195	0.00195
59:15:00	0.0000	0.0000	0.0000	0.0000	0.00193	0.00193
59:30:00	0.0000	0.0000	0.0000	0.0000	0.00192	0.00192
59:45:00	0.0000	0.0000	0.0000	0.0000	0.00191	0.00191
60:00:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
60:15:00	0.0000	0.0000	0.0000	0.0000	0.00188	0.00188
60:30:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
60:45:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
61:00:00	0.0000	0.0000	0.0000	0.0000	0.00184	0.00184
61:15:00	0.0000	0.0000	0.0000	0.0000	0.00183	0.00183
61:30:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
61:45:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
62:00:00	0.0000	0.0000	0.0000	0.0000	0.00179	0.00179
62:15:00	0.0000	0.0000	0.0000	0.0000	0.00178	0.00178
62:30:00	0.0000	0.0000	0.0000	0.0000	0.00177	0.00177

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
62:45:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
63:00:00	0.0000	0.0000	0.0000	0.0000	0.00174	0.00174
63:15:00	0.0000	0.0000	0.0000	0.0000	0.00173	0.00173
63:30:00	0.0000	0.0000	0.0000	0.0000	0.00172	0.00172
63:45:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
64:00:00	0.0000	0.0000	0.0000	0.0000	0.00169	0.00169
64:15:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
64:30:00	0.0000	0.0000	0.0000	0.0000	0.00167	0.00167
64:45:00	0.0000	0.0000	0.0000	0.0000	0.00166	0.00166
65:00:00	0.0000	0.0000	0.0000	0.0000	0.00165	0.00165
65:15:00	0.0000	0.0000	0.0000	0.0000	0.00164	0.00164
65:30:00	0.0000	0.0000	0.0000	0.0000	0.00163	0.00163
65:45:00	0.0000	0.0000	0.0000	0.0000	0.00161	0.00161
66:00:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
66:15:00	0.0000	0.0000	0.0000	0.0000	0.00159	0.00159
66:30:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
66:45:00	0.0000	0.0000	0.0000	0.0000	0.00157	0.00157
67:00:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
67:15:00	0.0000	0.0000	0.0000	0.0000	0.00155	0.00155
67:30:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
67:45:00	0.0000	0.0000	0.0000	0.0000	0.00153	0.00153
68:00:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152
68:15:00	0.0000	0.0000	0.0000	0.0000	0.00151	0.00151
68:30:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
68:45:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.47	No
BFIHOST19	0.47	No
PROPWET (mm)	0.38	No
SAAR (mm)	668	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 02 February 2022 16:51:24 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 8CB4-B641

Site name: FEH_Point_Descriptors_440696_390478

Easting: 440696

Northing: 390478

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH 2013 model (mm):	55.34	Total runoff (ML):	0.60
Total Rainfall (mm):	34.74	Total flow (ML):	1.86
Peak Rainfall (mm):	7.89	Peak flow (m³/s):	0.06

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:45:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.63	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	98.34	No
Cmax (mm)	372.94	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.73 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	36.28 [30.71]	Yes
BR	2.22	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.7627	0.0000	0.2019	0.0000	0.00127	0.00127
00:15:00	1.2778	0.0000	0.3417	0.0001	0.00126	0.00134
00:30:00	2.1296	0.0000	0.5793	0.0004	0.00125	0.00165
00:45:00	3.5213	0.0000	0.9845	0.0011	0.00126	0.00236
01:00:00	5.7306	0.0000	1.6733	0.0025	0.00127	0.00374
01:15:00	7.8942	0.0000	2.4493	0.0050	0.00132	0.00628
01:30:00	5.7306	0.0000	1.8827	0.0092	0.00142	0.0106
01:45:00	3.5213	0.0000	1.2006	0.0152	0.0016	0.0168
02:00:00	2.1296	0.0000	0.7422	0.0224	0.00187	0.0243
02:15:00	1.2778	0.0000	0.4512	0.0301	0.00226	0.0323
02:30:00	0.7627	0.0000	0.2714	0.0376	0.00276	0.0403
02:45:00	0.0000	0.0000	0.0000	0.0443	0.00337	0.0476
03:00:00	0.0000	0.0000	0.0000	0.0492	0.00406	0.0533
03:15:00	0.0000	0.0000	0.0000	0.0513	0.0048	0.0561
03:30:00	0.0000	0.0000	0.0000	0.0506	0.00554	0.0561
03:45:00	0.0000	0.0000	0.0000	0.0479	0.00626	0.0542
04:00:00	0.0000	0.0000	0.0000	0.0441	0.00692	0.051
04:15:00	0.0000	0.0000	0.0000	0.0396	0.00751	0.0471
04:30:00	0.0000	0.0000	0.0000	0.0350	0.00803	0.043
04:45:00	0.0000	0.0000	0.0000	0.0305	0.00847	0.039
05:00:00	0.0000	0.0000	0.0000	0.0267	0.00885	0.0355
05:15:00	0.0000	0.0000	0.0000	0.0234	0.00917	0.0326
05:30:00	0.0000	0.0000	0.0000	0.0206	0.00944	0.03
05:45:00	0.0000	0.0000	0.0000	0.0179	0.00967	0.0276
06:00:00	0.0000	0.0000	0.0000	0.0154	0.00986	0.0253
06:15:00	0.0000	0.0000	0.0000	0.0131	0.01	0.0231
06:30:00	0.0000	0.0000	0.0000	0.0107	0.0101	0.0208
06:45:00	0.0000	0.0000	0.0000	0.0085	0.0102	0.0187
07:00:00	0.0000	0.0000	0.0000	0.0063	0.0102	0.0165
07:15:00	0.0000	0.0000	0.0000	0.0043	0.0103	0.0146
07:30:00	0.0000	0.0000	0.0000	0.0027	0.0102	0.0129
07:45:00	0.0000	0.0000	0.0000	0.0015	0.0102	0.0117
08:00:00	0.0000	0.0000	0.0000	0.0007	0.0101	0.0109
08:15:00	0.0000	0.0000	0.0000	0.0003	0.0101	0.0104
08:30:00	0.0000	0.0000	0.0000	0.0001	0.01	0.0101

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	0.00995	0.00997
09:00:00	0.0000	0.0000	0.0000	0.0000	0.00988	0.00988
09:15:00	0.0000	0.0000	0.0000	0.0000	0.00981	0.00981
09:30:00	0.0000	0.0000	0.0000	0.0000	0.00975	0.00975
09:45:00	0.0000	0.0000	0.0000	0.0000	0.00968	0.00968
10:00:00	0.0000	0.0000	0.0000	0.0000	0.00961	0.00961
10:15:00	0.0000	0.0000	0.0000	0.0000	0.00955	0.00955
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00948	0.00948
10:45:00	0.0000	0.0000	0.0000	0.0000	0.00942	0.00942
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00935	0.00935
11:15:00	0.0000	0.0000	0.0000	0.0000	0.00929	0.00929
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00922	0.00922
11:45:00	0.0000	0.0000	0.0000	0.0000	0.00916	0.00916
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0091	0.0091
12:15:00	0.0000	0.0000	0.0000	0.0000	0.00904	0.00904
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00897	0.00897
12:45:00	0.0000	0.0000	0.0000	0.0000	0.00891	0.00891
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00885	0.00885
13:15:00	0.0000	0.0000	0.0000	0.0000	0.00879	0.00879
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00873	0.00873
13:45:00	0.0000	0.0000	0.0000	0.0000	0.00867	0.00867
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00861	0.00861
14:15:00	0.0000	0.0000	0.0000	0.0000	0.00855	0.00855
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00849	0.00849
14:45:00	0.0000	0.0000	0.0000	0.0000	0.00843	0.00843
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00838	0.00838
15:15:00	0.0000	0.0000	0.0000	0.0000	0.00832	0.00832
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00826	0.00826
15:45:00	0.0000	0.0000	0.0000	0.0000	0.0082	0.0082
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00815	0.00815
16:15:00	0.0000	0.0000	0.0000	0.0000	0.00809	0.00809
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00804	0.00804
16:45:00	0.0000	0.0000	0.0000	0.0000	0.00798	0.00798
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00793	0.00793
17:15:00	0.0000	0.0000	0.0000	0.0000	0.00787	0.00787
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00782	0.00782

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	0.00776	0.00776
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00771	0.00771
18:15:00	0.0000	0.0000	0.0000	0.0000	0.00766	0.00766
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00761	0.00761
18:45:00	0.0000	0.0000	0.0000	0.0000	0.00755	0.00755
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0075	0.0075
19:15:00	0.0000	0.0000	0.0000	0.0000	0.00745	0.00745
19:30:00	0.0000	0.0000	0.0000	0.0000	0.0074	0.0074
19:45:00	0.0000	0.0000	0.0000	0.0000	0.00735	0.00735
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0073	0.0073
20:15:00	0.0000	0.0000	0.0000	0.0000	0.00725	0.00725
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0072	0.0072
20:45:00	0.0000	0.0000	0.0000	0.0000	0.00715	0.00715
21:00:00	0.0000	0.0000	0.0000	0.0000	0.0071	0.0071
21:15:00	0.0000	0.0000	0.0000	0.0000	0.00705	0.00705
21:30:00	0.0000	0.0000	0.0000	0.0000	0.007	0.007
21:45:00	0.0000	0.0000	0.0000	0.0000	0.00695	0.00695
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00691	0.00691
22:15:00	0.0000	0.0000	0.0000	0.0000	0.00686	0.00686
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00681	0.00681
22:45:00	0.0000	0.0000	0.0000	0.0000	0.00676	0.00676
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00672	0.00672
23:15:00	0.0000	0.0000	0.0000	0.0000	0.00667	0.00667
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00663	0.00663
23:45:00	0.0000	0.0000	0.0000	0.0000	0.00658	0.00658
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00654	0.00654
24:15:00	0.0000	0.0000	0.0000	0.0000	0.00649	0.00649
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00645	0.00645
24:45:00	0.0000	0.0000	0.0000	0.0000	0.0064	0.0064
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00636	0.00636
25:15:00	0.0000	0.0000	0.0000	0.0000	0.00631	0.00631
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00627	0.00627
25:45:00	0.0000	0.0000	0.0000	0.0000	0.00623	0.00623
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00618	0.00618
26:15:00	0.0000	0.0000	0.0000	0.0000	0.00614	0.00614
26:30:00	0.0000	0.0000	0.0000	0.0000	0.0061	0.0061

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	0.00606	0.00606
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00602	0.00602
27:15:00	0.0000	0.0000	0.0000	0.0000	0.00598	0.00598
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00593	0.00593
27:45:00	0.0000	0.0000	0.0000	0.0000	0.00589	0.00589
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00585	0.00585
28:15:00	0.0000	0.0000	0.0000	0.0000	0.00581	0.00581
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00577	0.00577
28:45:00	0.0000	0.0000	0.0000	0.0000	0.00573	0.00573
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00569	0.00569
29:15:00	0.0000	0.0000	0.0000	0.0000	0.00565	0.00565
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00562	0.00562
29:45:00	0.0000	0.0000	0.0000	0.0000	0.00558	0.00558
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00554	0.00554
30:15:00	0.0000	0.0000	0.0000	0.0000	0.0055	0.0055
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00546	0.00546
30:45:00	0.0000	0.0000	0.0000	0.0000	0.00543	0.00543
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00539	0.00539
31:15:00	0.0000	0.0000	0.0000	0.0000	0.00535	0.00535
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00531	0.00531
31:45:00	0.0000	0.0000	0.0000	0.0000	0.00528	0.00528
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00524	0.00524
32:15:00	0.0000	0.0000	0.0000	0.0000	0.00521	0.00521
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00517	0.00517
32:45:00	0.0000	0.0000	0.0000	0.0000	0.00513	0.00513
33:00:00	0.0000	0.0000	0.0000	0.0000	0.0051	0.0051
33:15:00	0.0000	0.0000	0.0000	0.0000	0.00506	0.00506
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00503	0.00503
33:45:00	0.0000	0.0000	0.0000	0.0000	0.005	0.005
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00496	0.00496
34:15:00	0.0000	0.0000	0.0000	0.0000	0.00493	0.00493
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00489	0.00489
34:45:00	0.0000	0.0000	0.0000	0.0000	0.00486	0.00486
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00483	0.00483
35:15:00	0.0000	0.0000	0.0000	0.0000	0.00479	0.00479
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00476	0.00476

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	0.00473	0.00473
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00469	0.00469
36:15:00	0.0000	0.0000	0.0000	0.0000	0.00466	0.00466
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00463	0.00463
36:45:00	0.0000	0.0000	0.0000	0.0000	0.0046	0.0046
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00457	0.00457
37:15:00	0.0000	0.0000	0.0000	0.0000	0.00454	0.00454
37:30:00	0.0000	0.0000	0.0000	0.0000	0.0045	0.0045
37:45:00	0.0000	0.0000	0.0000	0.0000	0.00447	0.00447
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00444	0.00444
38:15:00	0.0000	0.0000	0.0000	0.0000	0.00441	0.00441
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00438	0.00438
38:45:00	0.0000	0.0000	0.0000	0.0000	0.00435	0.00435
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00432	0.00432
39:15:00	0.0000	0.0000	0.0000	0.0000	0.00429	0.00429
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00426	0.00426
39:45:00	0.0000	0.0000	0.0000	0.0000	0.00423	0.00423
40:00:00	0.0000	0.0000	0.0000	0.0000	0.0042	0.0042
40:15:00	0.0000	0.0000	0.0000	0.0000	0.00418	0.00418
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00415	0.00415
40:45:00	0.0000	0.0000	0.0000	0.0000	0.00412	0.00412
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00409	0.00409
41:15:00	0.0000	0.0000	0.0000	0.0000	0.00406	0.00406
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00403	0.00403
41:45:00	0.0000	0.0000	0.0000	0.0000	0.00401	0.00401
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00398	0.00398
42:15:00	0.0000	0.0000	0.0000	0.0000	0.00395	0.00395
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
42:45:00	0.0000	0.0000	0.0000	0.0000	0.0039	0.0039
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00387	0.00387
43:15:00	0.0000	0.0000	0.0000	0.0000	0.00384	0.00384
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00382	0.00382
43:45:00	0.0000	0.0000	0.0000	0.0000	0.00379	0.00379
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00377	0.00377
44:15:00	0.0000	0.0000	0.0000	0.0000	0.00374	0.00374
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00371	0.00371

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	0.00369	0.00369
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00366	0.00366
45:15:00	0.0000	0.0000	0.0000	0.0000	0.00364	0.00364
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00361	0.00361
45:45:00	0.0000	0.0000	0.0000	0.0000	0.00359	0.00359
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00356	0.00356
46:15:00	0.0000	0.0000	0.0000	0.0000	0.00354	0.00354
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00351	0.00351
46:45:00	0.0000	0.0000	0.0000	0.0000	0.00349	0.00349
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00347	0.00347
47:15:00	0.0000	0.0000	0.0000	0.0000	0.00344	0.00344
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00342	0.00342
47:45:00	0.0000	0.0000	0.0000	0.0000	0.0034	0.0034
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00337	0.00337
48:15:00	0.0000	0.0000	0.0000	0.0000	0.00335	0.00335
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00333	0.00333
48:45:00	0.0000	0.0000	0.0000	0.0000	0.0033	0.0033
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00328	0.00328
49:15:00	0.0000	0.0000	0.0000	0.0000	0.00326	0.00326
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
49:45:00	0.0000	0.0000	0.0000	0.0000	0.00321	0.00321
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
50:15:00	0.0000	0.0000	0.0000	0.0000	0.00317	0.00317
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00315	0.00315
50:45:00	0.0000	0.0000	0.0000	0.0000	0.00313	0.00313
51:00:00	0.0000	0.0000	0.0000	0.0000	0.0031	0.0031
51:15:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00306	0.00306
51:45:00	0.0000	0.0000	0.0000	0.0000	0.00304	0.00304
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00302	0.00302
52:15:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00298	0.00298
52:45:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00294	0.00294
53:15:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
53:30:00	0.0000	0.0000	0.0000	0.0000	0.0029	0.0029

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:45:00	0.0000	0.0000	0.0000	0.0000	0.00288	0.00288
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00286	0.00286
54:15:00	0.0000	0.0000	0.0000	0.0000	0.00284	0.00284
54:30:00	0.0000	0.0000	0.0000	0.0000	0.00282	0.00282
54:45:00	0.0000	0.0000	0.0000	0.0000	0.0028	0.0028
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
55:15:00	0.0000	0.0000	0.0000	0.0000	0.00276	0.00276
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
55:45:00	0.0000	0.0000	0.0000	0.0000	0.00272	0.00272
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00271	0.00271
56:15:00	0.0000	0.0000	0.0000	0.0000	0.00269	0.00269
56:30:00	0.0000	0.0000	0.0000	0.0000	0.00267	0.00267
56:45:00	0.0000	0.0000	0.0000	0.0000	0.00265	0.00265
57:00:00	0.0000	0.0000	0.0000	0.0000	0.00263	0.00263
57:15:00	0.0000	0.0000	0.0000	0.0000	0.00261	0.00261
57:30:00	0.0000	0.0000	0.0000	0.0000	0.0026	0.0026
57:45:00	0.0000	0.0000	0.0000	0.0000	0.00258	0.00258
58:00:00	0.0000	0.0000	0.0000	0.0000	0.00256	0.00256
58:15:00	0.0000	0.0000	0.0000	0.0000	0.00254	0.00254
58:30:00	0.0000	0.0000	0.0000	0.0000	0.00252	0.00252
58:45:00	0.0000	0.0000	0.0000	0.0000	0.00251	0.00251
59:00:00	0.0000	0.0000	0.0000	0.0000	0.00249	0.00249
59:15:00	0.0000	0.0000	0.0000	0.0000	0.00247	0.00247
59:30:00	0.0000	0.0000	0.0000	0.0000	0.00246	0.00246
59:45:00	0.0000	0.0000	0.0000	0.0000	0.00244	0.00244
60:00:00	0.0000	0.0000	0.0000	0.0000	0.00242	0.00242
60:15:00	0.0000	0.0000	0.0000	0.0000	0.00241	0.00241
60:30:00	0.0000	0.0000	0.0000	0.0000	0.00239	0.00239
60:45:00	0.0000	0.0000	0.0000	0.0000	0.00237	0.00237
61:00:00	0.0000	0.0000	0.0000	0.0000	0.00236	0.00236
61:15:00	0.0000	0.0000	0.0000	0.0000	0.00234	0.00234
61:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232
61:45:00	0.0000	0.0000	0.0000	0.0000	0.00231	0.00231
62:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
62:15:00	0.0000	0.0000	0.0000	0.0000	0.00228	0.00228
62:30:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
62:45:00	0.0000	0.0000	0.0000	0.0000	0.00225	0.00225
63:00:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
63:15:00	0.0000	0.0000	0.0000	0.0000	0.00222	0.00222
63:30:00	0.0000	0.0000	0.0000	0.0000	0.0022	0.0022
63:45:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
64:00:00	0.0000	0.0000	0.0000	0.0000	0.00217	0.00217
64:15:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
64:30:00	0.0000	0.0000	0.0000	0.0000	0.00214	0.00214
64:45:00	0.0000	0.0000	0.0000	0.0000	0.00213	0.00213
65:00:00	0.0000	0.0000	0.0000	0.0000	0.00211	0.00211
65:15:00	0.0000	0.0000	0.0000	0.0000	0.0021	0.0021
65:30:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00208
65:45:00	0.0000	0.0000	0.0000	0.0000	0.00207	0.00207
66:00:00	0.0000	0.0000	0.0000	0.0000	0.00205	0.00205
66:15:00	0.0000	0.0000	0.0000	0.0000	0.00204	0.00204
66:30:00	0.0000	0.0000	0.0000	0.0000	0.00203	0.00203
66:45:00	0.0000	0.0000	0.0000	0.0000	0.00201	0.00201
67:00:00	0.0000	0.0000	0.0000	0.0000	0.002	0.002
67:15:00	0.0000	0.0000	0.0000	0.0000	0.00198	0.00198
67:30:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197
67:45:00	0.0000	0.0000	0.0000	0.0000	0.00196	0.00196
68:00:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
68:15:00	0.0000	0.0000	0.0000	0.0000	0.00193	0.00193
68:30:00	0.0000	0.0000	0.0000	0.0000	0.00192	0.00192
68:45:00	0.0000	0.0000	0.0000	0.0000	0.0019	0.0019

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.47	No
BFIHOST19	0.47	No
PROPWET (mm)	0.38	No
SAAR (mm)	668	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

EASTWOOD & PARTNERS (Consulting Engineers) Ltd.

Project:	**46614**	Sheet	1.00
location	**Bawtry Road**	Job No.	46614
town	**Tinsley**	Date	28.01.22
Subject:		Designed	JSS
	Surface Water Drainage	Checked	CH
	Storage Estimates	Revision	A

Site Details :

Location :
Grid Ref :

Information From Wallingford Maps :

				M5-60	**18.0**	mm
				r	**0.35**	
				SAAR	**750**	mm
Total Site Area	**4.500**	ha	(developable area)	UCWI	80	(Fig. 9.7)
Deduct areas to soakaways	0.000	ha		Soil Type	**2**	
Effective Drainage Area	**4.500**	ha		SOIL	0.3	(Section 7.4)

Total Impermeable	**2.700**	ha	60%	assumed impermeable area
Allow for Urban Creep	**0.270**	ha	10%	
Total Impermeable	**2.970**	ha		

PIMP	66.0%	
PR	47.7	Equation 7.3
Cv	0.72	Equation 7.21
Default Cv	**1.00**	Designer to insert to override calculated Cv

Design Return Period **100** **Years**

Max. Branch Length **400** metres
Approx. Time of Flow **6.7** mins

Percentage Increase For Climate Change: **40%**

Details of Restricted Discharge :

Maximum Permitted Rate of Flow from the System
3.5 Litres/sec
Assumed Average Flow as a Proportion (Estimate) **90** %
Average Rate of Flow **3.2** Litres/sec

Calculation of Critical Duration and Storage Volume Required :

Trial Durations (mins)	**4500**	**4600**	**4700**	**4800**	**4900**	**5000**	**5100**
Average Point Intensity (mm/hr)	1.4	1.4	1.4	1.4	1.3	1.3	1.3
Volume of Run-off for the period = Area x Cv x i x D (m3)	3166.4	3181.0	3195.4	3209.5	3223.4	3237.1	3250.5
With climate change	4432.9	4453.5	4473.6	4493.4	4512.8	4531.9	4550.6
Volume of Out-flow for the period = Ave. flow x (D+Tf)(m3)	851.8	870.7	889.6	908.5	927.4	946.3	965.2
Storage Volume for this Duration (m3)	**3581**	**3583**	**3584**	**3585**	**3585**	**3586**	**3585**

Storage Volume Reqired for

100 Year Return Period = **3586** **m^3**

Is this the worst case (ie. Critical Duration)? 1 (1 = Yes, 0 = No)

SUDS Type	SUDS Technique	Description	Suitable	Comments
Source Control	Green roof	Vegetated roof that reduces runoff volume and rate	No	Expected planning requirement for traditional pitched roofs to match neighbouring housing.
	Rainwater harvesting/rainwater butts	Rainwater is stored and re-used	No	Individual water butts can be used for garden watering.
	Permeable paving	Paving which allows inflow of rainwater into underlying construction/soil	Possible	May be suitable for private drives. Private permeable paving areas could provide limited infiltration to the sub-soils could occur.
Infiltration	Soakaway	Pit or trench which stores and disposes of water to the ground	No	Expected presence of impermeable ground (clay and mudstone).
	Filter Drain	Trench which conveys and/or disposes of water to the ground.	No	
	Infiltration Basin	Shallow basin which stores and disposes of water to the ground	No	Lack of suitable open space.
Conveyance	Swale	Shallow vegetated depression which conducts and retains water	No	Difficulties of adoption and lack of space.
Detention	Subsurface storage	Traditional underground pipes, tank storage, or modular systems	Yes	Area available on the site for an attenuation tank.
	Detention Basin	Normally dry but may have small permanent water pools at the inlet and outlet. They can function as POS	No	Poor infiltration rate due to the expected presence of impermeable ground (clay and mudstone) resulting in residual water and siltation in the basin. Inefficient use of POS.
	Pond	Permanent body of water	No	Lack of suitable public open space.
	Wetland	Permanent body of shallow water or marsh	No	

BSG | ecology

Land off Bawtry Road, Sheffield

Preliminary Ecological Appraisal

September 2022

BLANK PAGE

BSG | ecology

Issuing office

3 Brunel House | Hathersage Park | Station Approach | Hathersage | Derbyshire | S32 1DP

[redacted]

Client	Barratt Homes & David Wilson Homes - Yorkshire West
Project	Land off Bawtry Road, Sheffield, Preliminary Ecological Appraisal
Version	FINAL
Project number	P21-1006

	Name	**Position**	**Date**
Originated	Fiona Shuttle	Ecologist	23 February 2022
Reviewed	Steve Betts	Associate Director	28 February 2022
Approved for issue to client	Jim Fairclough	Principal Ecologist	01 March 2022
Issued to client	Fiona Shuttle	Ecologist	02 March 2022
Updated	Emily McVean	Senior Ecologist	22 September 2022
Approved for issue to client	Katy Stiles	Principal Ecologist	23 September 2022
Issued to client	Emily McVean	Senior Ecologist	27 September 2022

Contents

1 Introduction

Background to commission

1.1 Barratt Homes Yorkshire West and David Wilson Homes Yorkshire West commissioned BSG Ecology to undertake a preliminary ecological appraisal of land to the north of Bawtry Road, Sheffield (referred to as the Site), to identify potential ecological constraints associated with a proposed development. It is understood that design proposals have not been produced for the Site at this stage, but that the development will be for residential housing.

1.2 As part of this appraisal BSG Ecology classified habitats and completed an extended survey for protected species on 2 February 2022. Using information from this survey the Defra Biodiversity Metric 3.1 was used to calculate the baseline biodiversity value of the Site.

Site description

1.3 The Site is located to the north of Bawtry Road, Tinsley, and is situated to the north-east of Sheffield. It is centred on Ordnance Survey (OS) grid reference SK 40708 90456 and occupies an area of 5.58 ha. The Site includes disused sports fields, a narrow strip of woodland along the southern Site boundary, lines of trees along parts of the eastern and western Site boundaries, a hedgerow and several areas of hardstanding.

1.4 The red line boundary and location of habitats present within the Site are presented in Figure 1, Section 6.

Aims of study

1.5 The aim of the study was to provide a preliminary assessment of the ecological features present within the Site and its surrounding area and to identify any ecological issues that need to be considered in relation to the proposed development. The study has included:

- Desk study review of information relating to protected species and sites designated for their nature conservation value.
- Identification of the existing habitats and features present within the Site, including those with the potential to support protected species.
- An outline of wildlife legislation and / or policy protection afforded to habitats and species of importance which may be relevant to the proposed development.
- Identification of potential ecological constraints and any future action likely to be required, including further survey and assessment.
- Information that will inform a biodiversity gain baseline calculation using the Defra 3.1 metric.
- Recommendations for biodiversity enhancement in line with planning policy recommendations.

2 Methods

Desk study

2.1 A desk study was undertaken to gather existing ecological data in relation to the Site and the surrounding area, and to provide contextual ecological information.

2.2 BSG Ecology obtained records from Sheffield Biological Records Centre (SBRC) and Rotherham Biological Records Centre (RBRC). The request included non-statutory designated sites, such as Local Wildlife Sites (LWS), and any protected species within a 1 km radius from the centre of the Site. The data were provided in January 2022. Records over 20 years old were excluded from the desk study.

2.3 The Multi-Agency Geographic Information for the Countryside website (http://www.magic.gov.uk/) was accessed in January 2022 to determine the location of any statutorily designated sites and European Protected Licences (EPSL) for bats and great crested newts granted within 2 km of the Site.

2.4 In addition, a review was undertaken of on-line aerial photographs and maps (Bing Maps 1:25,000, accessed January 2022) to identify any ponds within 500 m of the Site (to inform assessment of amphibian suitability) and to gain understanding of the Site context, habitat connectivity, and possible historic land-uses.

Field survey

2.5 The extended habitat survey was carried out by Fiona Shuttle (Ecologist at BSG Ecology) on 2 February 2022. Weather conditions were dry and sunny with temperatures of 2-3 C. The Site was walked over and the habitats were described using the UK Habitat Classification methodology (UK Habitat Classification Working Group, 2018). In order to classify grassland type and condition, species richness was recorded within twelve quadrats (eight within the fields and four within field margins), each measuring 1 m^2 and randomly positioned evenly throughout the grassland. All habitats present within the Site were mapped and are shown on Figure 1, Section 6.

2.6 The survey was 'extended' in order to assess the potential for the Site to support protected species, including Species of Principal Importance[1] , such as badgers *Meles meles*, bats, reptiles and amphibians. The Site was also searched for the presence of invasive non-native plants, such as Japanese knotweed *Reynoutria japonica* and Himalayan balsam *Impatiens glandulifera*, as listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

2.7 A verification of the grassland condition assessment was undertaken by Emily McVean (Senior Ecologist, ACIEEM) on 22 September 2022 during dry and fine weather conditions with a temperature of 19 C. The abundance of plant species was assessed via six quadrat samples across the grassland areas. The condition of the grassland was recorded with reference to the Defra Metric 3.1 condition criteria.

Assessment of bat roost potential

2.8 A preliminary ground-based bat roost assessment of trees and built structures within the Site and on the boundaries was carried out with reference to industry standard guidance (Collins, 2016; Bat Tree Habitat Key, 2018).

2.9 The survey assigned a level of suitability ('negligible', 'low', 'moderate' or 'high') to trees and structures based on their potential to support roosting bats; any signs of bat activity were noted. Locations of trees or structures with potential roosting habitat are shown on Figure 1.

[1] Species identified as being the most threatened and requiring conservation action in England, in accordance the Section 41 of the Natural Environment and Rural Communities Act (NERC Act, 2006)

Baseline biodiversity assessment

2.10 A calculation of the existing biodiversity value of the Site was undertaken using the DEFRA 3.1 biodiversity metric (Defra, 2021). Areas of each habitat type present on Site were calculated and a condition assessment of existing habitats was made during the habitat survey in line with industry guidance (Panks *et al.*, 2021). This was input into the calculator to generate the pre-development / baseline biodiversity value of the Site.

2.11 The post-development biodiversity value is yet to be calculated as a masterplan for the Site has not been produced at this stage. The post-development Defra 3.1 biodiversity metric will need to be completed prior to the submission of a planning application to calculate overall biodiversity losses, gains and enhancements anticipated from the development.

2.12 For the purposes of the present assessment the Site is considered to be in an 'Area/compensation not in local strategy/ no local strategy' when assigning strategic significance to the Site.

Limitations to methods

2.13 The habitat survey described in this report was carried out in February 2022, a time of year when some plant species can be less evident. The purpose of the survey was to characterise habitats rather than conduct a detailed botanical survey; given the nature of the habitats within the Site (modified grassland, broadleaved woodland, trees and hedgerow), it was possible to confidently categorise and evaluate the quality of the habitats present. A verification survey of the grasslands was undertaken in September 2022 to ensure that any limitations to the grassland survey in February could be adequately addressed, and to provide confidence to the condition assessment of the grasslands.

3 Results and evaluation

Designated sites

3.1 The desk study identified one statutory designated site within 2 km of the Site; Centenary Riverside Local Nature Reserve (LNR), situated 1.8 km to the north-east. This is an urban nature reserve which forms part of a flood alleviation scheme on the banks of the River Don and includes the following habitats; wet and dry woodland, wet grassland, meadow, reed bed, marshland and a pond.

3.2 The Site is not situated within any Site of Special Scientific Interest (SSSI) Impact Risk Zone.

3.3 The desk study identified three non-statutory designated sites within 1 km of the Site. Bawtry Road Wetlands Site of Importance for Nature Conservation (SINC) is located 320 m to the south-east, situated within sports grounds to the south of Bawtry Road. This is designated for its wetland habitat, with some open water present with emergent vegetation.

3.4 The Lower Don Valley Sheffield and Tinsley Canal SINC is located 870 m to the north-west of the Site. This is designated for the canal and its banks and is located beyond built up development and major roads. Finally, Tinsley Ponds Local Wildlife Site (LWS) is located approximately 950 m to the south-east and this includes a suite of ponds which are noted for the common amphibian, bird and invertebrate populations they support. This site is situated beyond a motorway and industrial developments.

Priority habitats

3.5 The desk study identified no ancient woodlands within 1 km of the Site; however, eleven deciduous woodlands and five mapped areas of open mosaic habitats on previously developed land were identified. The closest woodland is located approximately 110 m to the north-east of the Site and the closest mapped area of open mosaic habitat is 530 m south, situated beyond built up areas and roads.

Habitats

3.6 The habitats mapped during the habitat survey are described below in Table 1. This table also includes the results of a condition assessment and the assigned Defra 3.1 metric habitat category.

3.7 The locations of the habitats are shown on the habitat survey results plan in Section 6. The photographs referred to in the text below are presented in Section 7.

Table 1: Habitats on Site

UK Habitat	Description	Defra 3.1 metric habitat condition assessment
Modified grassland	The Site is dominated by two large fields which are disused sports pitches that have been subject to reduced management for a few years (Photograph 2). They have a sward height of approximately 15 cm and have developed a slightly tussocky nature with a layer of thatch. The fields are dominated by grasses including; common bent *Agrostis capillaris* and red fescue *Festuca rubra* and have locally frequent areas of meadow oat-grass *Helictochloa pratensis*, creeping bent *Agrostis stolonifera*, Yorkshire fog *Holcus lanatus*, perennial ryegrass *Lolium perenne*, , cock's foot *Dactylis glomerata*, false oat grass *Arrhenatherum elatius*, smooth meadow grass *Poa pratensis* and timothy grass *Phleum pratense*. Other species occasionally or	All areas of grassland support between 2 and 7 species per m^2, with the summer verification survey identifying an average of 3.2 species per m^2 (based on six quadrats across the fields). Sward height is not sufficiently varied due to mowing that appears to take place in summer, <20% scrub, <5% damage, bare ground varies due to mulched cut grass preventing plant growth but has ca. 20% coverage on average, no bracken present and <5%

UK Habitat	Description	Defra 3.1 metric habitat condition assessment
	rarely present include: yarrow *Achillea millefolium*, ragwort *Jacobaea vulgaris*, vetch *Vicia* sp., dandelion *Taraxacum officinale* agg., hairy bittercress *Cardamine hirsuta*, doves-foot cranesbill *Geranium molle,* ribwort plantain *Plantago lanceolata* and creeping buttercup *Ranunculus repens*. Unmanaged field margins between 2 and 6 m wide are present along the Site boundaries. These areas have a greater sward height up to 100 cm tall. Species composition is similar to that listed above, with additional: sweet woodruff *Galium odoratum*, cow parsley *Anthriscus sylvestris*, ivy *Hedera helix*, wood avens *Geum urbanum*, snowdrops *Galanthus nivalis*, white deadnettle *Lamium album*, common nettle *Urtica dioica*, umbellifer sp., and a sedge *Carex* sp. Scattered low-lying bramble *Rubus fruticosus* and rose *Rosa* sp. scrub are present, as well as a few patches of tall ruderal vegetation including creeping thistle *Cirsium arvense*, rosebay willowherb *Chamaenerion angustifolium*, common nettle and burdock *Arctium lappa* and garden escapees such as Michaelmas-daisy *Symphyotrichum* sp. A smaller field is present in the eastern part of the Site which is likely a disused bowling green (Photograph 8). This generally had lower diversity than the larger pitches and was dominated by red fescue. Brash piles, scattered scrub and young fruit trees are present along the eastern boundary of the field (Photograph 9).	undesirable species are present and Japanese knotweed and Cotoneaster are present within the unmanaged grassland in the south-eastern and south-western corners of the Site. All grassland within the Site fits the criteria to be **poor condition** in the Defra metric 3.1 condition table for grassland habitat type (low distinctiveness).
Developed land, sealed surface	Small areas of hardstanding are present throughout the Site, including disused tennis courts (Photograph 10), an old track (Photograph 11) and a waste-ground where buildings once stood (Photograph 13, it is understood that two buildings were present in the south-west of the Site which were demolished prior to 2020). Scattered scrub is occasionally present within the areas of hardstanding including bramble and butterfly bush *Buddleja davidii*. Additionally, some colonising species are present including occasional species from the adjacent grassland (listed above) as well as common mouse ear *Cerastium fontanum*, goldenrod *Solidago canadensis*, stonecrop Sedum *sp.* and common fleabane *Pulicaria dysenterica*. Two small shelters are present in the bowling green area in the eastern part of the Site (Photograph 7). They both have breeze block walls with a corrugated metal roof.	No condition assessment is required for this habitat type.

UK Habitat	Description	Defra 3.1 metric habitat condition assessment
	A dilapidated single-storey brick-built structure with a partially collapsed roof is also present on the eastern Site boundary (Photograph 5). Willow scrub is growing within the southern section of the building where the roof has collapsed.	
Other woodland; broadleaved	A narrow strip of broadleaved woodland is present on a north-facing bank along the southern Site boundary (Photograph 3). Species present include sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, silver birch *Betula pendula*, common lime *Tilia europaea*, apple *Malus sp.,* wild cherry *Prunus avium,* hawthorn *Crataegus monogyna* and elder *Sambucus nigra*. The ground flora is dominated by modified grassland field margins, bare ground and patches of dense bramble scrub.	Three age classes are present, no evidence of browsing, no invasive species present, >5 native species are present across the parcel, >50% of trees are non-native sycamore, <5% open space, saplings are present (one class), tree mortality <10%, no recognisable NVC ground flora, mostly one storey, no veteran trees present, moderate deadwood present and moderate enrichment / damage from, adjacent road and public. This habitat fits the criteria to be **moderate condition** in the Defra metric 3.1 condition table.
Line of trees	Three lines of semi-mature to mature trees are present along the eastern and western Site boundaries (Photograph 4 & 12). All have similar characteristics and species composition including; sycamore, ash and common lime. A small line of Lawson cypress *Chamaecyparis lawsoniana* trees is also present within the hardstanding in the south-eastern part of the Site.	The lines of trees along the Site boundaries contain >30% sycamore (non-native), have >10% gaps between canopies, include several mature trees, there is <6m of semi-natural vegetation on both sides and many trees are damaged from human activity (with many pruning wounds present). The Lawson cypress line of trees is non-native, has a continuous canopy, includes no mature trees, is bordered by hardstanding and is in a good condition. All lines of trees fit the criteria to be **poor condition** in the Defra metric 3.1 condition table.
Scattered trees (Urban trees)	A few additional scattered trees are present along the Site boundaries including a mature cherry along the northern Site boundary and a mature apple and cherry to the east. Young to semi-mature common lime, laburnum *Laburnum sp.*, whitebeam *Sorbus aria* and	This habitat is classified as urban trees as it is the closest fit in the metric; 3 large sized, 7 medium and 1 small tree are present.

UK Habitat	Description	Defra 3.1 metric habitat condition assessment
	cherry are also present in the grassland close to the entrance of the Site.	Most are native species with an intact canopy, under 50% are mature, they show signs of pruning damage, significant deadwood is present and trees are situated adjacent to other vegetation. This habitat fits the criteria to be **moderate condition** in the Defra metric 3.1 condition table.
Native hedgerow	A wild privet *Ligustrum vulgare* hedgerow is present in the eastern part of the Site, surrounding the disused bowling green (Photograph 6). It is approximately 2.5 m tall, 2 m wide and infrequently managed, with a few sycamore, willow and rose saplings present. The ground flora is dominated by undisturbed modified grassland. The hedgerow is classified as species-poor, having less than five species per 30 m (Defra, 2007).	The hedge is >1.5 m high and >1.5 m wide, has no gap at the base, has <10% gaps along its length, >1m undisturbed vegetation margins, <20% undesirable ground vegetation, no invasive species and no damage present. This habitat fits the criteria to be **good condition** in the Defra metric 3.1 condition table.

Protected and notable species

Bats - Roosts

3.8 MAGIC identified two European Protected Species Bat Licences that have been granted by Natural England for work impacting on bats within 2 km of the Site, the closest of which is located 1.6 km to the west. These were both for the destruction of a common pipistrelle resting place in 2013 and 2016. The desk study with SBRC and RBRC identified no records of bats within 1 km of the Site.

3.9 The Site provides suitable habitat for roosting bats in the form of seven trees with potential roost features (PRFs). Six trees (T1, T2, T3, T4, T5, T6) are assessed to have low potential for roosting bats due to the presence of small wounds to the main stem, snapped branches and ivy cover. The remaining tree with PRFs (T7)is assessed to have moderate potential due to the presence of a cavity at the intersection between two stems. Photographs of the trees with bat roosting potential are provided in Section 7 (Photographs 15 – 21).

3.10 Three built structures are present within the Site; all were assessed to have negligible potential to support roosting bats. The two small shelter structures in the eastern part of the Site (Photograph 7) are open sided, with breeze block walls and a corrugated metal roof. No gaps or suitable roosting features were noted within the structures.

3.11 The small, dilapidated brick-built building along the eastern Site boundary has a flat partially collapsed roof (Photograph 5). A few gaps were noted around a pipe extending into the interior wall where the roof is missing, however, willow scrub is growing directly outside making the entrance cluttered and providing sub-optimal access for bats. The brickwork is predominantly intact across the building and no additional gaps or potential roosting features were observed. Overall, this building is assessed to provide negligible roosting potential for bats.

Bats –Foraging habitat

3.12 Habitats present within the Site may provide opportunities for foraging and commuting bats within the local area; in particular the narrow woodland along the southern boundary and lines of trees along the eastern and western boundaries. The hedgerow may also provide some foraging and commuting opportunities. A review of aerial imagery identified limited foraging opportunities for bats in the local landscape which are connected to the Site. The Site is situated within a built-up area, with numerous roads present (including the M1 to the west) which likely act as a barrier to bat dispersal. A sports ground to the south of Bawtry Road may provide some commuting opportunities, and also Chapel Flat Dike, which is located 130 m to the east beyond residential properties, may provide a vegetated commuting route through the local area. Overall, the Site is considered to be of low value for foraging and commuting bats in line with guidance (Collins, 2016).

Badgers and other mammals

3.13 The desk study identified no records of badger within 1 km of the Site.

3.14 No evidence of badger was identified during the extended habitat survey. The habitats present within the Site provide sub-optimal sett building habitat for badgers. Although a woodland is present on a bank along the southern Site boundary, this is a narrow strip of woodland, is fairly exposed with limited understorey vegetation and is located adjacent to a fairly busy road. The Site is also poorly connected to alternative suitable habitat in the landscape. As such, it is unlikely that badgers will colonise the Site, although their future presence cannot be entirely ruled out.

Amphibians including great crested newt

3.15 The data search of MAGIC identified no previously issued EPS Great Crested Newt Licences within 2 km of the Site and the desk study with SBRC and RBRC identified no records within 1 km of the Site. However, records of ten smooth newt *Triturus vulgaris* were provided in 2003 for a location 850 m to the south of the Site.

3.16 No ponds are present within the Site and a review of aerial imagery did not identify any ponds located within 500 m of the Site boundary. The citation for Bawtry Road Wetlands SINC (320 m to the south-east) states that the site includes some areas of open water, but notes that these areas likely resulted from recent subsidence and are currently covered by willow *Salix* sp. scrub and reeds *Typha* sp.. The citation does not identify the potential for amphibians within the site. Given the information provided, it is unlikely that the SINC supports notable populations of any amphibian species and, if present, they will not likely travel into the Site due to the intervening distance and as alternative terrestrial habitat is present closer to this waterbody.

3.17 The Site provides habitats such as woodland, scrub and hedgerows that provide suitable habitats to support terrestrial great crested newt and common amphibian species,. Given the lack of suitable aquatic habitat within the surrounding area and lack of desk study records, it is highly unlikely that great crested newts are present within the Site and so are not considered further within this report. Common amphibian species including toad *Bufo bufo* (which is an Species of Principal Importance) have less specific habitat requirements and so may be present within the surrounding area. Even so, it is unlikely that significant numbers are present within the Site given the reasons mentioned above and as the Site is dominated by modified grassland which is a sub-optimal habitat for amphibians.

Reptiles

3.18 The desk study identified no records of any reptile species within 1 km of the Site.

3.19 Some habitats present within the Site provide suitable habitat for reptiles, including tussocky grassland adjacent to hedgerows and scattered scrub. However, it is understood that until recently, the Site was subject to an intensive management regime maintaining a short sward height. This would have provided sub-optimal habitat for reptiles and it is unlikely that they have since colonised the Site following relaxation of management due to its location within a predominantly built-up area. Given the lack of desk study records, historic management of the Site and its location, it is unlikely that any reptiles are present and so they are not considered further within this report.

Birds

3.20 The desk study identified ten notable bird species within 1 km of the Site. The following are on the red list of Birds of Conservation Concern (Stanbury *et al*, 2021); lapwing *Vanellus vanellus,* grey partridge *Perdix perdix,* starling *Sturnus vulgaris,* house sparrow *Passer domesticus* and yellow wagtail *Motacilla flava*. The following are on the amber list of Birds of Conservation Concern; bullfinch *Pyrrhula pyrrhula*, dunnock *Prunella modularis* and kestrel *Falco tinnunculus*.

3.21 No notable bird species were observed during the Site visit, however an owl pellet was found within the northern field (Photograph 22); it had a size and shape similar to that of barn owl *Tytus alba*, although it was not possible to confirm the species. The habitats present within the Site provide sub-optimal nesting habitat for owls, however, the fields and field margins may provide foraging opportunities as they are likely to support small mammals such as voles.

3.22 The line of trees, hedgerow, scattered trees and scrub within the Site provide nesting opportunities for tree and shrub nesting species. The large open fields also provide potential nesting habitat for ground nesting species; however, dog walkers were observed to pass through the Site which could disturb any bird species present. Additionally, no tall vegetation is present within the grassland such as scrub which would provide shelter and protection from predators. Considering the location of the Site within a predominantly built-up landscape, it is unlikely that any notable bird species use the fields for nesting.

Invasive plant species

3.23 Japanese knotweed was identified within the south-eastern corner of the Site (Photograph 14) and *Cotoneaster* sp. in the grassland close to the entrance of the Site; locations shown on Figure 1. These are non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

4 Potential Impacts and Recommendations

4.1 The purpose of this preliminary ecological appraisal is to inform design proposals for the Site, which have not yet been produced at this stage. As such, the conclusions and recommendations provided within this report are at a high level and should be updated when a Site layout has been produced.

Designated sites

4.2 The only statutory designated site located within 2 km of the Site, Centenary Riverside LNR, is located over 1.8 km from the Site boundary and is designated for the mosaic of habitats it supports. The Site is separated from the LNR by extensive built-up development and, as such, no direct or indirect impacts are anticipated to the designated site as a result of the proposed development.

4.3 Three non-statutory designated sites are situated within 1 km of the Site, all of which are located over 320 m from the Site boundary beyond built-up development and major roads including the M1. Given the geographical separation of the Site from these non-statutory designated sites and the nature of the proposed development, no direct or indirect impacts on any of these sites are anticipated.

Habitats

Woodland, trees and hedgerow

4.4 The woodland, hedgerow and scattered trees within the Site (including the lines of trees) have been evaluated as being of importance at the Site level (CIEEM, 2018) as these habitats each provide species and structural diversity of plant communities and take a long time to replace, although they comprise a relatively small area and are widespread habitats in the surrounding landscape. These habitats also provide habitat for a range of fauna including protected species discussed below. The hedgerow within the Site meets the criteria to be a Habitat of Principal Importance (HPI) as it is dominated by a native woody species (BRIG, 2008). The woodland within the Site does not currently meet the criteria to be a HPI (BRIG, 2008).

4.5 It is recommended that these habitats are retained and protected throughout the development. If any tree or hedge is to be lost to facilitate the development, this should be compensated for through the planting of native species of local provenance. The development provides the opportunity to enhance the ecological value of the woodland along the southern Site boundary (although note it is unlikely that it can be enhanced to good condition in the Defra 3.1 biodiversity metric). This could be achieved through management practices such as selective removal of non-native sycamore trees which are casting heavy shade to encourage a more diverse ground flora, and planting native tree species in gaps.

4.6 Direct and indirect impacts to trees to be retained are possible during the construction phase of development (including branch / root damage) and impacts are also possible following completion of construction works (such as inappropriate management / maintenance). It is recommended that no development work occurs within proximity to mature trees and that an arboricultural impact assessment of works areas is undertaken to inform design and construction operations.

4.7 Appropriate management and maintenance of habitats should be adopted following completion of the development. These measures should be detailed within an Ecological Management and Monitoring Plan (EMMP).

Other habitats

3.2 The areas of grassland within the Site are species poor, have historically been intensively managed and contain commonly occurring species. Modified grassland occurs relatively frequently within the surrounding area and so this habitat is considered to be of no more than Site level importance. The loss of grassland areas within the Site is not considered to be a significant ecological constraint.

4.8 The remaining habitats within the Site (hardstanding and built structures) are considered to be of negligible ecological value. Loss of these habitats as a result of development is not considered to result in a significant ecological impact, however, their potential to support protected and notable species should be considered, as discussed below.

Species

Bats

4.9 All UK bats are European Protected Species (EPS) under the Conservation of Habitats and Species Regulations 2017 (as amended) and several are Species of Principal Importance under the provisions of the Natural Environment and Rural Communities (NERC) Act 2006. Bats are protected against disturbance, killing or injuring and their roosts are protected against obstruction, damage or destruction. Detailed planning policy and legislation information is presented in Appendix 1.

4.10 The Site provides potential roosting habitat for bats in the form of seven trees; one of which has moderate bat roost potential (T7), whilst the remaining five (T1, T2, T3, T4, T5 & T6) have low potential. Their locations are shown on Figure 1, Section 6.

4.11 Where possible, the proposals should seek to retain all trees with bat roosting potential. If this is not possible, further survey may be required and / or a precautionary working methodology should be adopted during felling. In the first instance surveys would comprise a daytime aerial inspection of trees to determine the presence / likely absence of roosts. Further surveys, if required, may be seasonally restricted to the active bat season (between April and September) and, if roosting bats are found, a licence to damage or destroy the roosts would need to be secured from Natural England. This would require justification as to why avoidance is not possible and evidence that there is a public interest that overrides the harm caused to roosting bats.

4.12 The Site also provides potential foraging and commuting opportunities for bats, particularly along the Site boundaries. Overall, the Site is considered to be of low value for foraging and commuting bats, with reference to guidance (Collins, 2016), and the habitats present are considered to be of Site level importance for bats (CIEEM, 2018). Linear vegetative features should be retained where possible, including the woodland, lines of trees and hedgerow.

4.13 It is recommended that static bat detector surveys of the Site are carried out if any direct or indirect impacts are anticipated to suitable foraging / commuting habitat (hedgerow / woodland edge / line of trees). Detectors should be deployed for five consecutive nights in late May/June to ascertain whether the habitats present form an important commuting link or foraging resource for bats in the local area. The results of the initial static bat detector survey will then be used to determine the requirements for and scope of further bat surveys.

4.14 Any development within the Site will have the potential to indirectly impact on foraging and commuting bats through disturbance such as lighting. A sensitive lighting scheme should be designed for the development # in line with best practice guidance (ILP & BCT, 2018) to minimise light spill onto the vegetated Site boundaries. It will be necessary for the lighting engineer and the ecologist to work closely together to ensure that the lighting scheme is sensitively designed to avoid and minimise potential impacts on bats.

4.15 Additionally, impacts to bats could be minimised through incorporating a buffer of semi-natural vegetation along the Site boundaries to minimise disturbance of these habitats. This could also improve the post-development biodiversity value of the Site and contribute towards biodiversity gain (see below). It is also recommended that integral bat roosting features are incorporated into the design of new houses and bat boxes installed on retained trees to enhance the potential roosting opportunities for bats within the Site.

Badgers

4.16 Badgers are protected under the Protection of Badgers Act 1992 which makes it an offence to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to intentionally or recklessly interfere with a sett.

4.17 No evidence of badger was identified during the survey and the majority of the habitats present are sub-optimal for sett-building, with the exception of the woodland along the southern Site boundary. The habitats present are considered to be of no more than Site level importance to this species, if present.

4.18 It is anticipated that any development proposals will pose a low risk to badgers. However, individuals may pass through and forage within the Site and so construction works may result in direct harm to badgers unless appropriate mitigation measures are adopted. As a precaution to avoid entrapment of mammals, any excavations should be covered overnight, or should have a ramp installed to allow safe exit. Prior to construction commencing it is recommended that a pre-construction badger survey takes place due to the mobile nature of the species, and its ability to readily establish new territories in a short period of time.

Common amphibians

4.19 Small numbers of common amphibian species may be present within terrestrial habitat in the Site (such as hedgerow, scrub and woodland), including common toad which is an SPI. The habitats present are considered to be of no more than Site level importance to these species, if present.

4.20 Given the lack of desk study records and as there is alternative suitable habitat for common amphibians in the surrounding landscape, it is considered unlikely that clearance of these habitats would impact significantly on the conservation status of these species at the local level. Consequently, they are not considered to be a significant constraint to development of the Site.

4.21 Suitable terrestrial habitats for common amphibians should be retained as part of the proposed development where possible to continue to provide sheltering and foraging opportunities for these species. Habitats such as hedgerows and scrub could also be designed into the landscaping proposals to enhance the available habitat for common amphibians within the Site.

Nesting birds

4.22 All nesting birds are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. In addition, for some rarer species (listed on Schedule 1 of the Act), it is an offence to disturb them whilst they are nest building or at or near a nest with eggs or young, or to disturb the dependent young of such a bird.

4.23 Breeding bird habitat is present on Site, including scrub, woodland, mature trees, hedgerows and the dilapidated building. The habitats present are considered to be of Site level importance to nesting birds. Where suitable nesting habitat requires removal, this should be completed outside the breeding season (outside March to August) or further checks will need to be undertaken by an ecologist to ensure no nesting birds are present immediately prior to the works. Opportunities should also be sought to install bird boxes to retained mature trees and to incorporate them within buildings.

4.24 Foraging evidence of an owl (a pellet, species unconfirmed) was identified within the grassland during the field survey, although the majority of the Site provides sub-optimal nesting and roosting habitat for owl species. The Site is situated within a predominantly built-up area, with only small patches of green spaces present within the landscape and the M1 motorway situated 300 m to the west. Given that only one owl pellet was found, sub-optimal nesting or roosting habitat is present within the Site and the surrounding landscape is predominantly built-up, it is likely that individual owls only occasionally pass through the Site. Therefore, development within the Site would unlikely have a significant impact on local owl populations.

Invasive plant species

4.25 Small areas of Japanese knotweed and *Cotoneaster* sp. are present within the Site: locations are marked on Figure 1. As both are invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), it is illegal to cause their spread in the wild, which can occur as a result of moving contaminated soil or plant cuttings.

4.26 It is recommended that advice on the treatment and management of Japanese knotweed is sought from a specialist contractor as soon as possible and that a programme of chemical treatment is carried out. This may take several months to complete.

4.27 Cotoneaster should also be sensitively controlled within the Site as soon as possible. Control measures may involve mechanical removal, including removal of all roots, and waste material should be chipped or burnt on Site, or removed to a licenced landfill as controlled waste. A suitably experienced invasive species contractor should be involved to prepare and implement a strategy for its control.

Biodiversity gain baseline

Relevant policy

4.28 Government in England has formally identified a need for all development to deliver a net gain for biodiversity in the National Planning Policy Framework (summarised in Appendix 1).

4.29 Additionally, the Environment Act 2021 includes the provision of mandatory biodiversity gain for developments in England; this will be delivered through an amendment to the Town and Country Planning Act 1990. The two-year transition period following Royal Assent (November 2021) means that mandatory biodiversity gain will become law in autumn 2023. This will require:

- The provision of a required percentage of biodiversity gain, currently set nationally to be at 10%.
- The use of the national Defra Biodiversity Metric to calculate the biodiversity gain, currently Metric 3.1.
- The provision of a biodiversity gain plan to demonstrate how biodiversity gain will be delivered on and or off-site; statutory instruments and regulations are in preparation by Defra and Natural England to provide templates for reporting.
- Biodiversity gain will be secured for a fixed period, currently nationally set at 30 years.
- Demonstration of how the biodiversity gain will be secured; conservation covenants will be used to deliver this which are in preparation by Defra and Natural England.

Pre-development biodiversity calculation

4.30 The Site has a total area of 5.58 ha. The biodiversity metric calculations identified that the pre-development biodiversity value of the habitats within the Site is 13.39 habitat units and 1.41 hedgerow units.

4.31 Prior to the submission of a planning application, the post-development assessment of the Defra Metric 3.1 Biodiversity calculator will need to be completed to quantitatively assess the impacts of the proposal on biodiversity. This will involve an assessment of the type, condition and extent of the post-development habitats in order to calculate overall biodiversity losses, gains and enhancements.

4.32 In order to achieve biodiversity gain, the ecologist will need to work closely with the project team throughout the evolution of proposals for the Site to ensure that the scheme is designed to maximise on-site opportunities for the retention and enhancement of existing habitats and the creation of new habitats. This could include the creation of wildflower grasslands, pond creation, tree planting, hedgerow creation and scrub planting.

5 References

Bat Tree Habitat Key. (2018) *Bat Roosts in Trees.* Pelagic Publishing.

BRIG (2008). UK Biodiversity Action Plan: Priority Habitat Descriptions. UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG. (Updated 2011).

British Standard (BS) 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*. British Standards Institute, London.

CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland.* Chartered Institute of Ecology and Environmental Management.

Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. The Bat Conservation Trust, London.

Defra (2007). *Hedgerow Survey Handbook*, 2nd Edition.

Defra (2022) *The Biodiversity Metric 3.1 – Calculation Tool*, Department for Environment Food and Rural Affairs, London.

Institute of Lighting Professionals & Bat Conservation Trust (2018). Guidance note. *Bats and artificial lighting in the UK.* ILP, London.

MAGIC website: Available from https://magic.defra.gov.uk/.

Panks S., White N., Newsome A., Potter J., Heydon M, Mayhew E, Alvarez M, Russell T, Scott S.J., Heaver M., Scott S., Treweek J., Butcher B. and Stone D. (2022). *Biodiversity metric 3.1: Auditing and accounting for biodiversity – User Guide.* Natural England.

Stanbury et al. (2021) *The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and the Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain.* British Birds 114, pp 723–747

The UK Habitat Classification Working Group (2018) *The UK Habitat Classification: Habitat Definitions Version 1.0* at http://ecountability.co.uk/ukhabworkinggroup-ukhab

6 Figures

(overleaf)

Legend

- Site boundary
- Line of Trees
- Native Hedgerow
- Artificial hard structures
- Developed land; sealed surface
- Modified grassland
- Other woodland; broadleaved
- Tree
- Tree with bat roosting potential
- Japanese knotweed
- Cotoneaster
- Scattered scrub

BSG | ecology

OFFICE: Derbyshire
T: 01433 651869

JOB REF:

PROJECT TITLE

Bawtry Rd, Sheffield

DRAWING TITLE

Figure 1. Habitat survey plan

DATE: 21.02.2022 CHECKED: FS SCALE: 1:3,000 at A3

DRAWN: FS APPROVED: FS STATUS: FINAL

Document path

7 Photographs

Photograph 1. Overview of Site, including modified grassland, sealed surface and scattered trees at the Site entrance

Photograph 2. Disused sports pitch (modified grassland)

Photograph 3. Woodland along southern Site boundary.

Photograph 4. Line of trees and field margins along eastern Site boundary

Photograph 5. Dilapidated brick-built structure along eastern Site boundary.

Photograph 6. Hedgerow dominated by wild privet

Photograph 7. Shelter structure along north-eastern boundary.

Photograph 8. Modified grassland enclosed by hedges

Photograph 9. Scattered scrub and brash piles along eastern boundary

Photograph 10. Disused tennis courts with scattered scrub along boundaries.

Photograph 11. Old hardstanding track around the edge of the field, with encroaching vegetation.

Photograph 12. Line of trees along western boundary

Photograph 13. Waste ground where buildings once stood with scattered scrub.

Photograph 14. Japanese knotweed in south-eastern corner of the Site.

Photograph 15. Tree T1 with bat roosting potential

Photograph 16. Tree T2 with bat roosting potential

Photograph 17. Tree T3 with bat roosting potential

Photograph 18. Tree T4 with bat roosting potential

Photograph 19. Tree T5 with bat roosting potential

Photograph 20. Tree T6 with bat roosting potential

Photograph 21. Tree T7 with bat roosting potential

Photograph 22. Owl pellet within open field.

Photograph 22: Modified grassland in September

Photograph 23: grassland thatch/mown arisings

Appendix 1: Summaries of Relevant Policy, Legislation and Other Instruments

7.1 This section briefly summarises the legislation, policy and related issues that are relevant to the main text of the report. The following text does not constitute legal or planning advice.

National Planning Policy Framework (England)

7.2 The Government issued the National Planning Policy Framework (NPPF) in July 2021. Text excerpts from the NPPF are shown where they may be relevant to planning applications and biodiversity including protected sites, habitats and species.

7.3 The Government sets out the three objectives for sustainable development (economy, social and environmental) at paragraphs 8-10 to be delivered through the plan preparation and implementation level and 'are not criteria against which every decision can or should be judged' (paragraph 9). The planning system's environmental objective is 'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity…'(paragraph 8c).

7.4 In conserving and enhancing the natural environment, the NPPF (Paragraph 174) states that 'planning policies and decisions should contribute to and enhance the natural and local environment' by:

- Protecting and enhancing...sites of biodiversity value... '(in a manner commensurate with their statutory status or identified quality in the development plan)'.
- Recognising the wider benefits from natural capital and ecosystem services including trees and woodland.
- Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

7.5 In respect of protected sites, at paragraph 175, the NPPF requires local planning authorities to distinguish, at the plan level, '…between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value...take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.' A footnote to paragraph 175 refers to the preferred use of agricultural land of poorer quality if significant development of agricultural land is to take place.

7.6 Paragraph 179 refers to how plans should aim to protect and enhance biodiversity. Plans should: 'identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity [a footnote refers to ODPM Circular 06/2005 for further guidance in respect of statutory obligations for biodiversity in the planning system], wildlife corridors and stepping stones that connect them and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation;' and to 'promote the conservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.'

7.7 Paragraph 180 advises that, when determining planning applications, '…local planning authorities should apply the following principles:

- if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

- development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments) should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- development resulting in the loss or deterioration of irreplaceable habitats, (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and
- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.'

7.8 In paragraph 181, the following should be given the same protection as habitats sites:

- potential Special Protection Areas and possible Special Areas of Conservation;
- listed or proposed Ramsar sites; and
- sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.'

7.9 In paragraph 182 the NPPF refers back to sustainable development in relation to appropriate assessment and states: 'the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site'.

7.10 In paragraph 183, the NPPF refers to planning policies and decisions taking account of ground conditions and risks arising from land instability and contamination at sites. In relation to risks associated with land remediation account is to be taken of 'potential impacts on the natural environment' that arise from land remediation.

7.11 In paragraph 185 the NPPF states that planning policies and decisions should ensure that development is appropriate to the location and take into account likely effects (including cumulative) on the natural environment and, in doing so, they 'should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation' (paragraph 185c).

Government Circular ODPM 06/2005 Biodiversity and Geological Conservation (England only)

7.12 Paragraph 98 of Government Circular 06/2005 advises that "the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult Natural England before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-term protection of the species. They should also advise developers that they must comply with any statutory species' protection provisions affecting the site concerned..."

7.13 Paragraph 99 of Government Circular 06/2005[2] advises that "it is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision. The need to ensure ecological

[2] *ODPM Circular 06/2005. Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impacts within the Planning System* (2005). HMSO Norwich.

surveys are carried out should therefore only be left to coverage under planning conditions in exceptional circumstances, with the result that the surveys are carried out after planning permission has been granted".

Standing Advice (GOV.UK - England only)

7.14 The GOV.UK website provides information regarding protected species and sites in relation to development proposals: 'Local planning authorities should take advice from Natural England or the Environment Agency about planning applications for developments that may affect protected species.' GOV.UK advises that 'some species have standing advice which you can use to help with planning decisions. For others you should contact Natural England or the Environment Agency for an individual response.'

7.15 The standing advice (originally from Natural England and now held and updated on GOV.UK3) provides advice to planners on deciding if there is a 'reasonable likelihood' of protected species being present. It also provides advice on survey and mitigation requirements.

7.16 When determining an application for development that is covered by standing advice, in accordance with guidance in Government Circular 06/2005, Local planning authorities are required to take the standing advice into account. In paragraph 82 of the aforementioned Circular, it is stated that: 'The standing advice will be a material consideration in the determination of the planning application in the same way as any advice received from a statutory consultee…it is up to the planning authority to decide the weight to be attached to the standing advice, in the same way as it would decide the weight to be attached to a response from a statutory consultee.'

The Environment Act 2021

7.17 The Environment Act includes the provision of mandatory biodiversity gain for developments in England; this will be mandated through an amendment to the Town and Country Planning Act 1990. The two-year transition period following Royal Assent (November 2021) means that mandatory biodiversity gain will become law in autumn 2023. This will require:

- The provision of a required percentage of biodiversity gain, currently set nationally to be at 10%
- The use of the national Defra Biodiversity Metric to calculate the biodiversity gain, currently Metric 3.1
- The provision of a biodiversity gain plan to demonstrate how biodiversity gain will be delivered on and or off-site; statutory instruments and regulations are in preparation by Defra and Natural England to provide templates for reporting
- Biodiversity gain will be secured for a fixed period, currently nationally set at 30 years
- Demonstration of how the biodiversity gain will be secured; conservation covenants will be used to deliver this which are in preparation by Defra and Natural England
- A national register of land used for biodiversity gain will be established; this will involve setting up a new biodiversity credits market, the approach for which is in preparation by Defra and Natural England

NB. The policy basis for net gain is already set out in the NPPF. During the transition period, we would expect local planning authorities to increasingly require the measures set out within the Environment Act as part of their development decision making process.

Natural Environment and Rural Communities (NERC) Act 2006 – Habitats and species of principal importance (England)

7.18 The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Section 41 (S41) of the Act require the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England as required by the Act. In accordance with the Act the

[3] https://www.gov.uk/guidance/protected-species-how-to-review-planning-applications#standing-advice-for-protected-species

Secretary of State keeps this list under review and will publish a revised list if necessary, in consultation with Natural England.

7.19 The S41 list is used to guide decision-makers such as public bodies, including local authorities and utilities companies, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions, including development control and planning. This is commonly referred to as the 'Biodiversity Duty.'

7.20 Guidance for public authorities on implementing the Biodiversity Duty[4] has been published by Defra. One of the key messages in this document is that 'conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them.' In England the administration of the planning system and licensing schemes are highlighted as having a 'profound influence on biodiversity conservation.' Local authorities are required to take measures to "promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species. The guidance states that 'the duty aims to raise the profile and visibility of biodiversity, clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making.'

7.21 In 2007, the UK Biodiversity Action Plan (BAP) Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK Post-2010 Biodiversity Framework[5], which covers the period from 2011 to 2020, now succeeds the UK BAP. The UK priority list contained 1150 species and 65 habitats requiring special protection and has been used as a reference to draw up the lists of species and habitats of principal importance in England.

7.22 In England, there are 56 habitats of principal importance and 943 species of principal importance on the S41 list. These are all the habitats and species found in England that were identified as requiring action in the UK BAP and which continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.

European protected species (Animals)

7.23 The Conservation of Habitats and Species Regulations 2017 (as amended) consolidates various amendments that have been made to the original (1994) Regulations which transposed the EC Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Council Directive 92/43/EEC) into national law.

7.24 "European protected species" (EPS) of animal are those which are shown on Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). They are subject to the provisions of Regulation 43 of those Regulations. All EPS are also protected under the Wildlife and Countryside Act 1981 (as amended). Taken together, these pieces of legislation make it an offence to:

a. Intentionally or deliberately capture, injure or kill any wild animal included amongst these species

b. Possess or control any live or dead specimens or any part of, or anything derived from a these species

c. deliberately disturb wild animals of any such species

d. deliberately take or destroy the eggs of such an animal, or

e. intentionally, deliberately or recklessly damage or destroy a breeding site or resting place of such an animal, or obstruct access to such a place

7.25 For the purposes of paragraph (c), disturbance of animals includes in particular any disturbance which is likely—

[4] Defra, 2007. *Guidance for Public Authorities on Implementing The Biodiversity Duty*. (http://www.defra.gov.uk/publications/files/pb12585-pa-guid-english-070516.pdf)

[5] JNCC and Defra (on behalf of the Four Countries' Biodiversity Group). 2012. *UK Post-2010 Biodiversity Framework*. July 2012. (http://jncc.defra.gov.uk/page-6189)

a. to impair their ability—

i. to survive, to breed or reproduce, or to rear or nurture their young, or

ii. in the case of animals of a hibernating or migratory species, to hibernate or migrate; or

b. to affect significantly the local distribution or abundance of the species to which they belong.

7.26 Although the law provides strict protection to these species, it also allows this protection to be set aside (derogated) through the issuing of licences. The licences in England are currently determined by Natural England (NE) for development works and by Natural Resources Wales in Wales. In accordance with the requirements of the Regulations (2017, as amended), a licence can only be issued where the following requirements are satisfied:

a. The proposal is necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'

b. 'There is no satisfactory alternative'

c. The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Definition of breeding sites and resting places

7.27 Guidance for all European Protected Species of animal, including bats and great crested newt, regarding the definition of breeding and of breeding and resting places is provided by The European Council (EC) which has prepared specific guidance in respect of the interpretation of various Articles of the EC Habitats Directive.[6] Section II.3.4.b) provides definitions and examples of both breeding and resting places at paragraphs 57 and 59 respectively. This guidance states that 'The provision in Article 12(1)(d) [of the EC Habitats Directive] should therefore be understood as aiming to safeguard the ecological functionality of breeding sites and resting places.' Further the guidance states: 'It thus follows from Article 12(1)(d) that such breeding sites and resting places also need to be protected when they are not being used, but where there is a reasonably high probability that the species concerned will return to these sites and places. If for example a certain cave is used every year by a number of bats for hibernation (because the species has the habit of returning to the same winter roost every year), the functionality of this cave as a hibernating site should be protected in summer as well so that the bats can re-use it in winter. On the other hand, if a certain cave is used only occasionally for breeding or resting purposes, it is very likely that the site does not qualify as a breeding site or resting place.'

Competent authorities

7.28 Under Regulation 7 of the Conservation of Habitats and Species Regulations 2017 (as amended) a "competent authority" includes "any Minister of the Crown…, government department, statutory undertaker, public body of any description or person holding a public office.

7.29 In accordance with Regulation 9, "a competent authority must exercise their functions which are relevant to nature conservation, including marine conservation, so as to secure compliance with the requirements of the [Habitats and Birds] Directives. This means for instance that when considering development proposals a competent authority should consider whether EPS or European Protected Sites are to be affected by those works and, if so, must show that they have given consideration as to whether derogation requirements can be met.

Birds

7.30 All nesting birds are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. In addition to this, for some rarer

[6] Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC. (February 2007), EC.

species (listed on Schedule 1 of the Act), it is an offence to disturb them whilst they are nest building or at or near a nest with eggs or young, or to disturb the dependent young of such a bird.

7.31 The Conservation of Habitats and Species Regulations 2017 (as amended) places duties on competent authorities (including Local Authorities and National Park Authorities) in relation to wild bird habitat. These provisions relate back to Articles 1, 2 and 3 of the EC Directive on the conservation of wild birds (2009/147/EC, 'Birds Directive'[7]) (Regulation 10 (3)) requires that the objective is the 'preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of the upkeep, management and creation of such habitat, as appropriate, having regard to the requirements of Article 2 of the new Wild Birds Directive…' Regulation 10 (7) states: 'In considering which measures may be appropriate for the purpose of security or contributing to the objective in [Regulation 10 (3)] Paragraph 3, appropriate account must be taken of economic and recreational requirements'.

7.32 In relation to the duties placed on competent authorities under the 2017 Regulations, Regulation 10 (8) states: 'So far as lies within their powers, a competent authority in exercising any function [including in relation to town and country planning] in or in relation to the United Kingdom must use all reasonable endeavours to avoid any pollution or deterioration of habitats of wild birds (except habitats beyond the outer limits of the area to which the new Wild Birds Directive applies).'

Badger

7.33 Badger is protected under the Protection of Badgers Act 1992. It is not permitted to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it. A badger sett is defined in the legislation as "a structure or place, which displays signs indicating current use by a badger".

7.34 ODPM Circular 06/2005[8] provides further guidance on statutory obligations towards badger within the planning system. Of particular note is paragraph 124, which states that "The likelihood of disturbing a badger sett, or adversely affecting badgers' foraging territory, or links between them, or significantly increasing the likelihood of road or rail casualties amongst badger populations, are capable of being material considerations in planning decisions."

7.35 Natural England provides Standing Advice[9], which is capable of being a material consideration in planning decisions. Natural England recommends mitigation to avoid impacts on badger setts, which includes maintaining or creating new foraging areas and maintaining or creating access (commuting routes) between setts and foraging/watering areas.

Wild mammals in general

7.36 The Wild Mammals (Protection) Act 1996 (as amended) makes provision for the protection of wild mammals from certain cruel acts, making it an offence for any person to intentionally cause suffering to any wild mammal. In the context of development sites, for example, this may apply to rabbits in their burrows.

Hedgerows

7.37 Article 10 of the Habitats Directive[10] requires that 'Member States shall endeavour…to encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure…or their function as stepping stones…are essential for the migration, dispersal and genetic exchange of wild species'. Examples given in the Directive include traditional field boundary systems (such as hedgerows).

[7] 2009/147/EC Birds Directive (30 November 2009. European Parliament and the Council of the European Union.
[8] *ODPM Circular 06/2005. Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impacts within the Planning System* (2005). HMSO Norwich.
[9] http://www.naturalengland.org.uk/ourwork/planningdevelopment/spatialplanning/standingadvice/specieslinks.aspx
[10] Council Directive 92/43/EEC of 2i May 1992 on the conservation of natural habitats and of wild fauna and flora.

7.38 The aim of the Hedgerow Regulations 1997[11], according to guidance produced by the Department of the Environment[12], is "to protect important hedgerows in the countryside by controlling their removal through a system of notification. In summary, the guidance states that the system is concerned with the removal of hedgerows, either in whole or in part, and covers any act which results in the destruction of a hedgerow. The procedure in the Regulations is triggered only when land managers or utility operators want to remove a hedgerow. The system is in favour of protecting and retaining 'important' hedgerows.

7.39 The Hedgerow Regulations set out criteria that must be used by the local planning authority in determining which hedgerows are 'important'. The criteria relate to the value of hedgerows from an archaeological, historical, wildlife and landscape perspective.

Invasive non-native species

7.40 An invasive non-native species is any non-native animal or plant that has the ability to spread causing damage to the environment.

7.41 Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to release, or to allow to escape into the wild, any animal which is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state or is listed under Schedule 9 of the Act.

7.42 It is an offence to plant or otherwise cause to grow in the wild invasive non-native plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Japanese knotweed

7.43 It is an offence to plant or cause the spread of Japanese knotweed in the wild under the Wildlife and Countryside Act 1981 (as amended). All waste containing Japanese knotweed comes under the control of Part II of the Environmental Protection Act 1990.

7.44 The Environment Agency has produced "The Knotweed Code of Practice", which provides guidance on how to manage Japanese knotweed legally on development sites[13]. This document provides ecological information on Japanese knotweed, details of how to prevent its spread, how to manage Japanese knotweed and information on disposal. Natural Resources Wales refers to Environment Agency guidance in respect of landowners responsibilities in Wales and to the Wildlife and Countryside Act 1981 (as amended).

[11] Statutory Instrument 1997 No. 1160 – The Hedgerow Regulations 1997. HMSO: London
[12] The Hedgerow Regulations 1997: a guide to the law and good practice, HMSO: London
[13] *Managing Japanese knotweed on development sites: the knotweed code of practice* (2006). Environment Agency. https://www.gov.uk/government/publications/japanese-knotweed-managing-on-development-sites. See also 2013 Code of Practice update.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: ES25
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☒ No ☐

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Support Draft Allocation of site ES25, Land at Bawtry Road. Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To support the allocation and ensure that any objections are responded to appropriately.

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: AS1
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☐ No ☒

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

It is suggested that the wording of the policy could be improved to make it clear that this is not a density policy, but is concerned about controlling potential secondary uses in any particular policy zones

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To discuss the relevant issues

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: ES1
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☐ No ☒

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

The policy should be amended to be flexible enough to allow deviations, where this is reasonable and justified by either practical or viability concerns.

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To discuss the relevant issues

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: NC3
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☐ No ☒

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

It is suggested that Part b) is amended to suggest that the indicated proportions are a starting point for negotiations, and to add a reference to the (then current) SHMA to inform any discussion.

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To discuss the relevant issues

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: NC4
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☐ No ☒

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

The policy should be amended to reduce the proportions of M4(2) and M4(3) to find a better balance between making efficient use of the urban land resource and securing suitably accessible and adaptable housing.

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To discuss the relevant issues

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.

Sheffield Plan Consultation Representation Form January – February 2023

Please use this form to provide representations on the Sheffield Local Plan. Sheffield City Council must receive representations by **5pm on 20th February 2023**. Only those representations received by that time have the statutory right to be considered by the inspector at the subsequent examination.

Responses can be submitted via

- the electronic version of the comment form which can be found on the Council's web site at: https://haveyoursaysheffield.uk.engagementhq.com/draft-local-plan
- an e-mail attachment: sheffieldplan@sheffield.gov.uk
- post to: **Strategic Planning Team, Planning Service, 4th Floor, Howden House, Sheffield S1 2SH**

Please note:

- Representations must only be made on the basis of the legal compliance, compliance with the Duty to Co-operate and/or soundness of the Plan.

Please read the guidance note, attached or available on the Council's webpage##, before you make your representations. The Local Plan and the proposed submission documents, and the evidence base are also available to view and download from the Council's Local Plan webpage:

Data Protection Notice:
Under the General Data Protection Regulation 2016 (GDPR) and Data Protection Act 2018 (DPA) Sheffield City Council is a Data Controller for the information it holds about you. The lawful basis under which the Council uses personal data for this purpose is consent.

All representations are required to be made public and will be published on the Council's website following this consultation. Your representations and name/name of your organisation will be published, but other personal information will remain confidential. Your data and comments will be shared with other relevant agencies involved in the preparation of the local plan, including the Planning Inspectorate. Anonymous responses will not be considered. Your personal data will be held and processed in accordance with the Council's Privacy Notice which can be viewed at: https://www.sheffield.gov.uk/utilities/footer-links/privacy-notice

Due to the Data Protection Act 2018, Sheffield City Council now needs your consent to hold your personal data for use as part of the Sheffield Plan process. If you would like the Council to keep you informed about the Sheffield Plan, we need to hold your data on file. Please tick the box below to confirm if you would like to 'opt in' to receive information about the Sheffield Plan. Note that choosing to 'opt in' will mean that the Council will hold your information for 2 years from the 'opt in' date. At this time we will contact you to review if you wish to 'opt in' again. You can opt-out at any time by emailing sheffieldplan@sheffield.gov.uk or by calling 0114 2735897.

Please tick/ delete as appropriate:

Please confirm you have read and understood the terms and conditions relating to GDPR.

Yes ☒

No ☐

Please tick as appropriate to confirm your consent for Sheffield City Council to publish and share your name/ organisation and comments regarding the Sheffield Plan.

I confirm my consent for Sheffield City Council to share my name/ organisation and comments regarding the Sheffield Plan including with the Planning Inspectorate.

Yes ☒

No ☐

Please tick as appropriate below if you wish to 'opt in' and receive updates and information about the Sheffield Plan.

I would like to opt in to receive information about the Sheffield Plan.

Yes ☒

No ☐

Printed Name: Matthew Sheppard

Signature: Matthew Sheppard

Date: 20 February 2023

This form has two parts:
Part A - Personal details – need only to complete once.
Part B - Your representation(s) - Please fill in a separate sheet for each representation you wish to make.

Part A- Personal Details

1. Personal Details

Name: Barratt and David Wilson Homes Sheffield
Organisation (if applicable):
Address: c/o Agent
Postcode:
Tel:
Fax:
Email:

2. Agent Details (if applicable)

Agent: Matthew Sheppard
Organisation (if applicable): Sheppard Planning
Address: [redacted]
Postcode: [redacted]
Tel: [redacted]
Fax:
Email: [redacted]

Part B - Your representation

Please use a separate sheet for each representation and return along with a single completed Part A.

Name or Organisation: Barratt and David Wilson Homs Sheffield

3. **To which part of the Sheffield Plan does your representation relate?**

Policy Number: NC8
Paragraph Number:
Policies Map:

4. **Do you consider the Sheffield Plan is:**

   Tick all that apply, please refer to the guidance note for an explanation of these terms.

   4.(1) Legally Compliant Yes ☒ No ☐

   4.(2) Sound Yes ☐ No ☒

   4.(3) Complies with the Duty to Cooperate Yes ☒ No ☐

5. **Please give details of why you consider the Sheffield Plan is not legally compliant or is unsound or fails to comply with the duty to co-operate. Please be as precise as possible.** If you wish to support the legal compliance or soundness of the Sheffield Plan or its compliance with the duty to co-operate, please also use this box to set out your comments.

Please see Supporting Statement

Continue on a separate sheet if necessary

6. **Please set out the modification(s) you consider necessary to make the Sheffield Plan legally compliant and sound, in respect of any legal compliance or soundness matters you have identified in Question 5 above.**

(Please note that non-compliance with the duty to co-operate is incapable of modification at examination). You will need to say why each modification will make the Sheffield Plan legally compliant or sound. It will be helpful if you are able to put forward your suggested revised wording of any policy or text. Please be as precise as possible.

The policy should be amended to allow flexibility around compliance with NDSS. This could help to find a better balance between making efficient use of the urban land resource and securing new housing with appropriate amenity space.

Continue on a separate sheet if necessary

Please note: In your representation you should provide succinctly all the evidence and supporting information necessary to support your representation and your suggested modification(s). You should not assume that you will have a further opportunity to make submissions.
After this stage, further submissions may only be made if invited by the Inspector, based on the matters and issues they identify for examination.

7. **If your representation is seeking a modification to the plan, do you consider it necessary to participate in examination hearing session(s)?**

Yes, I wish to participate in hearing session(s) Yes ☒

No, I do not wish to participate in hearing session(s) No ☐

8. **If you wish to participate in the hearing session(s), please outline why you consider this to be necessary:**

To discuss the relevant issues

Please note that the inspector will make the final decision as to who is necessary to participate in hearing sessions, and to which hearing session(s) they should attend, and they will determine the most appropriate procedure to adopt to hear those who wish to participate at the examination hearings.