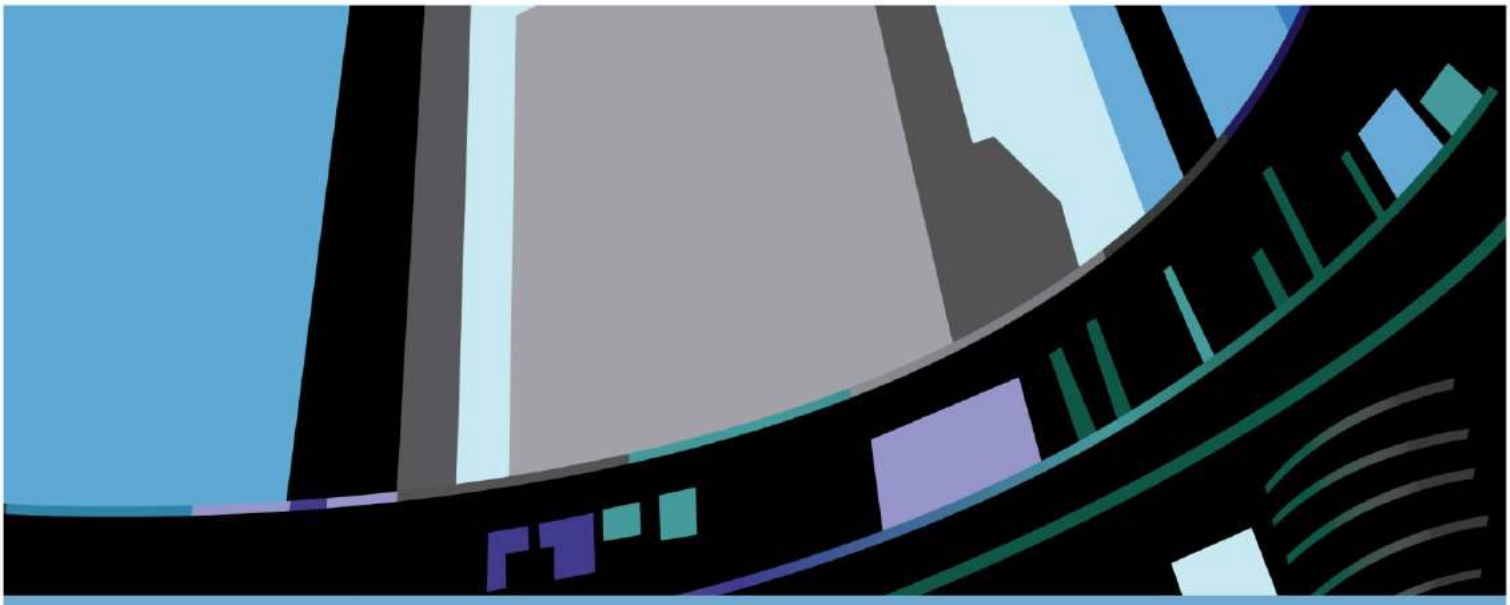
APPENDIX F

DRAINAGE NOTE



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Report

Scoping Flood Risk & SuDS Assessment

Project: Kingswood, Wotton-under-Edge

Client: Redrow Homes South West

Reference: M43134-JNP-XX-XX-RP-C-1001

Date: January 2020

Leamington Spa

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Scoping Flood Risk & SuDS Assessment

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FOR AND ON BEHALF OF JNP GROUP

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1 INTRODUCTION

1.1 Terms of Reference

1.1.1 jnpgroup have been commissioned by Redrow Homes South West to prepare a scoping flood risk & SuDS assessment for the development site in Kingswood, Wotton-under-Edge, Stroud, Gloucestershire.

1.1.2 The aim of this scoping flood risk & SuDS assessment is to support allocation of the site for development within the Local Plan. This report preliminarily assesses flood risk at the development site from all potential sources and is based on readily available topographic, geologic and hydrologic data covering the area of interest.

1.2 Key Stakeholders and Policy Framework

1.2.1 The *National Planning Policy Framework* (NPPF) (February 2019) sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed.

1.2.2 In areas at risk of flooding or for sites of 1 ha or more, developers must undertake a site-specific flood risk assessment to accompany applications for planning permission (or prior approval for certain types of permitted development).

1.2.3 In decision-taking, local planning authorities must ensure a sequential approach to site selection and master planning is followed so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk.

1.2.4 Where development needs to be in locations where there is a risk of flooding, local planning authorities and developers must ensure development is appropriately flood resilient and resistant, safe for its users for the development's lifetime, and will not increase flood risk elsewhere.

1.2.5 The Environment Agency (EA) are a statutory consultee on applications where there is a risk of flooding from the sea or main rivers.

1.2.6 Lead local flood authorities (unitary authorities or county councils) are responsible for managing local flood risk from ordinary watercourses, surface water or groundwater, and for preparing local flood risk management strategies. Local planning authorities work with lead local flood authorities to ensure local planning policies are compatible with the local flood risk management strategy.

1.2.7 Gloucestershire County Council (GCC) are the lead local flood authority (LLFA) and its strategy for managing local flood risk is set out in *Local Flood Risk Management Strategy* (Summer 2014) and *Gloucestershire SuDS Design & Maintenance Guide* (November 2015).

1.2.8 Stroud District Council (SDC) are the local planning authority (LPA) and its policies on flood risk management are set out in *Stroud District Local Plan* (November 2015). The key policies are:

- **SO5 (Climate Change and Environmental Limits)**: "*Minimising and mitigating against future flood risks, recycling water resources and protecting and enhancing the quality of surface and ground water resources"*;
- **ES4 (Water Resources, Quality and Flood Risk)**: "*In considering proposals for development SDC will weigh up all the relevant policy issues when considering the Sequential Test and implementing the Exception Test where necessary. Applications will be supported by Flood Risk Assessments where appropriate that demonstrate the development will be safe, not increase flood risk elsewhere and maximise opportunities to reduce flood risk*".

1.3 Sources of Information

1.3.1 This scoping flood risk & SuDS assessment has been based on the following sources of information:

- DEFRA / EA's LiDAR topographic data (2 m resolution) (DATA.GOV.UK);
- BGS' geologic data (1:50 000) (Geology of Britain Viewer);
- Cranfield University's soils data (Soilscapes);
- DEFRA / EA's aquifer and source protection data (MAGiC);
- FEH's catchment data (FEH Web Service);
- EA's *Flood Map for Planning* (GOV.UK) and *Long Term Flood Risk Information* (GOV.UK);
- GCC and SDC's *(Level 1) Strategic Flood Risk Assessment* (September 2008);
- SDC's *(Level 2) Strategic Flood Risk Assessment* (March 2012 and March 2014).

2 DEVELOPMENT SITE

2.1 Location

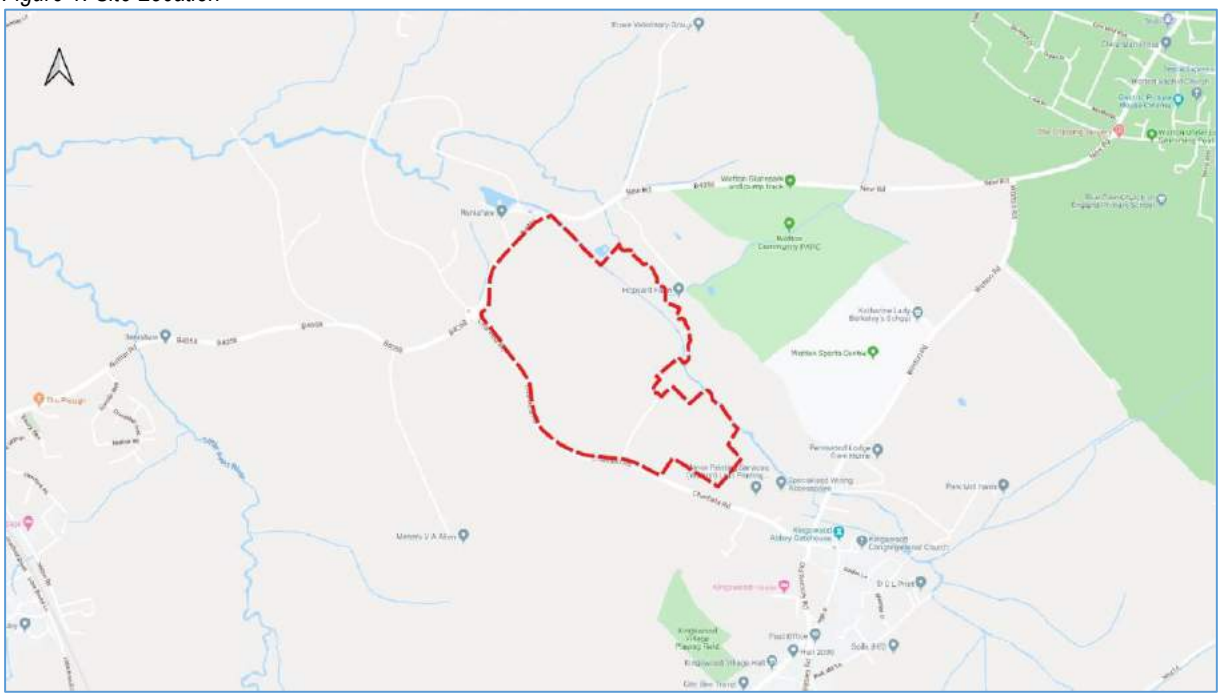
2.1.1 The 26.7 ha development site is located north-west of the village of Kingswood, south-west of Wotton-under-Edge, Stroud, Gloucestershire (Table 1, Figure 1 and Appendix A).

2.1.2 The greenfield site is bounded by the B4058 and an industrial estate to the north-west, the Marlees Brook and mill race to the north-east, Kingswood village to the south-east and the B4062 (Charfield Road) and open fields to the south-west.

Table 1: Site Location

OS X (Eastings)	OS Y (Northings)	Nearest Post Code	National Grid Reference
374090	192530	GL12 8JS	ST 74090 92530

Figure 1: Site Location



2.2 Topography

2.2.1 The available topographic information (Appendix A) shows that ground levels within the development site range between 35 m AOD and 50 m AOD, falling steeply (~1:20) towards two prominent overland flow paths across the site. These are:

- The Marlees Brook flowing south-east to north-west along the site's north-eastern boundary; and
- The Charfield Road valley falling south-east to north-west along the site's south-western boundary.

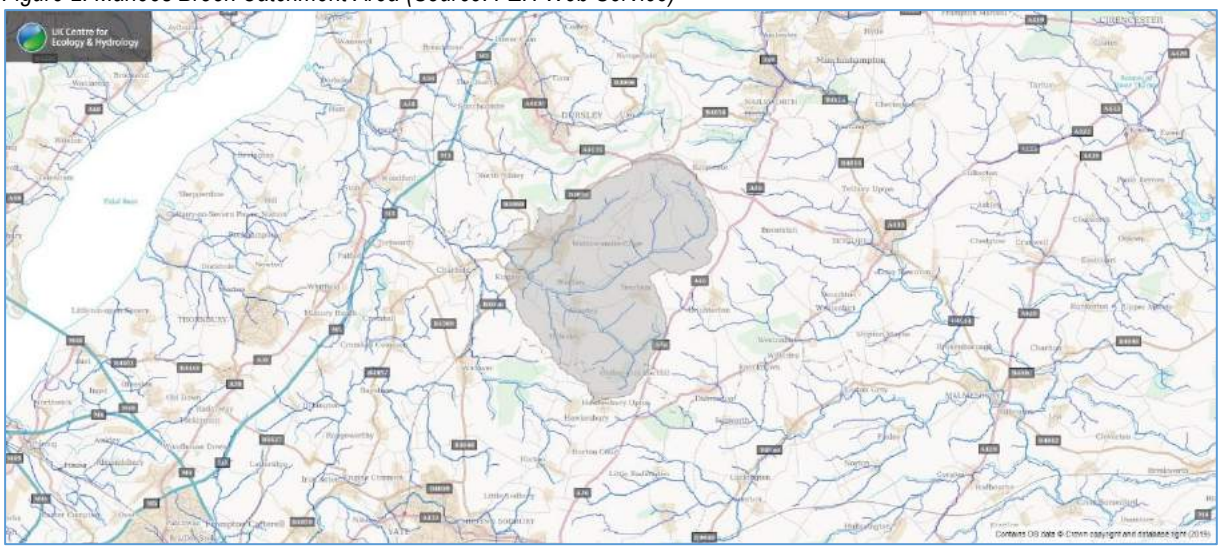
2.3 Hydrology

2.3.1 The Marlees Brook is a tributary of the River Little Avon and flows south-east to north-west along the north-eastern boundary of the development site. It is classified by the EA as a 'main river' and defines a total catchment area of 48.26 km² at the point where it leaves the site under the B4058 (Figure 2 and Appendix A).

2.3.2 The Marlees Brook feeds a mill race flowing south-east to north-west through the north-eastern part of the site towards the industrial estate to the north-west.

2.3.3 Immediately downstream of the development site (north of the B4058), the Charfield Road valley becomes an 'ordinary watercourse' flowing north through the adjacent industrial estate towards the Marlees Brook. The Charfield Road valley has an estimated catchment area of 0.51 km².

Figure 2: Marlees Brook Catchment Area (Source: FEH Web Service)



2.4 Geology and Hydrogeology

2.4.1 In accordance with BGS' *Geology of Britain Viewer* (Appendix A), the development site lies on mudstone bedrock (Blue Lias Formation and Charmouth Mudstone Formation) overlain by superficial deposits of clay, silt, sand and gravel (Alluvium) near the Marlees Brook main channel. Cranfield University's *Soilscapes* (Appendix A) describes the site's soils as "*lime-rich loamy and clayey soils with impeded drainage*".

2.4.2 DEFRA / EA's *MAGiC* describes the site's superficial deposits as a Secondary A aquifer and its bedrock as Unproductive Strata (Appendix A). The site is not in a source protection zone.

2.4.3 Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, in some cases forming an important source of base flow to rivers.

2.4.4 Unproductive Strata are layers of rock or drift deposits with low permeability that have a negligible significance for water supply or river base flow.

2.4.5 Based on the available geologic and hydrogeologic information, namely soil cohesiveness, infiltration drainage is unlikely to be feasible at the development site. Nevertheless, this should be confirmed through bespoke soakaway testing (BRE 365).

2.5 Proposed Development

2.5.1 The proposed development envisages a new residential neighbourhood of approximately 23.5 hectares.

2.5.2 Under *Table 2* of the *Flood Risk and Coastal Change Guidance* (March 2014), the proposed residential development is classified as 'more vulnerable'.

3 FLOOD RISK ASSESSMENT

3.1 Overview

3.1.1 All forms of flooding should be treated consistently when mapping probability and assessing vulnerability to apply the sequential approach to the location of development.

3.1.2 All potential sources of flood risk to the development site have been assessed based on the information listed in Section 1.3 and are summarised in Table 2. The key sources of flood risk to the proposed development are further described in the ensuing sections.

Table 2: Potential Sources of Flood Risk

Source	Flood Risk at Site
Coastal	*No risk. Site levels > 35 m AOD.*
Fluvial	Low risk in most of the site, but medium to high risk near the Marlees Brook and mill race.
Surface Water	Very low risk in most of the site, but low to high risk along the two prominent overland flow paths (Marlees Brook and Charfield Road valley).
Groundwater	Undetermined risk. Available topographic and geologic information suggest very low risk of groundwater emergence within the site.
Sewers	*No risk. There are no (known) sewers on site and the local topography ensures overland flows from off-site sewers will flow away from the site without posing a flood risk.*
Infrastructure Failure	*No risk. No embanked reservoirs or canals upstream or near the site.*

3.2 Climate Change

3.2.1 The *NPPF* sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

3.2.2 In accordance with the EA's guidance *Flood Risk Assessment: Climate Change Allowances* (February 2016), the proposed development with anticipated life span into the 2080's (2070 to 2115) must take account of the following allowances:

- Peak River Flows (Severn river basin district)
  - Central 25%
  - **Higher Central 35%**
  - **Upper End 70%**
- Peak Rainfall Intensity
  - Central 20%
  - **Upper End 40%**

3.2.3 *UKCP18* (November 2018) is the official source of information on how the climate of the UK may change over the rest of this century. However, the above allowances are still the best national representation of how climate change is likely to affect peak river flows and peak rainfall intensities until new advice is published.

3.3 Fluvial Flood Risk

3.3.1 Fluvial flooding occurs when a catchment area receives greater than usual amounts of water (e.g. rainfall or snow melt). When the converging runoff exceeds the conveyance capacity of the receiving channel, water spills onto the surrounding floodplains and fluvial flooding occurs.

3.3.2 Fluvial flooding usually occurs hours or days after heavy and / or prolonged rainfall and its effects often last several hours or days.

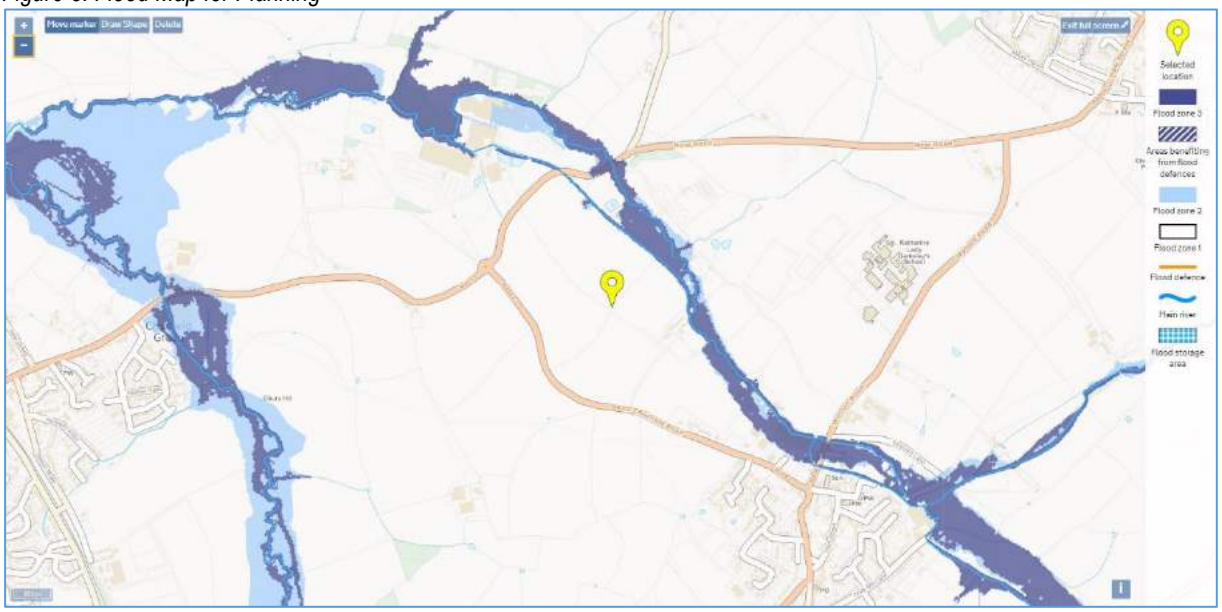
3.3.3 Besides posing a direct flood risk to floodplain areas, high water levels in watercourses can exacerbate other sources of flood risk by surcharging / locking outfalls, thus preventing the normal discharge of flows or even back flowing into tributary drainage systems.

3.3.4 In accordance with the EA's *Flood Map for Planning* (Figure 3 and Appendix B), most of the development site is in Flood Zone 1 (< 0.1% Annual Exceedance Probability). However, a small part of the site near the Marlees Brook and mill race along the north-eastern boundary is in Flood Zone 2 (0.1% to 1.0% AEP) and Flood Zone 3 (> 1.0% AEP).

3.3.5 Flooding is confined to the low-lying corridor along the site's north-eastern boundary (Marlees Brook valley). The steep valley ensures most of the development site is safe from flooding even in the most extreme event (0.1% AEP).

3.3.6 The site does not benefit from any formal flood defences.

Figure 3: Flood Map for Planning



3.3.7 Fluvial flood zones in GCC's Web Maps (Appendix B) are broadly in line with the EA's *Flood Map for Planning* and do not provide any significant additional information.

3.3.8 The EA's recorded flood outlines (Appendix B) show that the Marlees Brook flooded in 1968, with a recoded flood outline also in line with the flood extents in *Flood Map for Planning*.

3.3.9 The development site is not covered by the EA's flood warning system.

3.3.10 The likely requirements of a site-specific flood risk assessment and the management measures envisaged to deal with fluvial flood risk at the development site are described in Section 4.2.

3.4 Surface Water Flood Risk

3.4.1 Surface water flooding is a description for excessive overland flows that have yet to enter a natural or manmade receptor (e.g. aquifer, watercourse or sewer). Surface water flooding also occurs when the amount of runoff exceeds the capacity of the collecting system and spills onto overland flow routes.

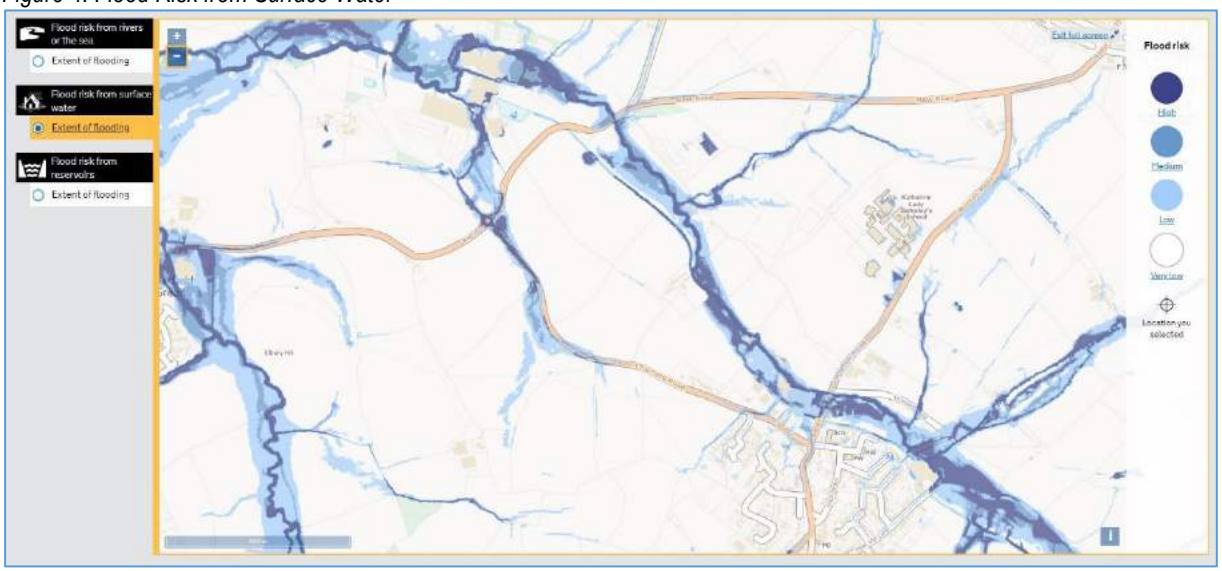
3.4.2 Surface water flooding is usually the result of very intense, short lived rainfall events, but can also occur during milder, longer lived rainfall events, when the ground is saturated or collecting systems are at capacity, resulting in the inundation of low points in the terrain.

3.4.3 In accordance with the EA's Long Term Flood Risk Information (Figure 4 and Appendix B), most of the development site is at very low (< 0.1% AEP) risk of surface water flooding. However, small parts of the site near the Marlees Brook and mill race and the Charfield Road valley are at low (0.1% to 1.0% AEP), medium (1.0% to 3.3% AEP) and high (> 3.3% AEP) risk of surface water flooding.

3.4.4 As shown by the similar flood extents (Figure 3 and Figure 4) fluvial and surface water flood risk near the Marlees Brook and mill race are intertwined and expected to be the result of longer lived (> 6 h) rainfall events necessary to concentrate runoff from the larger (48.26 km²) catchment area.

3.4.5 Given the small (0.51 km²) and steep catchment area, surface water flood risk along Charfield Road (valley) is expected to be the result of very intense, short lived rainfall events (i.e. flash flooding).

Figure 4: Flood Risk from Surface Water



3.4.6 GCC and SDC's strategic flood risk assessments do not add any information with regards to quantifying surface water flood risk but confirm instances of localised flooding in the area (Charfield and Kingswood) due to undersized watercourses / roadside ditches and culverts.

3.4.7 The likely requirements of a site-specific flood risk assessment and the management measures envisaged to deal with surface water flood risk at the development site are described in Section 4.3.

3.5 Groundwater Flood Risk

3.5.1 Groundwater flooding occurs when the level of water filling the pores and / or cracks in the underlying soil and / or rock (i.e. water table) rises and emerges on the surface. The level of the water table varies seasonally and depends upon long-term rainfall, thickness and porosity of the underlying strata and groundwater abstraction.

3.5.2 Groundwater flooding is most common in areas where the underlying bedrock and / or superficial deposits are very porous, but it can also happen at locations where superficial layers of sand and gravel overlay impermeable bedrock.

3.5.3 Groundwater flooding usually occurs after days or weeks of prolonged rainfall and often lasts for days or weeks, as subsiding of the water table can be a very slow process.

3.5.4 Besides posing a direct flood risk to developments (particularly basements), high water table levels can exacerbate other sources of flood risk by preventing infiltration and / or leaking into drainage systems.

3.5.5 In accordance with GCC's *Local Flood Risk Management Strategy*, the development site is in an area with low (<25%) susceptibility to groundwater flooding (Appendix B). GCC and SDC's strategic flood risk assessments indicate that there are no recorded incidents of groundwater flooding in the area.

3.5.6 Given the site's topography and geology, the risk of groundwater emergence outside of the areas at risk of fluvial and / or surface water flooding is deemed very low and unlikely to require management measures. Nevertheless, the presumed very low risk of groundwater flooding should be confirmed through bespoke ground investigation.

4 FLOOD RISK MANAGEMENT

4.1 The Sequential and Exception Tests

4.1.1 The sequential, risk-based approach to the location of development is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim is to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible.

4.1.2 Application of the sequential approach in the master planning process, namely application of the *Sequential Test*, helps ensure that development can be safely and sustainably delivered, and developers do not waste resources promoting proposals which are inappropriate on flood risk grounds.

4.1.3 The *Sequential Test* ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The aim is to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the *Exception Test* if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the *Exception Test* if required.

4.1.4 *Table 2* of the *Flood Risk and Coastal Change Guidance* categorises different types of uses and development according to their vulnerability to flood risk. *Table 3* of the *Flood Risk and Coastal Change Guidance* (Table 3) maps these vulnerability classes against flood zones to indicate where development is appropriate and where it should not be permitted.

4.1.5 It is important to note that application of the sequential approach at site level does not automatically satisfy the *Sequential Test*. Some guidance on how to satisfy the *Sequential Test* is provided in SDC's *Flood Risk Sequential Test* (November 2014).

Table 3: Flood Risk Vulnerability and Flood Zone Compatibility

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

Key:
✓ Development is appropriate
× Development should not be permitted

4.1.6 The *Exception Test* is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situation where suitable sites at lower risk of flooding are not available.

4.1.7 Essentially, the two parts of the *Exception Test* require proposed development to show that it will:

- Provide wider sustainability benefits to the community that outweigh flood risk; and
- Be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

4.1.8 The ensuing sections describe how the sequential approach to the location of development and, where necessary, the second part of the *Exception Test* can be implemented in the proposed development's master planning.

4.2 Fluvial Flood Risk

4.2.1 The requirements of a site-specific (fluvial) flood risk assessment should be discussed as soon as possible with the key stakeholders in the planning process: Environment Agency, Gloucester County Council and Stroud District Council.

4.2.2 The level of detail in the EA's *Flood Map for Planning* flood extents suggests the existence of a 1D-2D model of the Marlees Brook and mill race and flood levels along the site's north-eastern boundary should be obtainable from the EA under a freedom of information request.

4.2.3 The site-specific assessment would have to consider the latest climate change allowances of 35% (higher central) and 70% (upper end) (refer to Section 3.2). Unless the latest climate change allowances have already been considered in the EA's model of the Marlees Brook, this would require:

- Establishing relationships between peak water levels and peak flows (*stage x discharge*) along the watercourse and interpolating flood levels for the climate change events (i.e. intermediate approach); or
- Rerunning the existing model with inflows increased by 35% and 70% (detailed approach).

4.2.4 Once appropriate fluvial flood extents / zones are established in accordance with the *National Planning Policy Framework* (NPPF), the "*more vulnerable*" residential development being proposed should be placed in Flood Zone 1 (i.e. outside Flood Zones 2 and 3).

4.2.5 Subject to passing a *Sequential Test* demonstrating that land in Flood Zone 1 is not available, development may be placed in Flood Zone 2, provided it is made safe for its lifetime.

4.2.6 Development in Flood Zone 3 would require passing an *Exception Test* demonstrating that:

- The proposed development provides wider benefits that outweigh flood risk;
- The proposed development can be made safe for its lifetime without increasing flood risk elsewhere.

4.2.7 The second part of the *Exception Test* typically involves demonstrating that any floodplain impingement required by the proposed development can be compensated on site on a level-by-level and volume-by-volume manner.

4.2.8 For the purpose of this scoping flood risk assessment, the 0.1% AEP fluvial flood extent has been used as a proxy for the 1.0% AEP + 70% climate change fluvial flood extent to help establish the site's total developable area of approximately 23.5 ha (Appendix C). As mentioned in Section 3.3, the steep valley ensures most of the development site is safe from flooding even in the most extreme events (e.g. 0.1% AEP) and flooding is expected to be confined to the low-lying corridor along the site's north-eastern boundary (Marlees Brook valley).

4.3 Surface Water Flood Risk

4.3.1 As mentioned in Section 3.4, surface water flood risk in the area near the Marlees Brook and mill race (north-eastern boundary) is intertwined with fluvial flood risk and the envisaged sequential approach to locate development in Flood Zone 1 (i.e. outside Flood Zones 2 and 3) will address both sources of flood risk in that area.

4.3.2 The sequential approach should also be followed to steer development away from the area at risk of surface water flooding along the Charfield Road valley. The 0.1% AEP surface water flood extent has been used as a proxy for the 1.0% AEP + 40% climate change surface water flood extent to help establish the site's developable area of approximately 23.5 ha (Appendix C).

4.3.3 The envisaged surface water drainage strategy (Section 5) will manage runoff generated on site and help reduce surface water flood risk off-site, namely at Charfield Road and the B4058.

5 CONCEPTUAL SURFACE WATER DRAINAGE STRATEGY

5.1 Existing Drainage (Greenfield Runoff)

5.1.1 The undeveloped (greenfield) development site does not benefit from a formal surface water drainage system. Runoff generated within the site is expected to either infiltrate into the ground or flow overland towards the two prominent overland flow paths around the site (Marlees Brook and mill rate to the north-east and Charfield Road valley to the south-west).

5.1.2 Greenfield runoff rates of 4.3 l/s/ha (100.0% AEP), 5.1 l/s/ha (Q_{BAR}), 10.1 l/s/ha (3.3% AEP) and 13.2 l/s/ha (1.0% AEP) have been established for the development site using the *IH124* methodology and the *ICP SuDS* correction for small catchments (Appendix D).

5.2 Proposed Drainage

5.2.1 The conceptual surface water drainage strategy (Appendix D) has been designed in compliance with the *NPPF*, GCC's *SuDS Design & Maintenance Guide* and current best practices to attenuate runoff from all impermeable areas (17.6 ha) before discharge into the nearby open water bodies (i.e. Marlees Brook / mill race and Charfield Road drainage ditches) associated with the area's prominent overland flow paths, thus mimicking / formalising the existing drainage arrangement.

5.2.2 Discharge to the Charfield Road drainage ditches adjacent to the site is subject to confirmation of adequate connectivity between the ditches and the ordinary watercourse downstream (north) of the B4058.

5.2.3 Given the likely unfeasibility of infiltration drainage (Section 2.4), the proposed drainage strategy is based on the second best option for disposal of surface water runoff, i.e. controlled discharge into an open water body. As the volume of runoff leaving the proposed development cannot be reduced to greenfield values without infiltration, the excess runoff volume must be discharged at a low rate that will not pose a flood risk downstream of the site. The proposed drainage strategy has been preliminarily designed to limit the total off-site peak discharge to the greenfield Q_{BAR} rate of 89.9 l/s (5.1 l/s/ha of impermeable area), which should reduce surface water flood risk along Charfield Road and the B4058.

5.2.4 It is important to note that the conceptual drainage strategy is in line with the current level of detail of the proposed development and is merely intended to set out outline measures to demonstrate that surface water flood risk can be managed on site without increasing flood risk elsewhere.

5.2.5 The total impermeable area of 17.6 ha has been assumed to equal 75% of the total developable area of 23.5 ha. This includes 10% of roads, 45% of other impermeable areas, 10% urban creep allowance and 10% soft landscaping allowance.

5.2.6 Attenuation volumes for the 1% AEP + 40% climate change allowance standard of design have been established using (Innovyze) Micro Drainage's *Source Control (Quick Storage Estimate)*. The calculations used FEH rainfall (2013) and assumed detention basins with maximum water depth of 1.2 m and 1:3 banks. Based on the conceptual design (Appendix D), the detention basins are expected to take approximately 2.0 ha (~8.5%) of the total developable area (including 10% allowances for urban creep and soft landscaping).

Table 4: Conceptual Surface Water Drainage Strategy (Summary)

Sub-Catchment	Area (ha)		Greenfield Q_{BAR} (l/s)	Attenuation Volume (m^3)
	Developable	Impermeable		
Marlees Brook	3.9	2.9	14.8	2,118 ~ 2,751
Mill Race	11.0	8.2	41.8	5,992 ~ 7,780
Charfield Road	8.6	6.5	33.2	4,747 ~ 6,165

Total	***23.5***	***17.6***	***89.8***	***12,857 ~ 16,696***

5.3 Sustainable Drainage Systems (SuDS)

5.3.1 In accordance with the *NPPF*, (major) developments should incorporate sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate. In addition to water quantity control, SuDS should consider opportunities to provide water quality and amenity / biodiversity benefits (i.e. multifunctionality approach).

5.3.2 While the conceptual drainage strategy is largely reliant on detention basins to manage runoff quantity, Table 5 shortlists other SuDS deemed compatible with the site's characteristics and which inclusion in the proposed development must be continuously assessed throughout the master planning process.

5.3.3 It is important to note the need to remove silt from runoff prior to discharge into detention basins or attenuation storage tanks. SuDS such as filter drains, swales, bioretention systems and pervious pavements are sustainable alternatives to proprietary treatment systems otherwise required to manage silt.

Table 5: Sustainable Drainage Systems (SuDS)

SuDS Component	Description and Opportunities
Green / Blue Roofs	Green roofs are areas of living vegetation installed on the top of buildings for a range of reasons including visual benefit, ecological value, enhanced building performance and reduction of surface water runoff. A blue roof is a roof designed explicitly to store water for use within the building (rainwater harvesting) or controlled discharge. Green roofs that include reservoir storage zones beneath the growing medium could also be considered blue roofs. Green roofs can improve the thermal performance of buildings, help combat the urban heat island effect and contribute to improved air quality. Through evapotranspiration, green roofs can reduce peak flow rates to a site drainage system (principally for small and medium-sized events) but are unlikely to a have a significant impact on downstream attenuation storage requirements. Blue roofs can be designed to provide significant attenuation (and evapotranspiration).
Filter Drains/Strips	Filter drains are trenches filled with stone/gravel that create temporary subsurface storage for the filtration, attenuation and conveyance of surface water runoff. Ideally, filter drains receive lateral inflow from adjacent impermeable surfaces pre-treated over a filter strip. Filter drains can help manage peak flows by naturally limiting rates of conveyance through the filter medium and by providing attenuation storage when the rate of flow at the outlet is controlled. Filter drains can be effectively incorporated into the landscape and public open spaces and can have minimal land-take requirements. The use of filter drains is typically restricted to flat sites (unless placed parallel to contours). Filter drains are best located adjacent to (small) impermeable surfaces such as car parks and roads / highways.
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to treat, convey and often attenuate surface water runoff. Swales can also provide aesthetic and biodiversity benefits. Swales can help reduce flow rates by facilitating infiltration and / or providing attenuation storage when flow at the outlet is controlled. Coarse to medium sediments and associated pollutants can be removed by filtration through surface vegetation and ground cover. Swales are well suited for managing runoff from linear features such as main roads / highways. Swales are generally difficult to incorporate into dense urban developments, where space is limited.
Bioretention Systems	Bioretention systems (including rain gardens) are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution. They also provide attractive landscape features and biodiversity. Bioretention systems can help reduce flow rates from a site by promoting infiltration / evapotranspiration and providing some attenuation storage. Bioretention systems can also provide very effective treatment functionality. Bioretention systems are a very flexible surface water management component that can be integrated into a wide variety of developments / densities using different shapes, materials, planting and dimensions.

SuDS Component	Description and Opportunities
Pervious Pavements	Pervious pavements provide a pavement suitable for pedestrian and / or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before use, infiltration to the ground or controlled discharge downstream. Pervious pavements help reduce flow rates from a site by providing attenuation storage. A flow control structure is required to constrain the rate of water discharged from the sub-base via an outlet pipe. Pervious pavement drainage has been shown to have decreased concentrations of a range of surface water pollutants, including heavy metals, oil and grease, sediment and some nutrients. Pervious pavements are typically built as an alternative to impermeable surfaces and therefore require no extra development space for their construction.
Detention Basins	Detention basins are landscaped depressions that are normally dry expect during and immediately following storm events. They can be on-line components where surface runoff from regular events is routed through the basin or off-line components into which runoff is diverted once flows reach a specific threshold. Detention basins can be vegetated depressions (providing treatment in on-line components) or hard landscaped storage areas. Off-line basins will normally have an alternative principal use (e.g. amenity or recreational facility or urban (hard) landscaping).
Attenuation Storage Tanks	Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before use, infiltration or controlled release. Attenuation storage tanks can help reduce flow rates from a site by providing significant attenuation storage. Storage tanks do not provide any form of treatment of surface water runoff and therefore need to be combined in a "management train" with other methods that do provide suitable treatment of all relevant pollutants (coarse sediment must always be removed upstream of a storage tank). The inherent flexibility in size and shape of the typical attenuation storage tank systems means that they can be tailored to suit the specific characteristics and requirements of any site. However, the lack of amenity and biodiversity benefits means that storage tanks should be a last resource in any surface water drainage strategy for a major development.

5.4 Exceedance Events

5.4.1 Events exceeding the design standard of protection of the proposed surface water drainage strategy (1.0% AEP + 40% climate change) are expected to overflow from the proposed infrastructure at / near the detention basins (i.e. lowest areas).

5.4.2 The estimated overland flow routes for exceedance events are shown in Appendix D. Overland flows resulting from exceedance events are expected to leave the developed site via the same routes as in the pre-development conditions, without posing any significantly increased flood risk off-site.

5.5 Water Quality Management

5.5.1 The suitability of the proposed drainage strategy to manage the development's pollution risk will have to be appropriately assessed as design progresses. Table 6 illustrates application of the *SuDS Manual* (2015) simple index approach to the typical treatment trains expected in the proposed development.

5.5.2 While detention basins should provide enough treatment for the envisaged very low / low sources of pollution, SuDS such as pervious pavements can provide an additional level of treatment closer to the source of runoff / pollution and are sustainable alternatives to proprietary treatment systems otherwise required to manage silt.

Table 6: Surface Water Quality Management (Simple Index Approach)

Treatment Train 1				
Land Use / SuDS	**Hazard Level**	**TSS**	**Metals**	**Hydro-Carbons**
Pollution Hazard Indices				
Residential Roofs	Very Low	0.20	0.20	0.05
Driveways, residential car parks and low traffic roads	Low	0.50	0.40	0.40
SuDS Mitigation Indices				
Detention Basin	-	0.50	0.50	0.60
Total SuDS Mitigation Index ≥ Pollution Hazard Index (for each contaminant type)				

Treatment Train 2				
Land Use / SuDS	**Hazard Level**	**TSS**	**Metals**	**Hydro-Carbons**
Pollution Hazard Indices				
Driveways, residential car parks and low traffic roads	Low	0.50	0.40	0.40
SuDS Mitigation Indices				
Pervious Pavement	-	0.70	0.60	0.70
Detention Basin	-	0.50	0.50	0.60
Total SuDS Mitigation Index = Pervious Pavement Index + 0.5 (Downstream Defender Index)				
Total SuDS Mitigation Index	-	0.95	0.85	1.00
Total SuDS Mitigation Index ≥ Pollution Hazard Index (for each contaminant type)				

5.6 Operation and Maintenance

5.6.1 The function of the surface water drainage system must be understood by those responsible for maintenance, regardless of whether individual components are below ground or on the surface. In any system properly designed, monitored and maintained, performance deterioration can usually be minimised.

5.6.2 A maintenance plan clearly identifying who is responsible for maintaining proposed SuDS as well as the maintenance regime to be applied will be required to support a planning application. Typical maintenance requirements for the shortlisted SuDS are summarised in Table 7.

Table 7: Typical Operation and Maintenance Requirements

Operation and Maintenance Activity	SuDS Component						
	Green Roof	Filter Drain	Swale	Bioretention System	Pervious Pavement	Detention Basin	Attenuation Storage Tank
Regular Maintenance							
Inspection	■	■	■	■	■	■	■
Litter and debris removal		■	■	■	■	■	□
Grass cutting		■	■	■	□	■	□
Weed and invasive plant control	■	□			□	□	
Shrub management (including pruning)			□	□	□	□	
Shoreline vegetation management						□	
Aquatic vegetation management						□	
Occasional Maintenance							
Sediment management		■	■	■	■	■	■
Vegetation replacement	■		□	□		□	
Vacuum sweeping and brushing					■		
Remedial Maintenance							
Structure rehabilitation/repair	□	□	□	□	□	□	□
Infiltration surface reconditioning		□	□	□	□		

Key:
■ Will be required
□ May be required

6 CONCLUSIONS AND RECOMMENDATIONS

6.1.1 In accordance with the EA's *Flood Map for Planning*, most of the development site is in Flood Zone 1 (< 0.1% AEP). However, a small part of the site near the Marlees Brook and mill race along the north eastern boundary is in Flood Zone 2 (0.1% to 1.0% AEP) and Flood Zone 3 (> 1.0% AEP).

6.1.2 The EA's recorded flood outlines show that the Marlees Brook flooded in 1968, with a recoded flood outline in line with the flood extents in *Flood Map for Planning*.

6.1.3 The development site is not covered by the EA's flood warning system.

6.1.4 The site-specific flood risk assessment will have to consider the latest climate change allowances of 35% (higher central) and 70% (upper end). Once appropriate fluvial flood extents / zones are established in accordance with the *National Planning Policy Framework* (NPPF), the "*more vulnerable*" residential development being proposed should be placed in Flood Zone 1 (i.e. outside Flood Zones 2 and 3).

6.1.5 For the purpose of this scoping flood risk assessment, the 0.1% AEP fluvial flood extent has been used as a proxy for the 1.0% AEP + 70% climate change fluvial flood extent to help establish the site's total developable area of approximately 23.5 ha.

6.1.6 In accordance with the EA's *Long Term Flood Risk Information*, most of the development site is at very low (< 0.1% AEP) risk of surface water flooding. However, small parts of the site near the Marlees Brook and mill race and the Charfield Road valley are at low (0.1% to 1.0% AEP), medium (1.0% to 3.3% AEP) and high (> 3.3% AEP) risk of surface water flooding.

6.1.7 Surface water flood risk in the area near the Marlees Brook and mill race (north-eastern boundary) is intertwined with fluvial flood risk and the envisaged sequential approach to locate development in Flood Zone 1 (i.e. outside Flood Zones 2 and 3) will address both sources of flood risk in that area.

6.1.8 The sequential approach should also be followed to steer development away from the area at risk of surface water flooding along the Charfield Road valley. The 0.1% AEP surface water flood extent has been used as a proxy for the 1.0% AEP + 40% climate change surface water flood extent to help establish the site's developable area of approximately 23.5 ha.

6.1.9 The conceptual surface water drainage strategy has been designed in compliance with the *NPPF*, GCC's *SuDS Design & Maintenance Guide* and current best practices to attenuate runoff from all impermeable areas before controlled discharge into the nearby open water bodies (i.e. Marlees Brook / mill race and Charfield Road drainage ditches) associated with the area's prominent overland flow paths, thus mimicking / formalising the existing drainage arrangement.

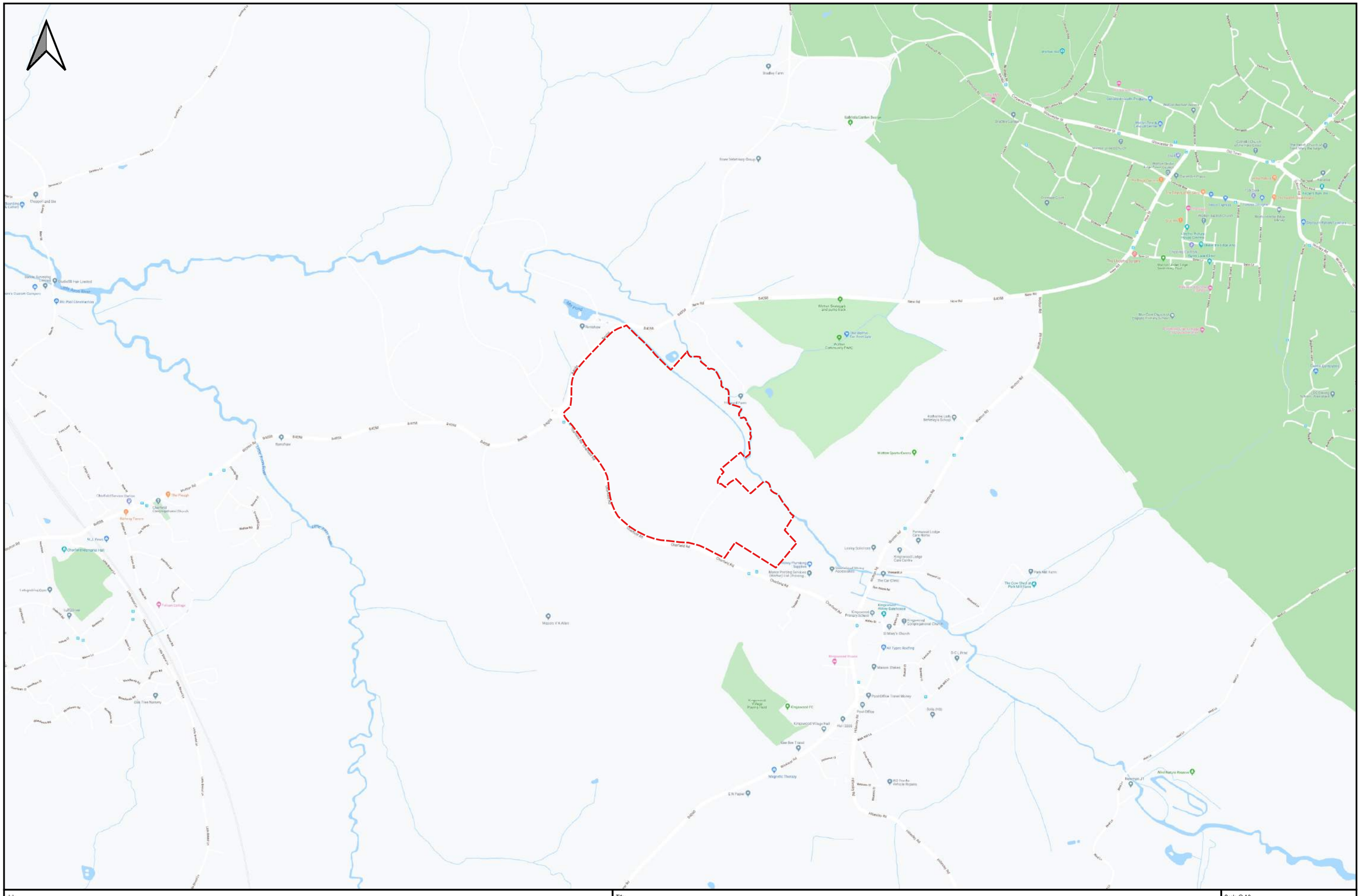
6.1.10 Discharge to the Charfield Road drainage ditches adjacent to the site is subject to confirmation of adequate connectivity between the ditches and the ordinary watercourse downstream (north) of the B4058.

6.1.11 Attenuation volumes for the 1% AEP + 40% climate change allowance standard of design have been established using (Innovyze) Micro Drainage's *Source Control (Quick Storage Estimate)*. Based on the conceptual design undertaken, the detention basins are expected to take approximately 2.0 ha (~8.5%) of the total developable area (including 10% allowances for urban creep and soft landscaping).

6.1.12 Overland flows resulting from exceedance events are expected to leave the developed site via the same routes as in the pre-development conditions, without posing any significantly increased flood risk off-site.

6.1.13 Given the site's topography and geology, the risk of groundwater emergence outside of the areas at risk of fluvial and / or surface water flooding is deemed very low and unlikely to require management measures. Nevertheless, the presumed very low risk of groundwater flooding should be confirmed through bespoke ground investigation.

Appendix A
Site Information



Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Site Location	1:10,000

Ordinary Watercourse (Charfield Road Valley)

Mill Race

Marlees Brook

Charfield Road Valley

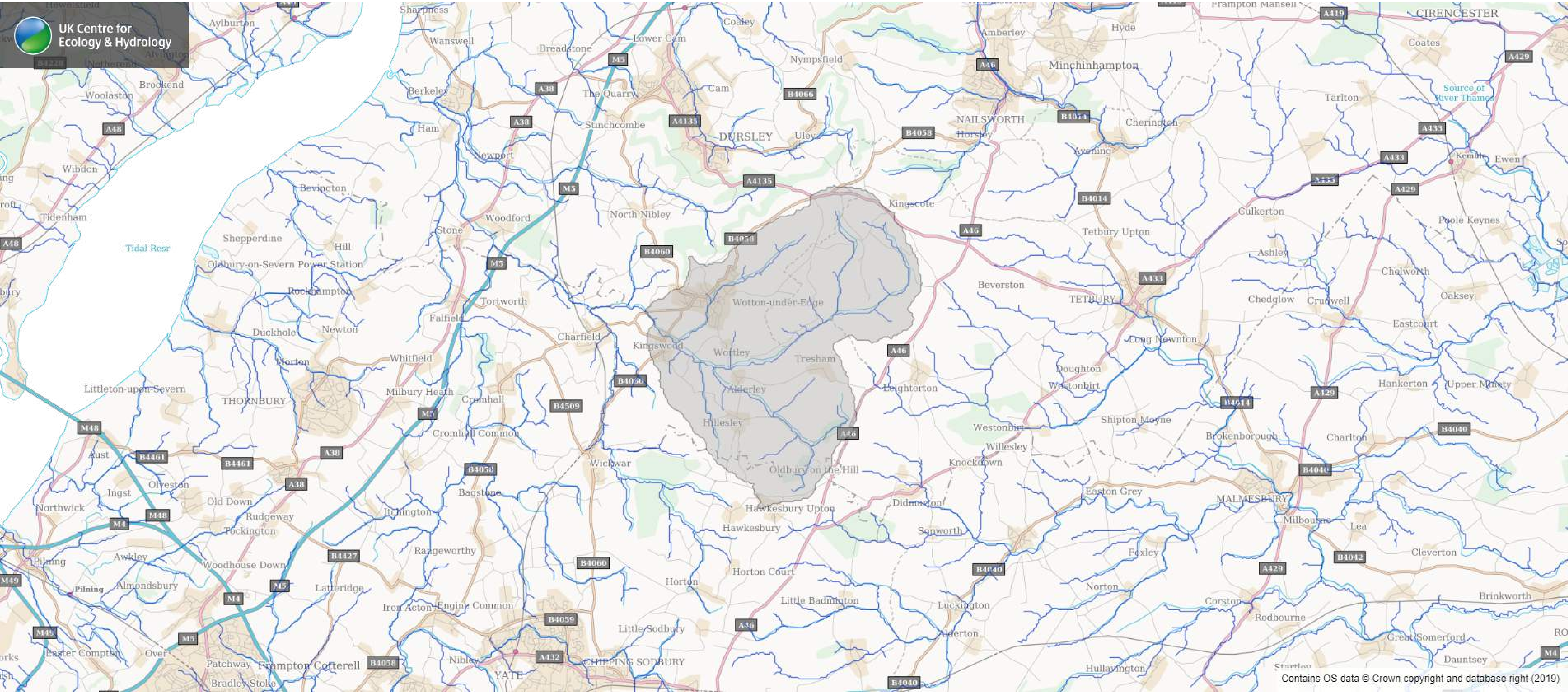
KEY

- Development Site Boundary
- Watercourse
- Surface Water Drainage Ditch
- Topographic Contour

Elevation (m AOD)

- <= 36
- 36 - 37
- 37 - 38
- 38 - 39
- 39 - 40
- 40 - 41
- 41 - 42
- 42 - 43
- 43 - 44
- 44 - 45
- 45 - 46
- 46 - 47
- 47 - 48
- 48 - 49
- 49 - 50
- > 50

Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Site Topography (LiDAR)	1:3,000



UK Centre for Ecology & Hydrology
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Wotton-under-Edge
Wortley
Tresham
Alderley
Hillesley
Oldbury on the Hill
Hawkesbury Upton
Hawkesbury
Kingswood
Charfield
Kingscote
DURSLEY
Uley
Cam
Lower Cam
Coaley
Nympsfield
NAILSWORTH
Horsley
Minchinhampton
Amberley
Hyde
Avening
Cherington
Tetbury Upton
TETBURY
Beverston
Long Newton
Doughton
Westonbirt
Leighterton
Shipton Moyne
Willesley
Knockdown
Didmarton
Sopworth
Easton Grey
MALMESBURY
Milbourne
Brokenborough
Charlton
Hankerton
Upper Minety
Eastcourt
Crudwell
Chedglow
Ashley
Culkerton
Chelworth
Oaksey
Poole Keynes
Kemble
Ewen
Tarlton
Coates
CIRENCESTER
Source of River Thames
Frampton Mansell
Sharpness
Wanswell
Breadstone
Berkeley
Ham
Newport
Stinchcombe
The Quarry
North Nibley
Stone
Woodford
Tortworth
Falfield
Whitfield
Milbury Heath
Cromhall
Cromhall Common
Wickwar
Bagstone
Rangeworthy
Horton
Horton Court
Little Badminton
Luckington
Alderton
Norton
Foxley
Corston
Rodbourne
Lea
Cleverton
Brinkworth
Great Somerford
Dauntsey
Hullavington
Little Sodbury
CHIPPING SODBURY
YATE
Nibley
Engine Common
Iron Acton
Latteridge
Frampton Cotterell
Tidal Resr
Shepperdine
Hill
Oldbury-on-Severn Power Station
Rockhampton
Newton
Duckhole
Morton
THORNBURY
Littleton-upon-Severn
Aust
Olveston
Ingst
Old Down
Rudgeway
Tockington
Northwick
Awkley
Pilning
Almondsbury
Woodhouse Down
Easter Compton
Over
Patchway
Bradley Stoke
Aylburton
Woolaston
Brockend
Wibdon
Tidenham
Bevington
M5
M4
M48
M49
A38
A46
A48
A429
A433
A419
A432
A4135
B4058
B4060
B4066
B4014
B4509
B4059
B4461
B4427
B4040
B4042

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NATURAL ENVIRONMENT RESEARCH COUNCIL

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Surface Geology

- Superficial only
- Bedrock only
- Bedrock and Superficial

Visible geology: 1:50 000 scale

Geology Key

More on digital geology

Go to Location

Switch Basemap

100% 0%

Geology Transparency

Grid Ref: 374579, 195261

Superficial geology

1:50 000 scale superficial deposits description: Alluvium - Clay, Silt, Sand And Gravel. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by rivers (U).

Setting: rivers (U). These sedimentary deposits are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).

Further details | What are Superficial Deposits?

To purchase detailed geological reports for this area, try our GeoReports service

Damery
Howley
Bournstream
Coombe
Swinhay
Huntingford
Wotton under Edge
Synwell
Ozleworth
Bradley Green
Tortworth
Charfield
Kingswood
Leyhill
Bibstone
Heathend
Tresham
Katharine Lady Berkeley's School
Old London Road
Swinhay Lane
Bradley Road
Adey's Lane
Parklands
Coombe Road
Blackquarries Hill
Blackesmith Hill
New Road
Wotton Road
Wortley Road
New Street
Manor Lane
Little Bristol Lane
Charfield Road
Wickwar Road
Hillesley Road
Hillmill Lane
Wintersprigg Lane
Tortworth Road
Churchend Lane
Rectory Lane
Devils Lane
Alderley
B4060
B4058
B4062
B4509
0 0.3 0.6km

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Surface Geology

- Superficial only
- Bedrock only
- Bedrock and Superficial

Visible geology: 1:50 000 scale

Geology Key

More on digital geology

Go to Location

Switch Basemap

100% 0%

Geology Transparency

Grid Ref: 376233, 194750

Bedrock geology

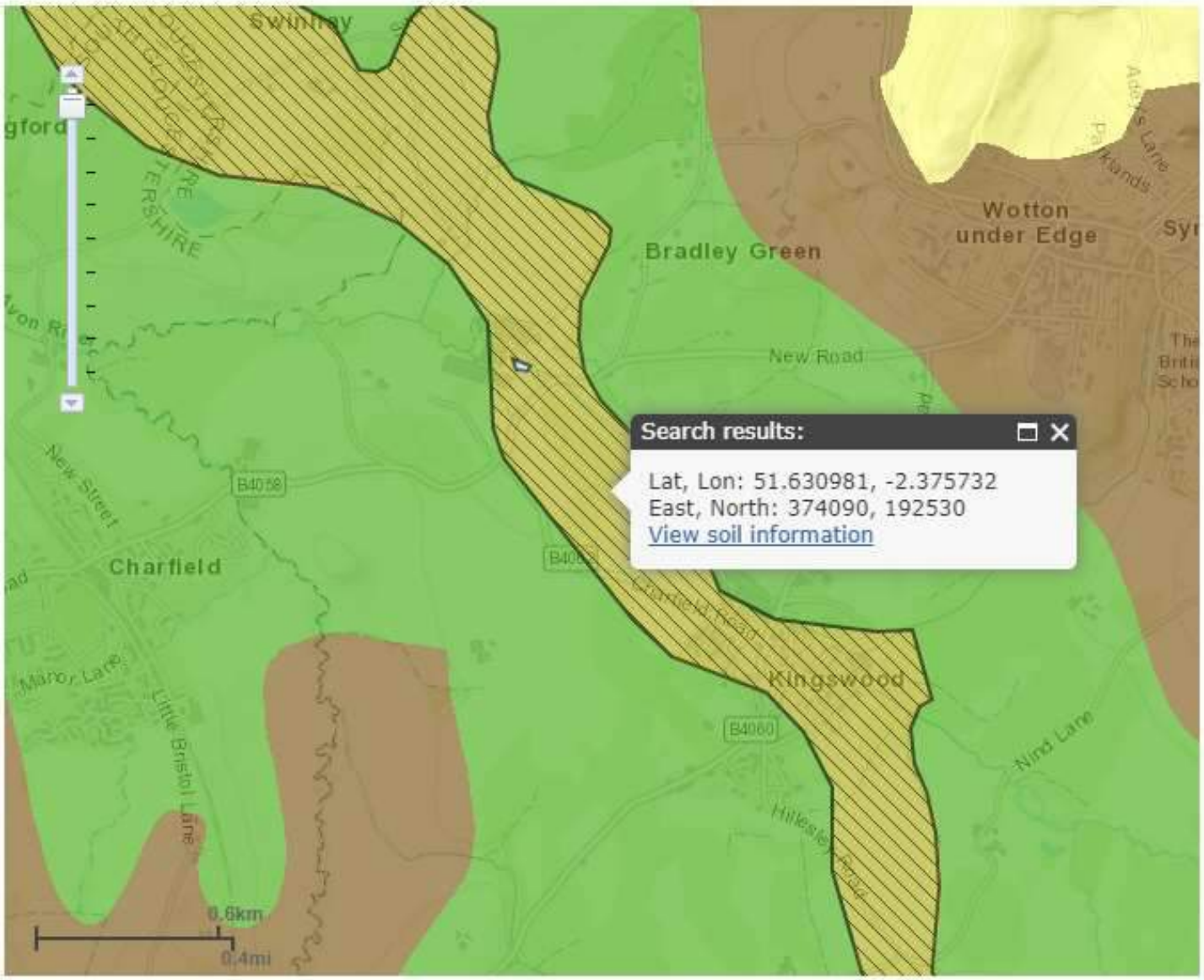
1:50 000 scale bedrock geology description: Blue Lias Formation And Charmouth Mudstone Formation (undifferentiated) - Mudstone. Sedimentary Bedrock formed approximately 183 to 210 million years ago in the Jurassic and Triassic Periods. Local environment previously dominated by shallow lime-mud seas.

Setting: shallow lime-mud seas. These sedimentary rocks are shallow-marine in origin. They are detrital and biogenic, generally comprising fine-grained sediments, with carbonate material (coral, shell fragments) forming interbedded sequences.

Further details What is Bedrock Geology?

To purchase detailed geological reports for this area, try our GeoReports service

Damery
Howley
Bournstream
Swinhay
Huntingford
Wotton under Edge
Synwell
Ozleworth
Bradley Green
Tortworth
Charfield
Kingswood
Leyhill
Tresham
Bibstone
Heathend
0 0.3 0.6km



Adjust transparency

Legend

Search

Soil information

Soilscape 9:
Lime-rich loamy and clayey soils with impeded drainage

Texture:
Clayey, some loamy

Coverage:
England: 5.3% Wales: 0%
England & Wales: 4.5%

Selected area:
4.1km^2

Drainage:
Slightly impeded drainage

Fertility:
High

Habitats:
Base-rich pastures and classic chalky boulder clay ancient woodlands; some wetter areas and lime-rich flush vegetation

Landcover:
Arable some grassland

Carbon:
Low

Drains to:

MAGiC

374090,192530

OSGB36

1:80,000

Table of Contents

- Access
- Administrative Geographies
- Countryside Stewardship Targeting & Scoring Layers
- Designations
- Habitats and Species
- Land Based Schemes
- Landscape
- Geology and Soils
  - Aquifer Designation Map (Bedrock) (England)
  - Aquifer Designation Map (Superficial Drift) (England)
    - Principal
    - Secondary A
    - Secondary B
    - Secondary (undifferentiated)
    - Unknown (lakes+landslip)
    - Unproductive
  - Groundwater Vulnerability Map (England)
  - Geological Places to Visit (England)
  - Geological Descriptions (England)
  - Soilscape (England)
- Landscape Classifications

Development Site

0 1 2km

Coords: (360744,195356) Grid Ref:ST60749535

MAGiC

374090,192530

OSGB36

1:80,000

Table of Contents

- Access
- Administrative Geographies
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      - Secondary A
      - Secondary B
      - Secondary (undifferentiated)
      - Unproductive
    - Aquifer Designation Map (Superficial Drift) (England)
    - Groundwater Vulnerability Map (England)
    - Geological Places to Visit (England)
    - Geological Descriptions (England)
    - Soilscape (England)
  - Landscape Classifications
- Marine

Development Site

Hereford
Gloucester
Newport
Swindon
Bristol
Bath

Foxley
Corston

0 1 2km

Coords: (365803,200055) Grid Ref:SO65800005

Appendix B
Flood Risk Information

Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Flood Map for Planning (Rivers and Sea)	1:3,000

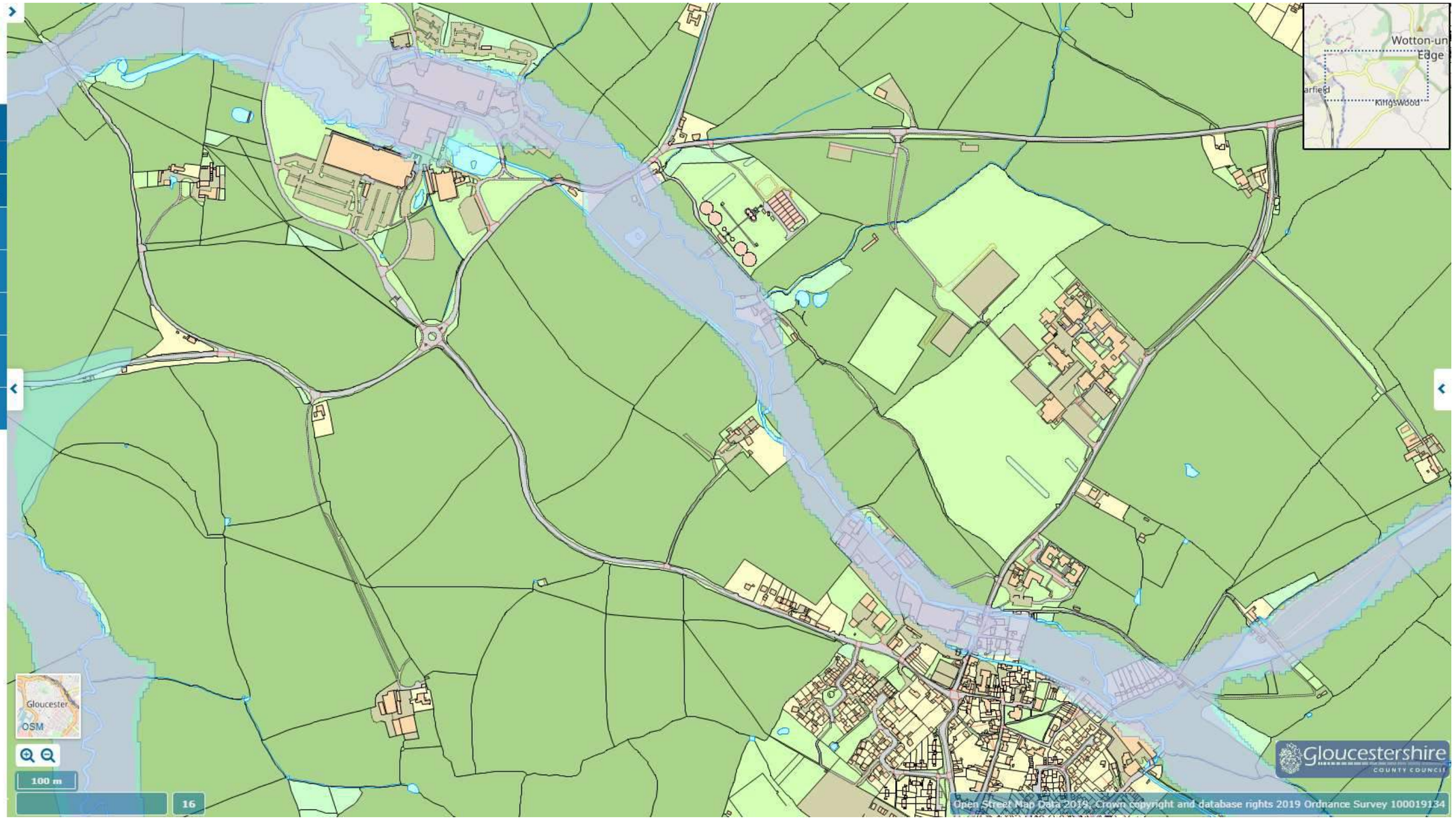
GCC Flooding

SHOW LAYERS

Background Mapping +

Flooding -

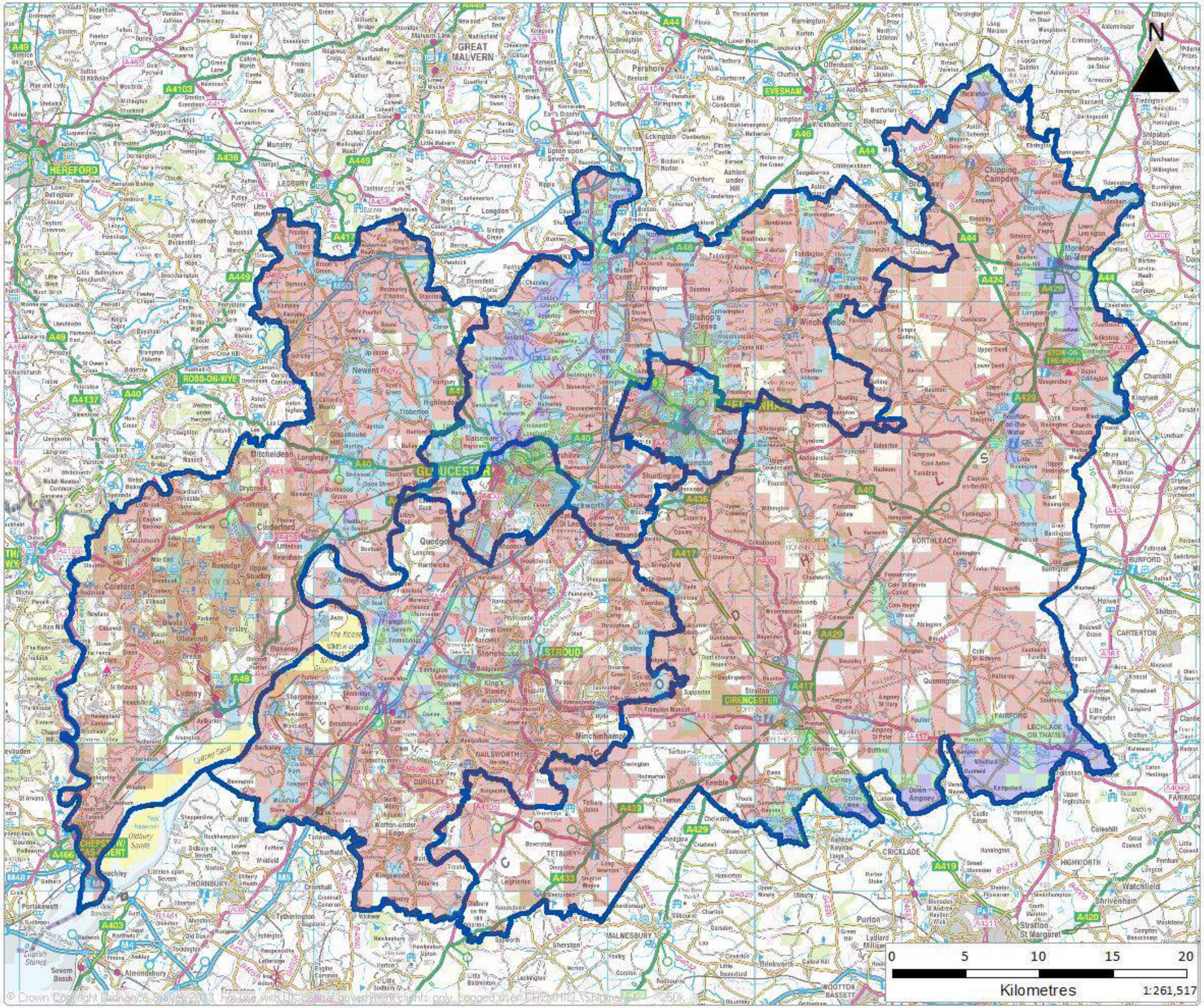
- Contours
- SFRA Level 1 Flood Zone 3b
- SFRA Level 1 Flood Zone 3a
- SFRA Level 1 Flood Zone 3aCC
- SFRA Level 1 Flood Zone 2



Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Recorded Flood Outline (1968)	1:3,000

Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Flood Risk from Surface Water	1:3,000

Gloucestershire County Council LFRMS



Legend

CLASS

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

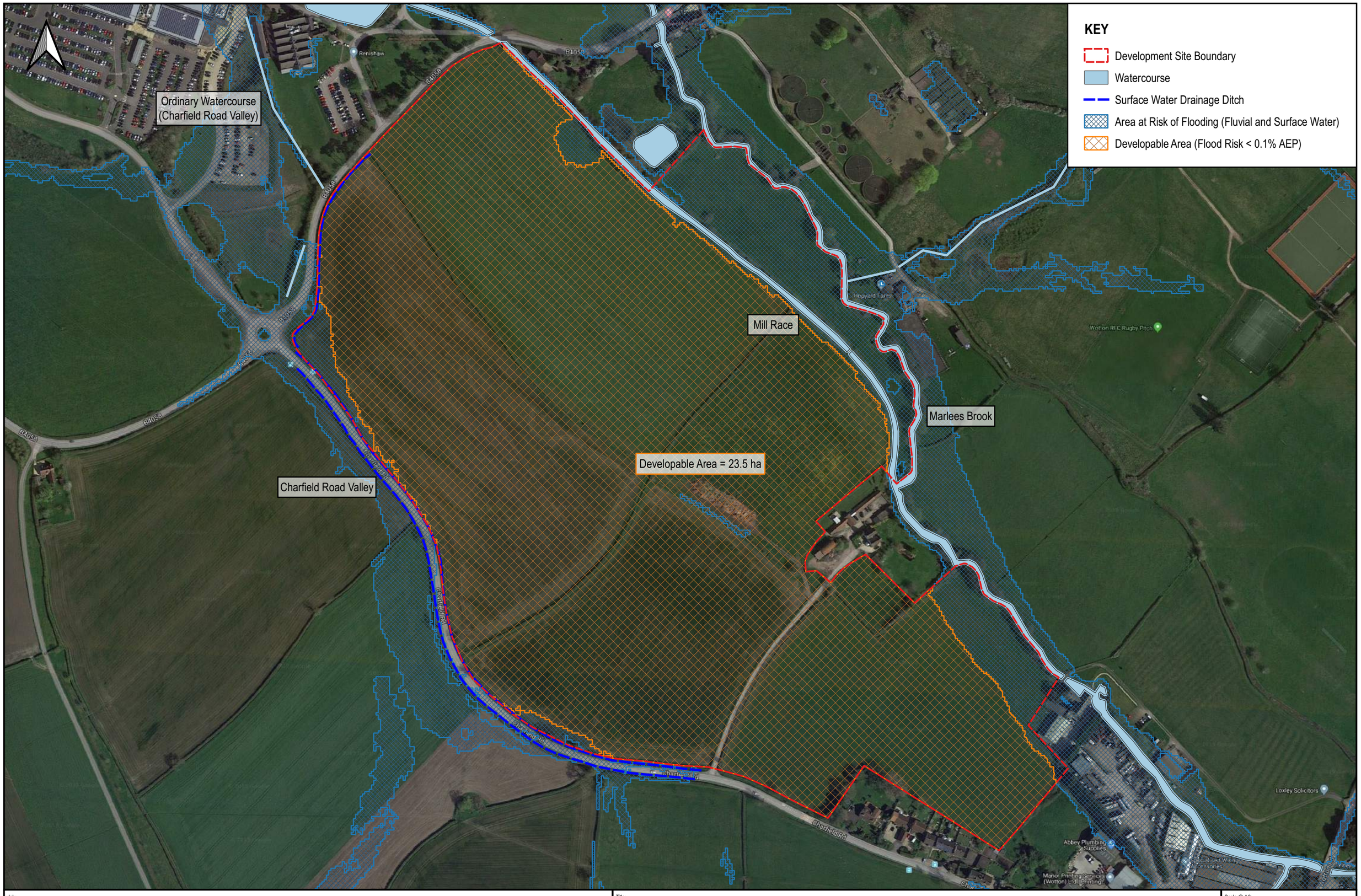
Areas susceptible to groundwater flooding

Gloucestershire County Council CH2MHILL.

Created by: Lizzie Shipman (12/12/2013)
Checked by: Ali Cotton (12/12/2013)

Document Path: W:\we\Urban Water Market Sectors\Urban Water UK\Projects\WBACGC - GCC Secondment\001 - Secondment\11-General\2014_15 contract\1. LFRMS\Data for Maps\Maps\Groundwater flooding.mxd

Appendix C
Flood Risk Management Measures



Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Developable Area (Flood Risk < 0.1% AEP)	1:3,000

Appendix D
Conceptual Surface Water Drainage Strategy

[redacted]

Kingswood, Wotton-under-Edge
Sustainable Drainage Strategy
Greenfeld Runoff Rates

Date 19/12/2019 13:35
File [redacted]
Designed by JNP Group

Micro Drainage 18.1.1

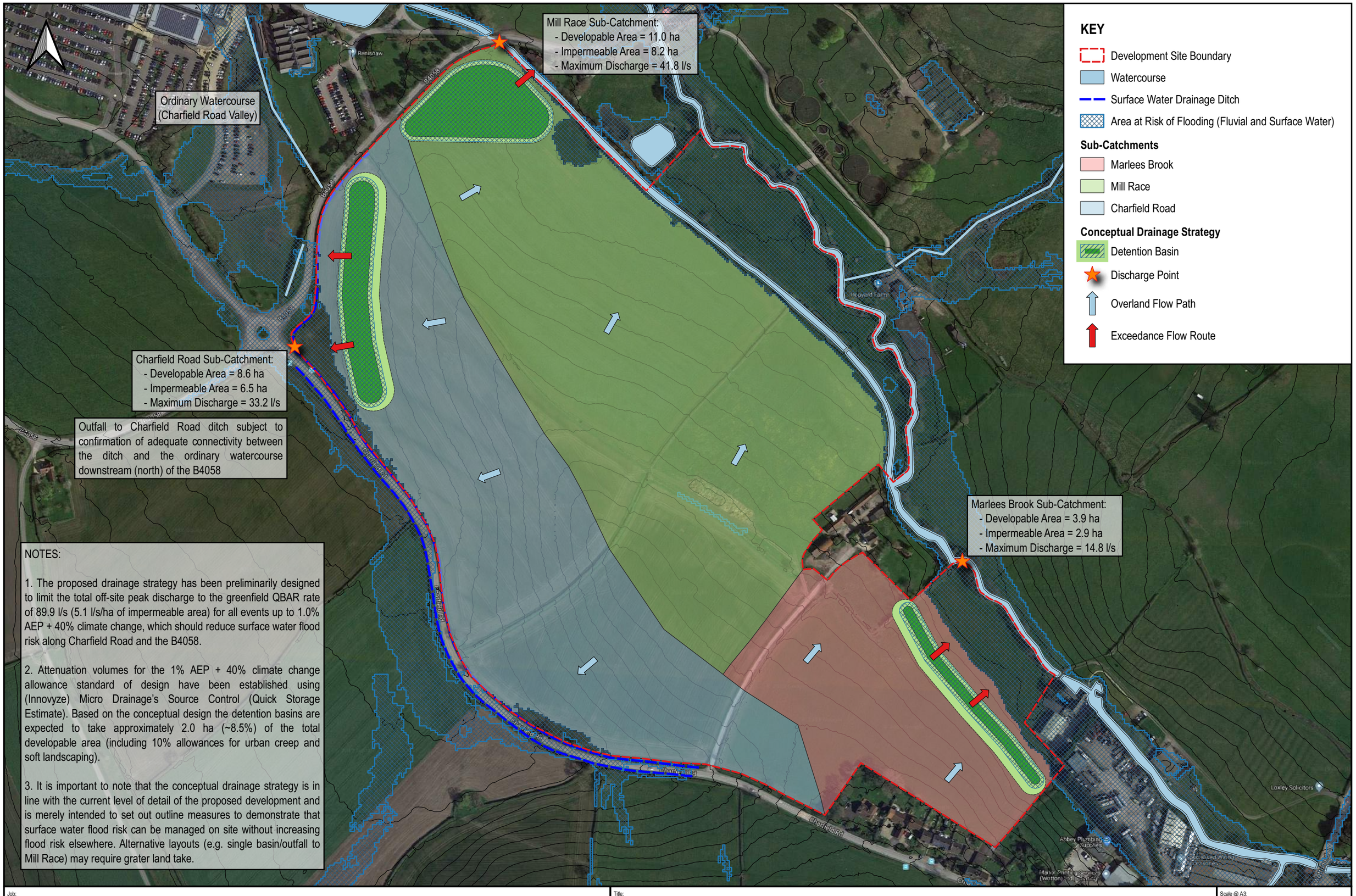
ICP SUDS Mean Annual Flood

Input

Return Period (years)	5	SAAR (mm)	800	Urban	0.000
Area (ha)	1.000	Soil	0.450	Region Number	Region 4

Results l/s

QBAR Rural	5.1
QBAR Urban	5.1
Q5 years	6.3
Q1 year	4.3
Q30 years	10.1
Q100 years	13.2



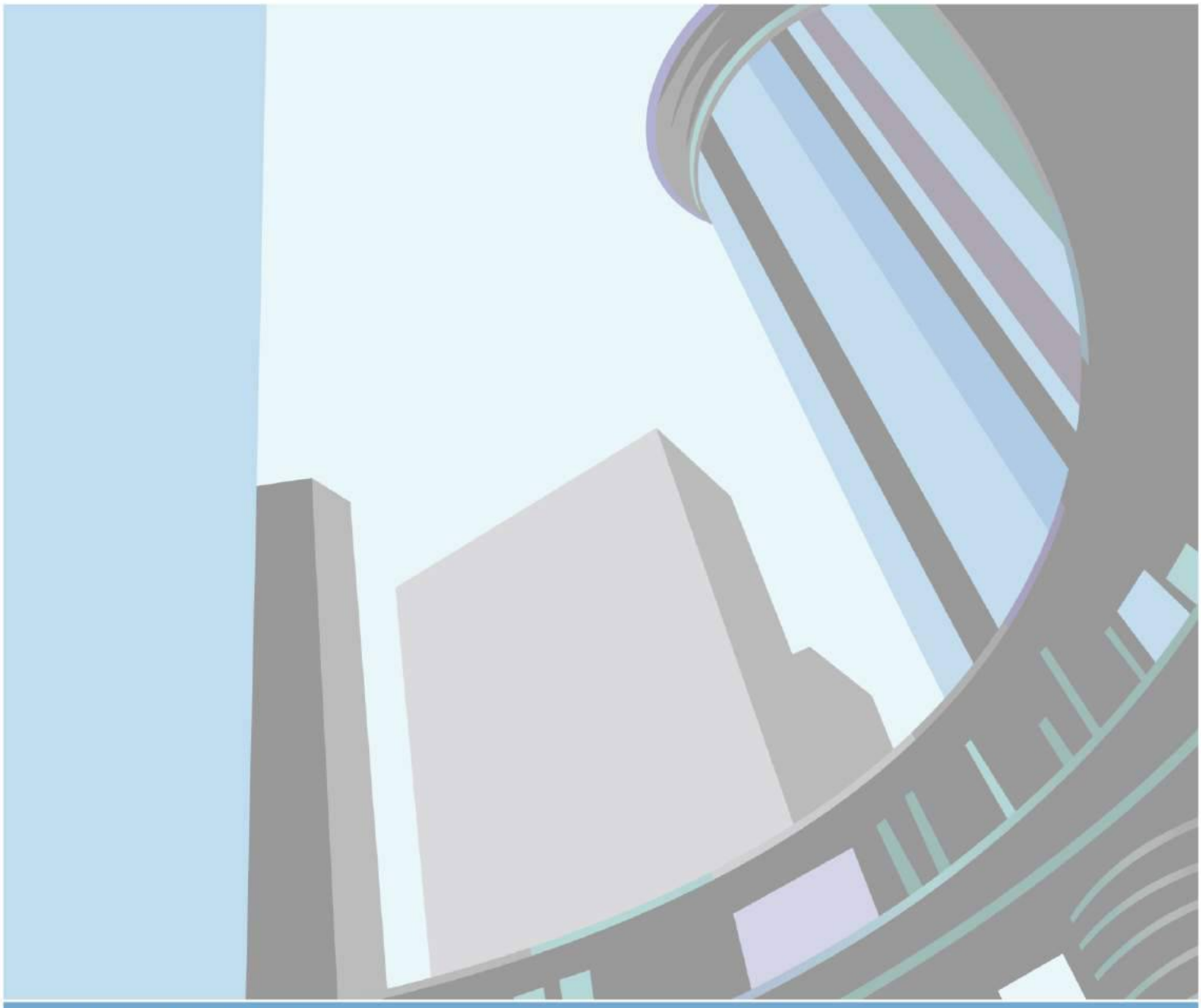
NOTES:

1. The proposed drainage strategy has been preliminarily designed to limit the total off-site peak discharge to the greenfield QBAR rate of 89.9 l/s (5.1 l/s/ha of impermeable area) for all events up to 1.0% AEP + 40% climate change, which should reduce surface water flood risk along Charfield Road and the B4058.

2. Attenuation volumes for the 1% AEP + 40% climate change allowance standard of design have been established using (Innovyze) Micro Drainage's Source Control (Quick Storage Estimate). Based on the conceptual design the detention basins are expected to take approximately 2.0 ha (~8.5%) of the total developable area (including 10% allowances for urban creep and soft landscaping).

3. It is important to note that the conceptual drainage strategy is in line with the current level of detail of the proposed development and is merely intended to set out outline measures to demonstrate that surface water flood risk can be managed on site without increasing flood risk elsewhere. Alternative layouts (e.g. single basin/outfall to Mill Race) may require grater land take.

Job:	Title:	Scale @ A3:
Kingswood, Wotton-under-Edge	Conceptual Drainage Strategy and Overland Flows	1:3,000



john newton & partners
jnpgroup
Consulting Engineers

www.jnpgroup.co.uk

[redacted]

APPENDIX E

PRELIMINARY ECOLOGICAL APPRAISAL

Ecological Constraints and Opportunities Report

Charfield Road, Kingswood, Gloucestershire

(central OS grid reference: ST 740 925)

A report on behalf of Redrow Homes

Ref: 1011-ECOR-FM

[redacted]

1. Introduction

This document has been produced by GE Consulting on behalf of Redrow Homes to provide preliminary ecological constraints and opportunities at this site.

Note that this document aims to provide design and planning advice prior to further surveys that may be required, and it is not intended to be submitted with a planning application to develop the Site. However, recommendations have been provided below with a view to support and enhance any future applications.

2. Site Survey

The survey comprised an Extended Phase 1 Habitat Survey and habitat condition assessment undertaken on 23 December 2019 and 13 October 2020, supplemented by a desk-based study, whereby biological data was obtained from the Gloucestershire Centre for Environmental Records (GCER). This survey identified the potential for protected species for which surveys need undertaking (see **Section 5**).

3. Results

Figure 1 shows the survey area and identifies key constraints as well as opportunities to avoid, mitigate and enhance key ecological features.

Table 1 provides more detail of issues for consideration. In summary, recommendations are made to ensure the design meets nature legislation and the principles of the NPPF and local policy, including:

- Sites of importance to wildlife should be safeguarded, e.g. SACs/ SPAs, SSSIs, locally designated sites and ecological networks/ corridors;
- Developments should apply the mitigation hierarchy: avoid, mitigate, compensate;
- Avoid loss of irreplaceable habitat e.g. ancient woodland or trees;
- Conservation and enhancement of biodiversity is supported, especially where this secures measurable net gains for biodiversity.

4. Biodiversity Net Gain (BNG)

The Government are planning to roll out a requirement for achieving a 10% net gain in biodiversity for all developments once the Environment Bill is enacted. This 10% gain relates to both linear habitats (e.g. hedgerows) and non-linear habitats (e.g. grassland/woodland) and requires the use of a 'metric' to calculate the required biodiversity units. Some LPA's already request the use of the metric through current or emerging policies. For this site, the use of the metric should be confirmed with the LPA ecologist.

Habitats of high 'distinctiveness' should be targeted for retention such as hedgerows, woodland and watercourses and new habitats with high distinctiveness can be created to provide net gains. Offsite measures may be acceptable through legal agreements but should only be sought once all on-site options have been explored.

Refer to **Tables 2** & **3** for an indication of the BNG requirements on this Site.

5. Further Survey Work

The timeline below shows the further ecological survey work that would be expected to accompany a planning application and to inform suitable mitigation.

TASK	Mar	April	May	June	July	August	Sept	Oct
Breeding birds								
Commuting/ foraging bats – (1 transect walked monthly & 5 static automated bat detectors per visit, for 5 nights)								
Reptiles (8 visits, approx. 50 refugia)				Sub-optimal				
Dormouse survey (100 tubes April/ May to August/ September)								
Great crested newt survey (**or** enter District Licensing Scheme to avoid survey								
Riparian mammal survey (2 visits, one April-June, one July – Sept)								
Liaision with LPA and District Licensing Scheme								
Ecological Impact Assessment for Planning Application, including BNG Assessment								

Many of these surveys are seasonally constrained and therefore ecological advice early in the project programme is always recommended. However, if there are conflicts with the project timetable, please speak to a member of the team at GE Consulting at an early stage and we will make every effort to find a pragmatic approach that works within your time frame if possible.

Assessment of ponds within 250m of the Site required for great crested newt. Further survey and licence may be required. Alternatively financial contribution to District Licensing for offsite mitigation required.

Poor semi-improved grassland field and flood zones provide good opportunities for ecological enhancement to acheive net biodiversity gain. This could include higher quality meadow grassland, wetland, ponds and scrub.

Recommend a 15m buffer from stream to protect riparian vegetation, otter and water vole. Keep corridor dark and protect from pollution/ excess water using SUDS.
Can form part of Green Infrastructure, SUDS and Public Open Space, as well as wildlife habitat e.g. rough grass and log piles/ ponds.

Design to include bat, bird and bug boxes to enhance site for wildlife. Wildlife-friendly and native planting to be used where practicable.
* Additional habitat creation may be required depending on results of further survey work.

No major constraints regarding loss of improved grassland or arable, however biodiversity net gain required across site through species-rich grassland creation (e.g. on verges and in Public Open Space), orchard, wetland and flowering lawns, for example.

Retain and protect hedgerows (ideally with 2-3m maintenance strip). Replace any losses and provide 'net gain' in total hedgerow length. Enhance with additional species-rich planting, fill gaps in defunct hedges or improve management to increase condition.

Ideally retained ditches will be buffered with 3m strip to protect from pollution and allow maintenance access.

A

SI

I

I

A

I

SI

Legend

- A — Arable
- SI — Poor Semi-improved Grassland
- Marsh Grassland
- I — Improved Grassland
- Semi-natural Broad-leaved Woodland
- Dense/Continuous Scrub
- Tall Ruderal
- Scattered Broad-leaved Trees
- Scattered Coniferous Trees
- Native Species-rich Hedge
- Native Species-rich Hedge with Trees
- Species-poor Hedge
- Defunct Species-poor Hedge
- Running Water
- Fence
- Brick Wall
- Dry Ditch
- Wet Ditch
- Mammal Track

0 80 160 240 320 m

N

Figure 1: Ecological Constraints & Opportunities Plan

Project: Charfield Road, Kingswood

Client: Redrow Homes

Date: 3/11/2020

Ref: 1011-ECOP-F1

Version: 3

[redacted]

ge consulting — ECOLOGY ARBORICULTURE LAND MANAGEMENT

Table 1: Potential Constraints and Opportunities Related to Development of Site

Ecological Receptor	Constraints and Likely Impacts During Construction and Operation	Recommended Mitigation, Opportunities and Enhancements
Designated Sites		
Natura 2000 sites within 10km: • None	• N/A	N/A
Statutory sites within 2km: • Wotton Hill Site of Special Scientific Interest (SSSI), 1.4km north-east The Site is within an Impact Risk Zone for this SSSI; Natural England will be consulted for 'All planning applications (except householder) outside or extending outside existing settlements/urban areas affecting greenspace, farmland, semi natural habitats' etc. • Cullimore's Quarry SSSI, 1.6km west	• Wotton Hill is designated for ancient beech woodland, unimproved limestone grassland and the rare Schedule 8 plant: limestone woundwort *Stachys alpina*. The SSSI is in largely favourable condition but could be sensitive to trampling and changes in management. • Cullimore's Quarry is designated due to geological interest and is not considered further in this report.	• Include good quality, linked and naturalistic Public Open Space (POS) as part of design, to provide recreational opportunities within the site itself. • Ensure that no impacts arise during construction (e.g. through Construction Environmental Management Plan (CEMP)).
Non-statutory sites within 2km: Nind Trout Farm & Ozleworth Brook Local Wildlife Site (LWS) and Wildlife Trust Reserve (765m upstream)	• A residential scheme in this location has the potential to increase recreational pressure to this LWS. • No pollution impacts are anticipated as the LWS is upstream.	• Include good quality, linked and naturalistic Public Open Space (POS) as part of design, to provide recreational opportunities within the site itself. • Protect watercourse (e.g. buffer and keep dark) to maintain water vole/ otter populations in the local area (see also FAUNA).
Habitats		
Improved grassland	• No major constraints – low value botanically and low distinctiveness. • Compensatory habitat creation required under new Biodiversity Net Gain (BNG) Metric.	• Scope to provide net gain by creating areas of species-rich grassland (especially along watercourse and hedgerows), flowering lawns on road verges and other higher quality habitat such as orchards. • POS provides good opportunities for providing recreational space as well as informal areas with wildlife value.
Poor semi-improved and marshy grassland	• Low lying land between watercourses; likely to flood. Low value botanically but good potential for enhancement. • Compensatory habitat creation required under new BNG Metric if lost.	• Good potential to enhance this area with wetland, ponds, rough grassland and scrub, providing net gain for the site and providing an area for wildlife.

Ecological Receptor	Constraints and Likely Impacts During Construction and Operation	Recommended Mitigation, Opportunities and Enhancements
River corridor and ditches	• The north-eastern boundary is formed by the Ozleworth Brook and a leat diverts off this through part of the Site. The brook is known to support otter, water vole, heron, kingfisher and dipper upstream at the Gloucestershire Wildlife Trust Nature Reserve at Nind. • Rivers and streams are a Gloucestershire BAP priority and of high conservation importance. • In addition ditches are present alongside many of the hedgerows; these are of lower value but feed into the brook. • Potential impacts include pollution, flooding and recreational damage.	• Ensure appropriate mitigation measures are in place during construction (e.g. CEMP). • Buffer the brook and leat (and associated trees) with a minimum 15m buffer (could form part of attractive POS/ green infrastructure). Allow accessible and inaccessible sections of water course, to prevent uncontrolled access to water course by the public. • Buffer smaller streams/ ditches with minimum 3m where practicable to protect water from pollution as well as allow access for management. • Create wildlife-friendly SuDS to prevent pollution incidents to water courses.
Hedgerows	• Species-rich and species-poor hedgerows are a Habitat of Principal Importance (S41 of NERC Act), Gloucestershire BAP habitat. Many of the hedgerows are very diverse and some contain mature standard trees. • Important ecological feature.	• Retain where possible, restore and buffer (outside property boundaries) to allow future management, e.g. 2-3m. • Retain hedgerow trees. • Enhance species-poor hedgerow with additional planting. • Can form part of green infrastructure strategy. • Replace any losses and plant new native hedgerows to provide net gain.
Arable	• No major constraints – low ecological value.	• Compensatory habitat creation required under new Biodiversity Net Gain Metric – this can be grassland (e.g. POS or other habitat).
Fauna		
Breeding birds	• Protected under Wildlife and Countryside Act (WCA) 1981. Potential for offence to be committed by damaging/ destroying active birds' nests. • Recommended that **bird surveys** are undertaken, concentrating on farmland birds and the riparian corridor to establish the presence of Schedule 1 species, such as kingfisher.	• Retain trees and hedgerows that provide nesting habitat for birds. • Provide new nesting opportunities e.g. place nest boxes on retained trees and incorporate nest boxes into new buildings. • Time vegetation clearance to avoid bird breeding season (March – August inclusive) or with a check for active birds' nests.
Bats	• European Protected Species. Many bats are also Species of Principal Importance under the NERC Act 2006. • Site boundaries (trees and hedgerows) may be important commuting/ foraging routes. • **Surveys required** to establish species assemblage and site usage.	• Identify key corridors for bats, retain and buffer these habitats where possible. • Avoid direct lighting of key areas during construction and operation. • Enhance site with additional roosting opportunities.

Ecological Receptor	Constraints and Likely Impacts During Construction and Operation	Recommended Mitigation, Opportunities and Enhancements
Reptiles	• Protected under WCA 1981. Risk of an offence being committed (killing/ injury of reptiles) during vegetation clearance, particularly along the stream corridor and at hedgerow bases. • **Surveys required** to establish presence/ absence.	• Enhance site to increase the value for reptiles e.g. habitat enhancement such as rough grassland, ponds and log piles.
Invertebrates	• The water courses and hedgerows are likely to support common/ widespread invertebrates and potentially some notable species. • Ideally these habitats should be retained, or suitable replacement habitats included in the design.	• The buildings could incorporate a green roof and bee/bug bricks. • A range of habitats should be retained/ created within POS. • New planting schemes should include wildlife friendly species e.g. selected from the RHS Perfect for Pollinators list.
Great Crested Newt	• There are numerous records of great crested newt (European Protected Species) locally, including at the new development south of Charfield Road. Two ponds are shown on OS maps as being present within boundary, although they are no longer present. One pond to the south is also no longer present. There are 10 other ponds within 500m (five within 250m). • The majority of the Site provides low value foraging habitat, although the hedgerows and river edge provide higher quality commuting, foraging and refuge opportunities. • **Surveys can be undertaken,** followed by traditional licensing techniques, or the Stroud GCN District Licensing Scheme can be followed which requires mitigation payment rather than surveys. • If present, the development could result in a permanent loss of terrestrial habitat for this species and result in an offence under UK and EU legislation.	• It may be possible to avoid surveys through the Stroud GCN District Licensing Scheme. This is an optional approach and can be expensive but will speed up the licensing process post-consent. • Alternatively, surveys of surrounding ponds will need to be undertaken, and appropriate mitigation undertaken on site – for example including high quality terrestrial habitat and ponds providing wildlife corridors. A licence from Natural England may be required for vegetation removal. • New ponds could be included as part of SuDS to provide an enhancement.
Dormouse	• European Protected Species. The site provides good quality hedgerows for this species and there are known records within 2km (EPS mitigation licence, shown on MAGIC). **Surveys required** to establish presence/ absence. • If present, a licence from Natural England is likely to be required for hedgerow removal.	• Avoid removal of hedgerows and woodland. • If present, mitigation will involve additional hedgerow/ woodland planting and timing constraints to vegetation removal.
Otter/ water vole	• Otter are a European Protected Species. Water vole are protected via the Wildlife & Countryside Act 1981 (as amended) – both are known to be present on the Ozleworth Brook, at Nind Nature Reserve upstream. **Surveys required** to identify resting/ breeding sites. • Presence of this species may impact design and result in timing constraints.	• Buffer the stream corridor to avoid disturbance of riparian mammals. • Any key areas e.g. holts should be protected from human/ dog disturbance by restricting access.

Table 2: Biodiversity Metric Indicative Baseline Calculations (Habitats)

Habitat Distinctiveness	Habitats on Site	Current Condition	Units on Site	Requirements to Deliver Gain	Likely Delivery
Very Low				Compensation not required	
Low	• Arable fields • Improved Grassland • Bareground • Tall Ruderal Vegetation	Poor to Moderate	56.42	Same distinctiveness or better habitat required	• Retain some existing grassland where possible e.g. in buffers and enhance to 'good' condition through over-sowing and management. • Retain ruderal vegetation and enhance to 'good' condition by controlling and eradicating Himalayan balsam. • Create species-rich meadow (higher distinctiveness). • Create other high distinctiveness habitats e.g. scattered trees, orchard, marshy grassland, ponds and wetland.
Medium	• Mixed Scrub • Marshy grassland	Poor	0.12	Same broad habitat or a higher distinctiveness habitat required	• Retain scrub and enhance to 'good' condition, or if lost replace with scrub or woodland habitat. • Retain marshy grassland and enhance/ extend through management. If lost replace with higher quality grassland (e.g. meadow) or wetland features.
High	None	N/A			
Very High	None	N/A			

Table 3: Biodiversity Metric Indicative Baseline Calculations (Hedgerows)

Habitat Distinctiveness	Habitats on Site	Current Condition	Units on Site	Requirements to Deliver Gain	Likely Delivery
Very Low	None	N/A			
Low	• Native hedgerow (species-poor)	Moderate to Good	5.46	Same distinctiveness band or better	• To provide gains, enhance 'Moderate' hedgerows to 'Good' condition, or to higher distinctiveness band such as species-rich hedgerow.
Medium	• Native species-rich hedgerow (with or without trees)	Poor to Good	12.624	Like for like or better	• Aim to retain these hedgerows. • Any losses will need compensation. • To provide gains, enhance 'Poor' and 'Moderate' hedgerows to 'Good' condition through management.
High	None	N/A			

NOTE – more biodiversity units are available when habitats are retained and protected during construction, and then 'enhanced' through management (rather than replaced). A detailed assessment will be required as the scheme develops, which will indicate the habitat areas and hedgerow lengths required to achieve the required BNG.

To achieve a 10% BNG (based on the current red/ blue line boundaries indicated in the Site Promotional Document), the Site will need to demonstrate **62.19 habitat units** and **19.89 linear (hedgerow) units**.

The above assessment was based on the assumption that the water course will not be impacted and will have a minimum 10m buffer.

6. Conclusions

The preliminary survey work has not identified any major ecological constraints to development of the site.

Whilst further surveys are required to help fully inform the emerging masterplan for the site, it is considered that the habitats of ecological value can be readily accommodated into a sensitively designed scheme. There remains ample opportunity for mitigation, compensation and enhancement measures through careful design, following the guidance given above.

Overall, it is considered that there are no significant or in-principle ecological constraints that would preclude the residential development of the site, and there is moreover the opportunity to achieve biodiversity net gain and compliance with local and national policy.

APPENDIX H

ODOUR IMPACT ASSESSMENT

LAND AT KINGSWOOD, WOTTON-UNDER-EDGE, STROUD, GLOUCESTERSHIRE.

DETAILED ODOUR IMPACT ASSESSMENT

September 2020

Report Ref: 01.0188.001/OIA v1

Isopleth Ltd.

[redacted]

CONTENTS

1.0 INTRODUCTION

Redrow has appointed Isopleth to undertake a detailed odour impact assessment of the Kingswood Wastewater Treatment Works (WwTW) with the aim of predicting any odour impact on their land to the South West of this site. The WwTW lies within the administrative authority of Stroud District Council and the Kingswood WwTW is operated by Wessex Water.

1.1 Site Description

The land of interest to Redrow lies less than 20 metres from the Kingswood WwTW site boundary and around 25 metres from the closest odour source. The site ownership boundary is shown in Appendix A.

1.2 Scope

This detailed assessment report only relates to odour from the WwTW and its constraints on the owned land and does not include assessment air quality impacts associated with construction or operation of any subsequent development, for example.

The sources of odour generation at the Kingswood WwTW have been identified and the resultant release and impact on the surrounding locality estimated, using site monitoring data and dispersion modelling techniques to determine exposure in terms of European Odour Units (ou_E/m^3).

1.3 Objectives

The objectives of this assessment are as follows:

- To predict odour impacts at the land of interest to Redrow; and
- To assess the significance of these impacts in terms of potential development constraints.

1.4 Experience of Assessor

According to guidance issued by the IAQM, odour surveys must only be completed by a qualified assessor if they are to be considered robust. This includes both experience in the field of odour assessment as well as a defined odour acuity.

This assessment has been completed by Matt Stoaling of Isopleth ltd and Fellow of the IAQM. Matt has been involved in the field of odour assessment for over 20 years. During this time, Matt has also provided air quality and odour advice and services to a range of industry sectors and clients, including solid waste, wastewater and agriculture. Matt has worked on behalf of local authority and government agencies advising on odour issues, including documents relating to odour assessment published by the Environment Agency, Sniffer and the IAQM. The IAQM Fellowship certificate for Matt Stoaling is included as Appendix B.

2.0 REGULATORY STANDARDS AND GUIDELINES

In the UK there are no statutory numerical standards for assessing the acceptability of predicted odour impacts from quantitative odour impact assessments. On this basis, odour impact criteria are typically based upon guideline documents (predominately based on research from outside of the UK), case law and research which differ depending on the regime i.e. planning (to avoid significant detriment to amenity) or permitting (to avoid unacceptable pollution).

The numerical limits applied have largely been derived from the findings of a limited number of epidemiological assessments where modelled odour impacts have been compared to the findings of quality of life surveys; a dose-effect study. These dose-effect studies have only been undertaken for a limited number of odour types; however they have been used as the foundation for the setting of acceptable odour standards in many countries.

The actual acceptable level of impact will be dependent on the nature (offensiveness) of the odour and the broad sensitivity of the population. To account for this differing numerical limits are often set not only depending on the offensiveness of the odour but also the broad sensitivity of the environment.

2.1 The National Planning Policy Framework (NPPF)

The latest guidance published in February 2019, the National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied.

At the heart of the NPPF is a presumption in favour of sustainable development. It is described as providing a framework within which locally-prepared plans for housing and other development can be produced. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development. The following Policies are of relevance.

Under paragraph 170(e), it states that:

> *'127. Planning policies and decisions should ensure that developments:*
>
> *…..*
>
> *f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users46; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.'*

Under paragraph 180, it states that:

> *'180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well*

as the potential sensitivity of the site or the wider area to impacts that could arise from the development. '

Under paragraph 182, it states that:

'182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

2.2 UK Guidance

UK guidance identifies a range of odour impact criteria depending primarily on the nature of the odour (i.e. its pleasantness/unpleasantness) and the likelihood of causing unacceptable impacts based on the 98th percentile of predicted hourly average concentrations over a year. It is therefore evident that such criteria apply only to locations where an individual's exposure is likely to occur for prolonged periods of time i.e. residential properties. Where exposure is more transient (i.e. roads, footpaths etc.) the direct application of such criteria should be treated with caution and further consideration should be given to how the duration and frequency of exposure of the individual will influence the acceptability of the predicted impact.

2.3 IAQM Odour Guidance

In October 2018 the Institute of Air Quality Management released the latest version of its guidance on the assessment of odour for planning. The guidance is for assessing odour impacts for planning purposes. It provides background information relating to requirements for odour impact assessments and suitable impact criteria and draws from other sources of information such as that described in EPR H4 horizontal odour guidance.

The information provided in this guidance relating to receptor sensitivity and also impact criteria have been used in this assessment.

2.3.1 Receptor Sensitivity

The sensitivity of the receptor and therefore the degree to which a complaint is likely to arise, will differ depending on the land use. The IAQM (2018) document provides the receptor sensitivity framework overleaf.

Table 2: Receptor sensitivity to odours

For the sensitivity of people to odour, the IAQM recommends that the Air Quality Practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor	Surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium sensitivity receptor	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low sensitivity receptor	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

It can be seen that:

- Residences are regarded as being of 'high' sensitivity to odour; and
- Commercial / retail premises (for example) are regarded as being of 'medium' sensitivity to odour.

2.3.2 IAQM Odour Impact Criteria

Odours from WwTW may include sludge sources which would be regarded in relative terms as being of the highest offensiveness, and 'humic' type odours from secondary treatment (for example) which would be regarded in relative terms as being of the highest offensiveness.

Table 7: Proposed odour effect descriptors for impacts predicted by modelling – "Moderately Offensive" odours

Odour Exposure Level C_{98}, ou_E/m^3	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-<10	Slight	Moderate	Moderate
3-<5	Negligible	Slight	Moderate
1.5-<3	Negligible	Negligible	Slight
0.5-<1.5	Negligible	Negligible	Negligible
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms "adverse" or "beneficial "should be added to the descriptors.

The IAQM (2018) Guidance the refers to the combined odour from wastewater treatment as being of 'moderate' offensiveness. The proposed odour effect descriptors for impacts predicted by modelling of moderately offensive odours is as shown above.

In terms of the application of the above odour effect descriptors, the IAQM (2018) Guidance states the following:

> *'Where the overall effect is greater than "slight adverse", the effect is likely to be considered significant. Note that this is a binary judgement: either it is "significant" or it is "not significant". Concluding that an effect is significant should not mean, of itself, that a development proposal is unacceptable and the planning application should be refused; rather, it should mean that careful consideration needs to be given to the consequences, scope for securing further mitigation, and the balance with any wider environmental, social and economic benefits that the proposal would bring.'*

Therefore, in relation to a high sensitivity receptor such as a residence and a moderately offensive odour such as from WwTW, an odour greater than $C_{98,\ 1\text{-hour}}$ 3 ou_E/m^3 would be regarded as 'moderate adverse' and therefore 'significant'.

2.4 UK Case Law (Planning)

There have been a number of planning Appeal judgments specifically in relation to the acceptability of odour from wastewater treatment on residential development; both in terms of encroachment of new housing in proximity to an existing WwTW and for new WwTW in proximity to existing housing.

Judgements such as The Fitz Cockermouth, Haverill Snooker Club and Bloor Homes Leighton Linslade for example, have accepted assessment criterion of $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ and $C_{98,\ 1\text{-hour}}$ $5ou_E/m^3$ as being sufficient enough to safeguard residential amenity.

On 1st March 2016 the Inspectors report for the appeal relating to 'Land South of Le Neubourg Way, Gillingham, Dorset' (Appeal Ref: APP/N1215/W/15/3005513) was released. This appeal, which centred on a development north of the Wessex Water Gillingham WwTW included a significant and detailed discussion between two odour expert witnesses and the issues are described in some detail in the Inspectors report. In relation to odour criteria, the Inspector concluded the following:

> *'19. Taking all the above into account, I conclude that the appropriate parameter to apply in this case is the 3 OU_E/m^3 contour line; a more restrictive approach would preclude from development areas which are comparable in odour terms with extensive areas of existing housing in Gillingham. A less restrictive approach would permit development of areas which, in odour terms, clearly ought not to be developed.'*

The limit criteria used in this assessment is discussed further in section 4.9 of this report.

2.5 Wessex Water Guidance

Wessex Water has prepared its own guidelines relating to development near WwTW:

- Odour Policy Plan. ENVS12015; and
- Odour Risk Assessment Procedure for Proposed New Development. Issue NO 4 TRTWG669, March 2019.

This guidance provides an assessment framework which Wessex Water prefer is used when the potential impacts of a WwTW on a new development are assessed.

Wessex Water has previously applied an impact criterion of between $C_{98,\ 1\text{-hour}}$ 1.5 ou_E/m^3 and $C_{98,\ 1\text{-hour}}$ 5 ou_E/m^3 as being sufficient enough to safeguard residential amenity. However, their current position, is that $C_{98,\ 1\text{-hour}}$ 3 ou_E/m^3 is appropriate.

3.0 ASSESSMENT METHODOLOGY

3.1 General Approach

This odour assessment has been undertaken using the concept of the European Odour Unit (ou_E), as defined in BS EN 13725. This approach allows impact assessment of any odorous gas as it is independent of chemical constituents and centres instead on multiples of the detection threshold (i.e. the physiological response of a human) of the gas in question. This approach is consistent with the requirements of Wessex Water and also for the previous odour assessments completed by Isopleth Ltd in relation to this WwTW.

As the odour unit is a Standard Unit in the same way as gram or milligram, the notation used in odour assessment follows the conventions of any mass emission unit as follows:

- concentration: ou_E/m^3
- emission: ou_E/s
- specific emission (emission per unit area): $ou_E/m^2/s$

Like air quality standards for individual pollutants, exposure to odour is given in terms of a percentile of averages over the course of a year. The exposure criteria most accepted in the UK at present is given in terms of (concentration) European Odour Units as a 98th percentile (C_{98}) of hourly averages. This allows 2% of the year when the impact may be above the limit criterion (175 hours). The notation for impact is therefore: $C_{98,\ 1\ hour}$ X ou_E/m^3.

3.2 Wessex Water Consultation

This assessment is based on consultation with Wessex Water and an accompanied site visit to the Kingswood WwTW on 3rd August 2020. The assessment follows the requirements of *Odour Risk Assessment Procedure for Proposed New Development* (March 2019) and inputs have been agreed with Mr James Humphries, Regional Process Scientist (Odour and Fly Management Co-ordinator).

3.3 Quantification of Odour Impact

Emissions data agreed with Wessex Water and confirmed as appropriate has been used as input to an atmospheric dispersion model. For this assessment the AERMOD model has been used with due consideration to relevant guidance. This model is widely used and accepted by the EA and UK planning authorities for undertaking such assessments and its predictions have been validated against real-time monitoring data by the USEPA. Wessex Water prefer the use of the AERMOD model (which is a valid model as stated in the IAQM guidance) as the majority of odour modelling completed in the Wessex Water area has been completed using AERMOD and therefore makes future comparisons easier. It is therefore considered a suitable model for this assessment.

Dispersion modelling guidance indicates that at least 3 (and ideally 5) years of meteorological data should be applied to ensure that infrequent weather conditions do not unduly bias the

results. This results in a range of predicted impacts for different years of meteorological data and the average value is used to assess compliance, with the range of impacts used to assess likely variation between years and the risk of shorter-term impacts. This is particularly important in relation to odour, where acceptability of impacts is assessed by receptor over long time periods rather than as a result of infrequent or unusual meteorological conditions.

The results of the dispersion modelling have been presented in the form of:

- illustrations of the odour footprint as isopleths (contours of concentration) for the criteria selected enabling determination of impact at any locations within the study area; and
- tabulated odour concentrations ($C_{98,\ 1\text{-hour}}$ X ou_E/m^3) at discrete receptor locations to facilitate the discussion of results.

4.0 BASELINE ENVIRONMENT & MODEL INPUT

4.1 Development Area and Complaint History

The location of the land ownership (within the red line boundary) is shown in Appendix A.

The Kingswood WwTW is a traditional works, with inlet flows pumped to screens, primary tanks and then biotrickling filter beds. As it is a pumped works there are no flows in excess of full flow to treatment (FFT) received at the works. Sludge is held in open holding tanks (only 2 of which are currently operational) before being tankered from the site.

Wessex Water was not aware of any odour complaints that have been received from existing residential receptors in relation to emissions from the Kingswood works, although there have been reports of odour from receptors on the New Road. These reports were attributed to a pumping station which serves the works rather than the works process units themselves.

4.2 Topography

The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

The WwTW facility lies on land which slopes downwards towards the potential development site (and river), with a basal elevation of around 35-45m AoD. Topography has been incorporated within the dispersion model.

4.3 Meteorological Conditions

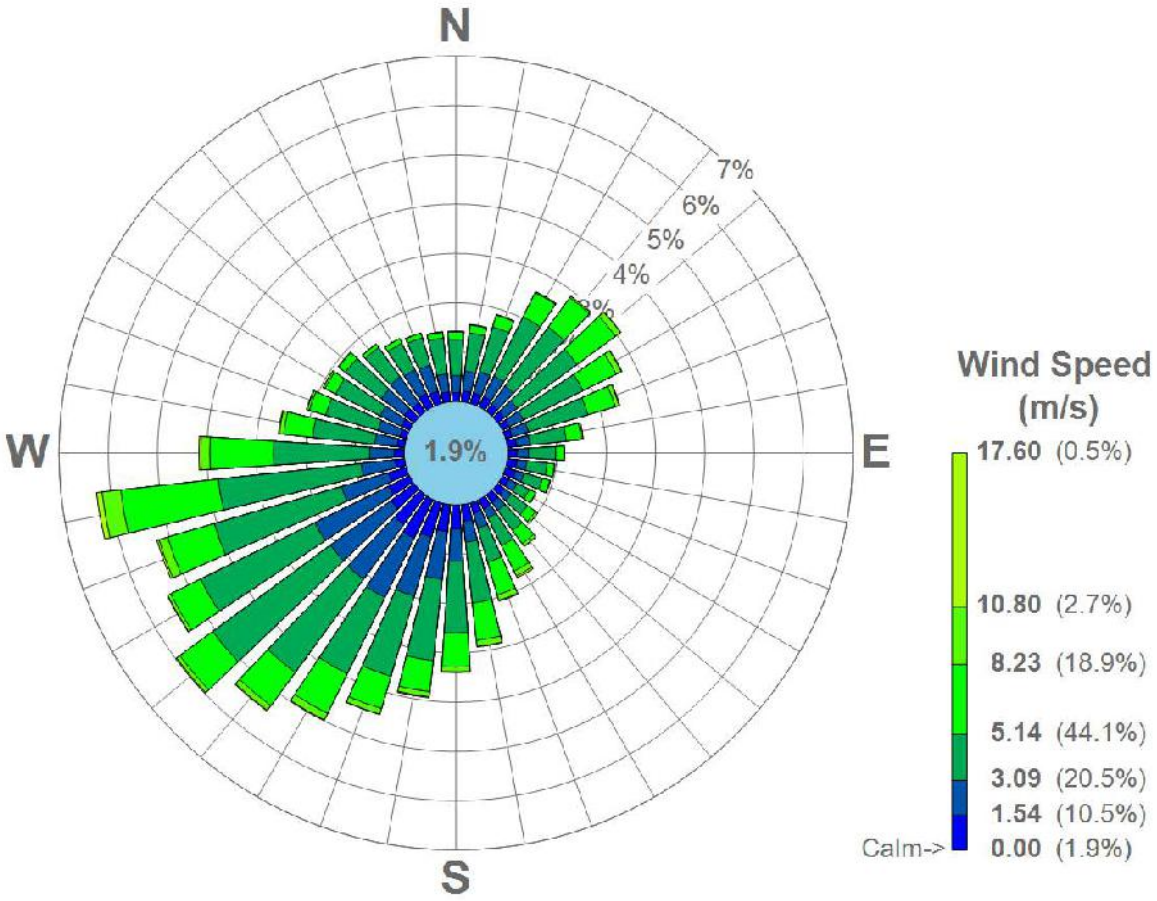
For meteorological data to be suitable for dispersion modelling purposes a number of meteorological parameters need to be measured on a continuous basis. There are only a limited number of sites where the required meteorological measurements are made. In the UK, all of these sites are quality controlled by the Met Office.

The closest Met Office site to Kingswood is located at RAF Lyneham. Wessex Water was consulted regarding the suitability of the RAF Lyneham data set and has confirmed that this is their preferred meteorological data set for this site due to proximity and height of ground level (mAoD). Data for the years 2014 to 2018 inclusive have been used for this assessment as showing in Figure 4-1.

It is apparent from this data that the predominant wind direction is from the SSW with very infrequent wind from the north east (i.e. from the WwTW to the proposed residence). This is as would be expected given the prevailing winds of the UK.

Figure 4-1

Lyneham Data: Windrose



The AERMOD dispersion model requires the selection of a suitable data set (in this case Lyneham) and then 'preparation' of this data set using the AERMET software to account for site characteristics such as surface roughness, and albedo. The WwTW is currently surrounded by a thin band of trees, with grassland in the wider area including pasture from the WwTW to the proposed dwelling.

The surface roughness and albedo / bowen preparation (which relies on the land use proportions over a larger area), are as follows and have been agreed with Wessex Water:

- Roughness: 0.2m;
- Albedo: 0.2664; and
- Bowen: 1.0225

4.4 Site Surroundings and Potentially Sensitive Receptors

A total of 102 receptor locations have been selected in the model to represent locations within the land ownership, as shown in Drawing AQ1, Appendix A.

Five receptor locations have been selected in the model to represent existing residences close to the Kingswood WwTW, as shown in Table 4-1, below and Drawing AQ1, Appendix A.

Table 4-1
Existing Receptors

Reference	Description	OS Xm	OS Ym
NR1	Blueboy Cottage	374110.2	192913.9
NR2	The Round House	374149.7	192969.2
NR3	Bushford House	374194.8	192976.6
NR4	Bushford Bridge Cottage	373988.1	192886.7
NR5	Hopyard farm	374275.7	192497.7
NR6	Merryford Farm	373976.7	192807.9

Impacts have also been assessed by use of a 1.05km x 1.05km grid at 30m resolution across the model domain. These results have been presented as odour impact isopleths.

4.5 Odour Baseline Conditions

Ambient odour is not a pollutant that is measured in the UK as it is not possible to accurately obtain a background concentration using standard monitoring techniques.

Wessex Water has agreed that these is no requirement for the predictive modelling to be accompanied by walkover odour audits ('sniff tests') following the IAQM procedure in this case.

4.6 Model Scenarios

A single model scenario has been assessed. In this scenario the agreed emission rates have been used which are based on UKWIR values. The rates used are specific to the Kingswood site and it should not be assumed that they are relevant to any other WwTW.

4.7 Quantification of Odour Emissions

A site schematic for the WwTW is included as Appendix C (reproduced courtesy of Wessex Water). The WwTW includes the following potentially odorous sources:

- Inlet works;
- 3 No. Primary Settlement Tanks (with distribution tank);
- 4 No. Trickling filter beds;
- 2 No. Sludge holding tanks (others disused);
- 4 No. Humus tanks; and

- holding / transfer chambers.

No seasonal variability has been applied to the specific emission rates, although in reality emissions are likely to be lower during the winter months when volatilisation will be higher and the potential development of septicity more rapid.

The modelled odour emission rates from the inlet works are presented in Table 4-2 below.

Table 4-2
Odour Emission Rates – Inlet

ID	Source	Surface Area (m^2)	Emission Rate ($ou_E/m^2/s$)
SS	screens skip	2.6	20.0
IC	Inlet channels	3.9	6.2
IBT1	Inlet Balance Tank 1	10.2	6.2
IBT2	Inlet Balance Tank 2	10.2	6.2
IS	inlet screens and sump	4.0	80.0

The modelled odour emission rates from primary treatment are presented in Table 4-3 below.

Table 4-3
Odour Emission Rates – Primary Treatment

ID	Source	Surface Area (m^2)	Emission Rate ($ou_E/m^2/s$)
PSTDT	PST Distribution Tank	3.0	100.0
PSTDS1	PST desludge well 1	1.4	140.0
PSTDS2	PST desludge well 2	1.4	140.0
PST3	Primary Tank 3	28.3	2.0
PST2	Primary Tank 2	28.3	2.0

The modelled odour emission rates from the sludge sources are presented in Table 4-4 below.

Table 4-4
Odour Emission Rates – Sludge and Returns

ID	Source	Surface Area (m^2)	Emission Rate ($ou_E/m^2/s$)
SST1	Sludge Settling Tank 1	112.5	140.0
SST2	Sludge Settling Tank 2	112.5	140.0
BBSPS	Bushford Bridge SPS	8.0	100.0

The site exports sludge via vacuum tanker on an irregular basis. These emissions have not explicitly been included within the model although it could be assumed that by incorporating the open sludge tank, transfer and liquors return as a continuous source the odorous emissions from this location are appropriate.

The modelled odour emission rates from the trickling filter beds are presented in Table 4-5 below.

Table 4-5
Odour Emission Rates – Biotrickling Filters

ID	Source	Surface Area (m^2)	Emission Rate ($ou_E/m^2/s$)
DOSE1	filter distribution 1	9.0	2.0
DOSE2	filter distribution 2	9.0	2.0
FIL4	FIL1 04	380.1	1.5
FIL3	FIL1 03	380.1	1.5
FIL2	FIL1 02	380.1	1.5
FIL1	FIL1 01	380.1	1.5

The modelled odour emission rates from the final treatment stages (humus tanks) are presented in Table 4-6 below.

Table 4-6
Odour Emission Rates – Final Treatment

ID	Source	Surface Area (m^2)	Emission Rate ($ou_E/m^2/s$)
HT4	humus tank 4 (square)	10.2	0.7
HT3	humus tank 3 (square)	10.2	0.7
TAN1	empty centre tank (square)	9.0	0.0
HT1	Humus Tank 1	28.3	0.7
HT2	Humus Tank 2	28.3	0.7

The overall site odour emissions and the relative contribution of each source group, is presented in Table 4-7 below.

Table 4-7
Site Odour Contribution

Source	Emission (ou_E/s)	% of total
Inlet Works	283.2	0.8%
Primary Settlement Tanks	861.6	2.4%
sludge	32300.0	90.1%
Filter Beds	2316.8	6.5%
Humus Tanks	69.6	0.2%
total	**35831.2**	**100.0%**

This site contribution is dominated by the odour emissions from the sludge sources, particularly the 2 No. sludge holding tanks to the north east of the works. There are additional tanks at the site which are currently out of use but could be brought back into use in the future if refurbished.

4.8 Building Downwash

Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated point source to be displaced and dispersed rapidly towards the ground, resulting in higher ground level concentrations. Building downwash should always be considered for buildings that have a maximum height equivalent to at least 40% of the emission height and which within a distance defined as five times the lesser of the height or maximum projected width of the building. There are no point sources (such as odour control stacks) at the WwTW.

4.9 Assessment Criteria: Limits

The objective of the assessment is to determine the potential extent to which unacceptable levels of odour impact could reasonably be expected to occur as a result of emissions from the site. Consideration should be given to all of the FIDOL factors, particularly frequency and duration in the case of amenity receptors.

As it is not known how the landowners would develop the plot, it is appropriate to apply criteria for high sensitivity receptors (such as residences) as well as receptors of medium sensitivity.

4.9.1 Residences

An odour limit criterion of $\mathbf{C_{98,1\text{-}hour}\ 3ou_E/m^3}$ is considered reasonable / appropriate in this case for residential receptors, which are regarded as 'high sensitivity receptors'. At this level it is likely that odour will be detected, however the IAQM Guidance states that at this level it is unlikely that a Statutory Nuisance will be caused. Above a level of $C_{98,\ 1\text{-}hour}\ 5ou_E/m^3$ Nuisance may be established.

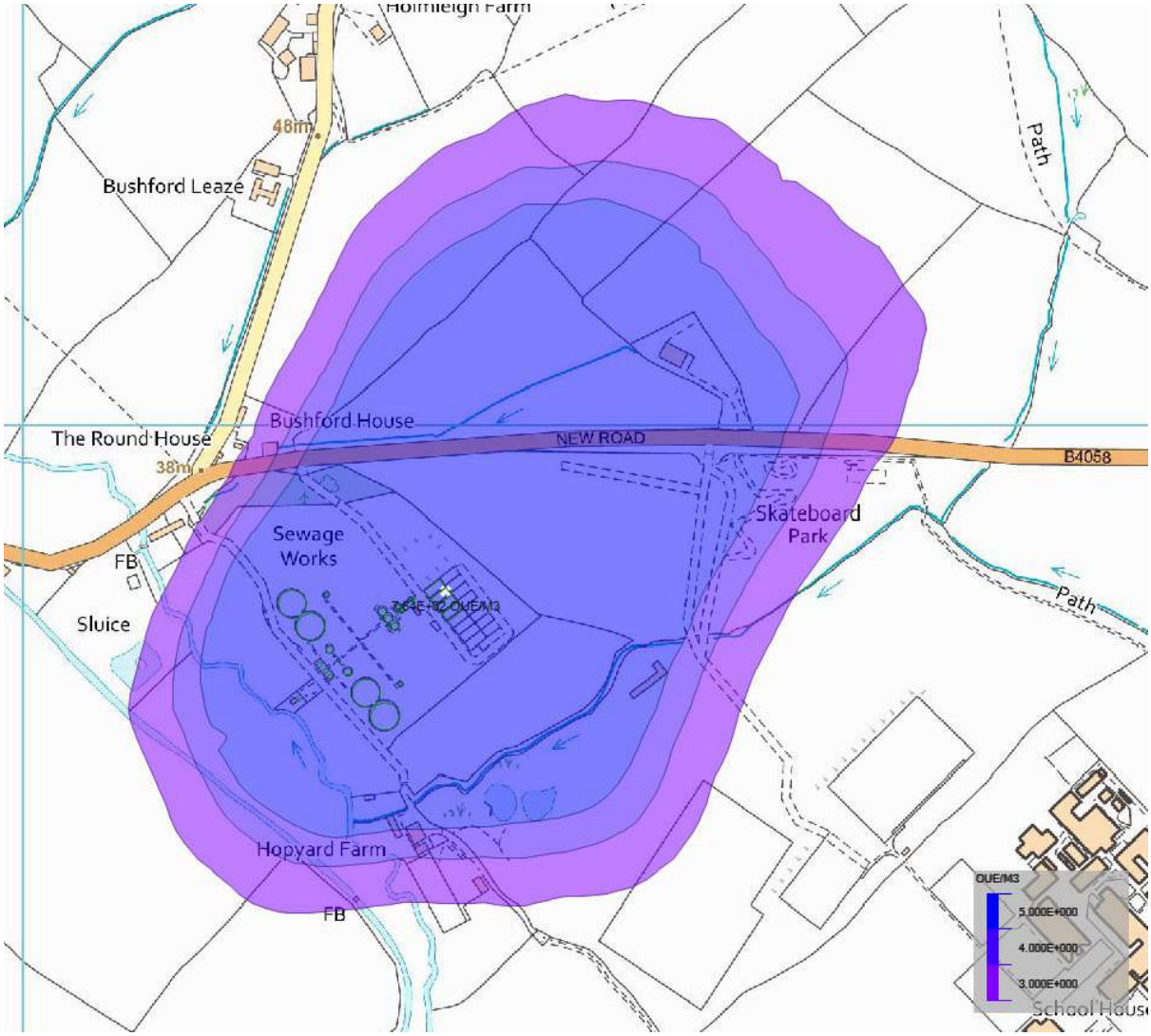
4.9.2 Other receptors

A less stringent odour limit criterion of $\mathbf{C_{98,1\text{-}hour}\ 5ou_E/m^3}$ is considered reasonable / appropriate in this case for receptors of 'medium' sensitivity such as workplaces. At this level it is likely that odour will be detected, however the IAQM Guidance states that at this level it is unlikely that a Statutory Nuisance will be caused. Above a level of $C_{98,\ 1\text{-}hour}\ 10ou_E/m^3$ Nuisance may be established for these receptors

5.0 PREDICTED IMPACTS

The results of the detailed dispersion modelling assessment are presented in Appendix D, table D-1 for the receptors within the land ownership boundary. Isopleths of impact are also shown in Figure 5-1, below which shows the $C_{98,1\text{-hour}}$ 3, 4 and 5 ou_E/m^3 isopleths for the 5 year average impact.

Figure 5-1
5-year average odour impact



The results of the assessment indicate that, based on the input data used in the model, the average odour impact associated with the WwTW is less than the limit of $C_{98,1\text{-hour}}$ 3 ou_E/m^3 at all locations within the potential development site except for those closest to the WwTW.

The results of the detailed dispersion modelling for the existing residential receptors.

Table 5-2
WwTW: Predicted Odour Impact ($C_{98\ 1\ hour}$ ou_E/m^3)

	2014	2015	2016	2017	2018	2014-18
NR1	2.3	2.4	3.0	2.0	2.8	2.4
NR2	2.4	2.6	3.0	2.2	2.7	2.6
NR3	3.4	4.3	4.4	3.6	3.6	3.8
NR4	0.9	1.2	1.4	0.8	1.1	1.1
NR5	1.6	1.2	1.5	1.0	1.4	1.3
NR6	1.1	1.4	1.9	0.9	1.3	1.3

The results of the assessment indicate that the odour impact associated with the WwTW is less than the limit of $C_{98,1\text{-hour}}$ 3 ou_E/m^3 at existing properties other than NR3 (Bushford House) when all 2 sludge holding tanks are in operation. The maximum impact at an existing dwelling is 4.4 ou_E/m^3 (NR3, 2016) indicating that although this receptor would detect odours from the works and it is above the selected odour criteria. Given the absence of complaints this would indicate that either these receptors are less sensitive to these odours than the 'standard' receptor or that the model is overpredicting impact at this location.

6.0 CONCLUSIONS

This report presents a detailed odour impact assessment (OIA) of the Kingswood Wastewater Treatment Works (WwTW), particularly in relation to the potential for impact at land of interest to Redrow.

The assessment has been completed using information provided by Wessex Water and obtained during an audit of the works. This includes:

- a list of odour sources on the site;
- dimensions of all process units; and
- Emission rates for each of the sources.

Wessex Water has confirmed that walkover odour audits ('sniff tests') following the IAQM procedure are not required at this site.

The average odour impact isopleths have been presented in Figure 5-1 which show the extent of the odour constraints associated with the WwTW. Quantitative predictions are presented in Section 5 of this report. These indicate that an area closest to the WwTW is constrained for residential development, based on the emission rates assumed in the dispersion modelling and also assuming that 2 sludge holding tanks are in use.

Notice:

This report was produced by Isopleth Ltd to present the results of an odour impact assessment for a proposed development on land at Kingswood, Gloucestershire.

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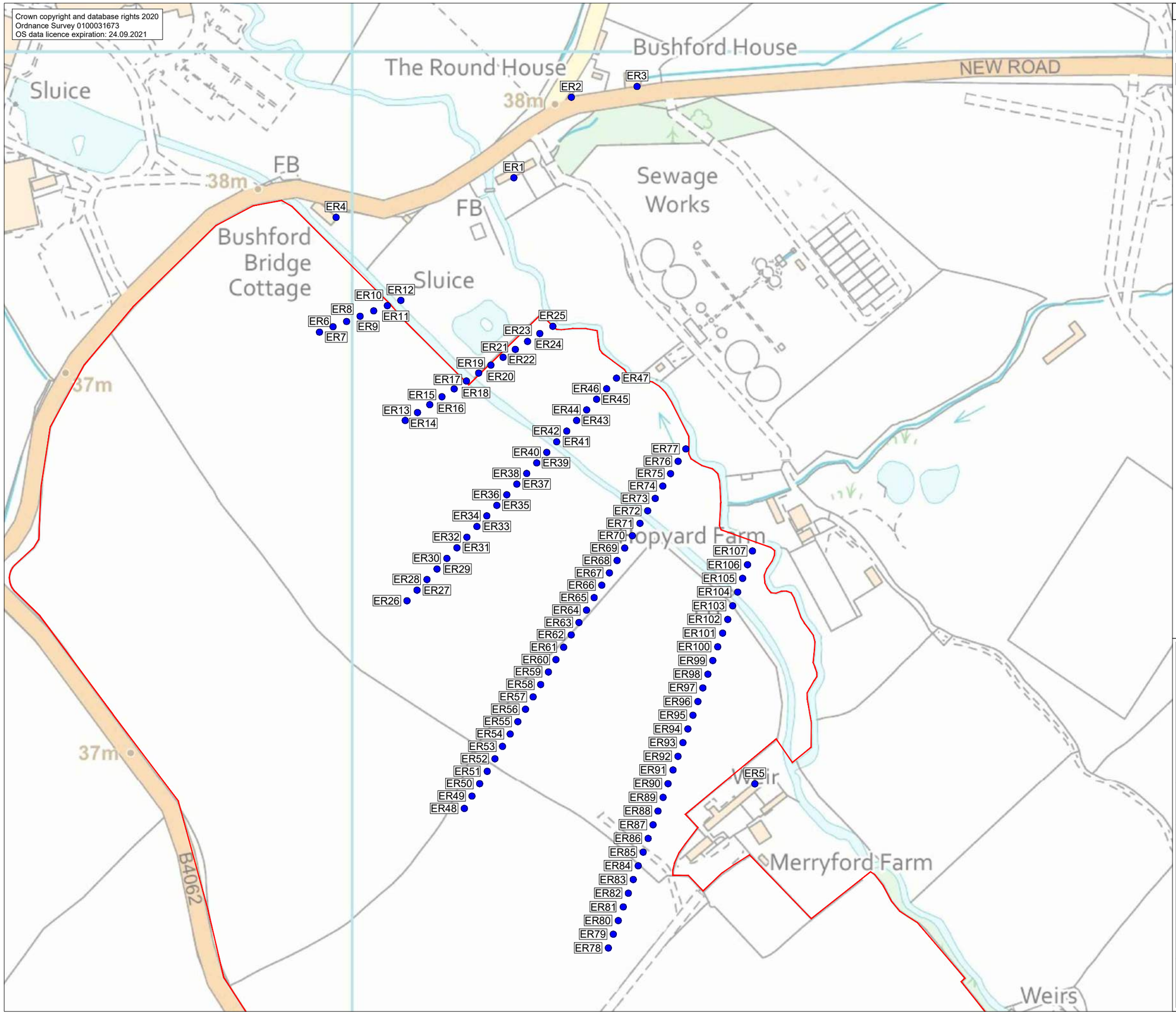
APPENDIX A



LEGEND

- SITE BOUNDARY
- RECEPTOR LOCATION

N
W E
S

Redrow

SITE
Kingswood, Wotton under Edge

PROJECT
Air Quality Assessment 01.0188.001

DRAWING TITLE
Assessment Receptors

DRAWING NUMBER	REVISION
AQ1	0
SCALE	DATE
1:2500 @ A3	28.09.2020

ISOPLETH

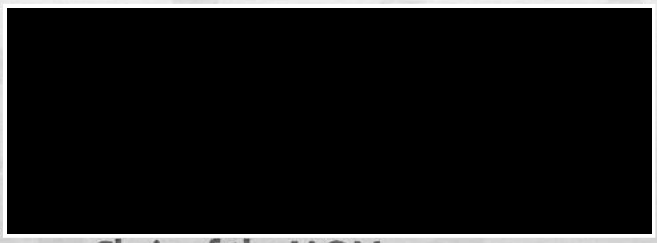
APPENDIX B

Mr Matthew Stoaling

has been elected for membership of the Institue of Air Quality Management, having satisfied the entry criteria laid out by the committee of the IAQM. Therefore the application review panel have recommended:

Fellowship

and the holder may now use the post-nominal letters FIAQM



Chair of the IAQM

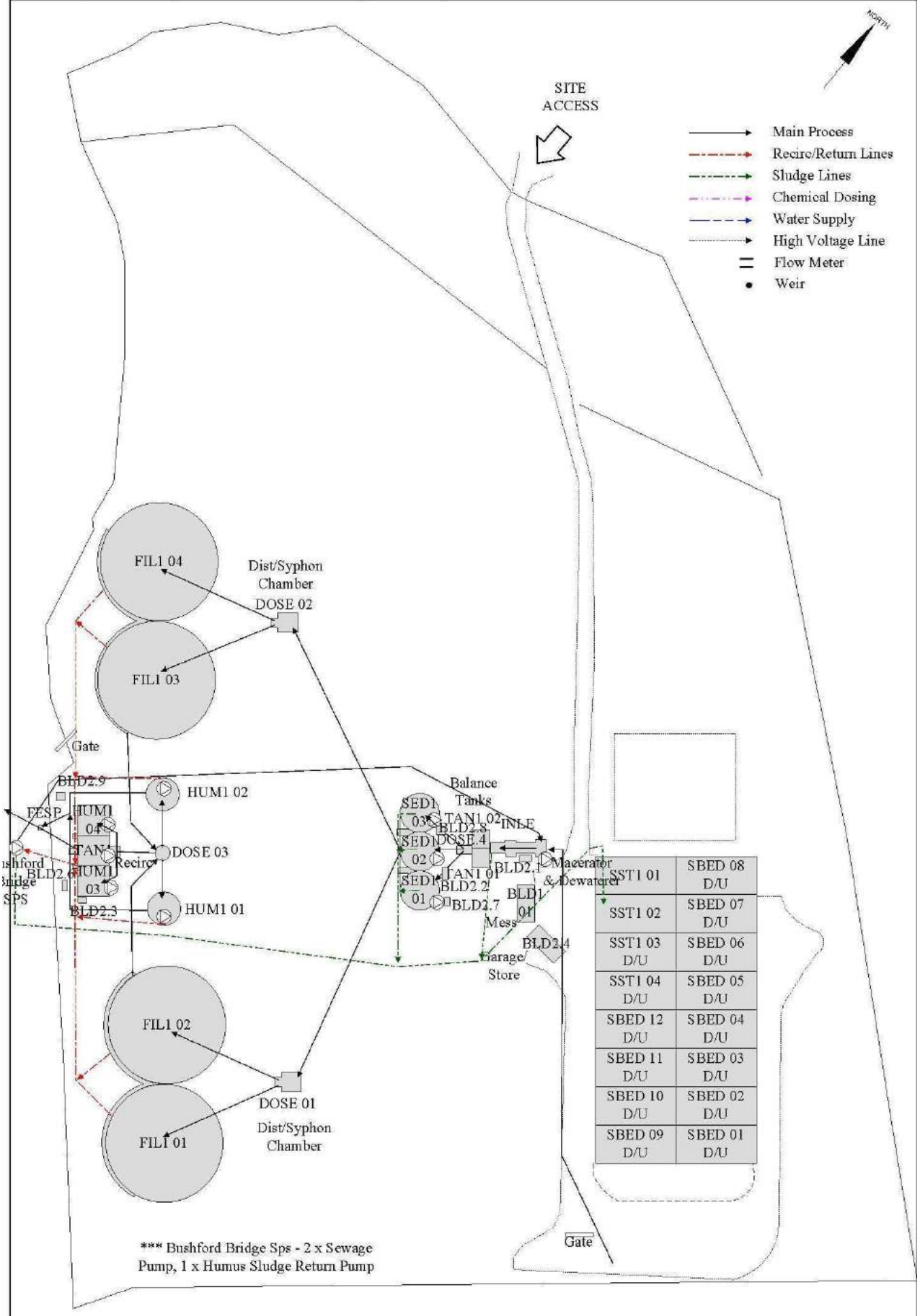
August 2012

IAQM | Institute of Air Quality Management

F

APPENDIX C

Drawing Number:	13361/10/001	TITLE:	WOTTON UNDER EDGE - KINGSWOOD STW



Revision No:	4	Revision Date :	08.05.2006	Status	RECORD DRAWING

APPENDIX D

The results of the assessment at the receptor locations modelled (as showing in Appendix A) are as follows:

Table D-1
WwTW: Predicted Odour Impact ($C_{98\ 1\ hour}$ ou_E/m^3)

	2014	2015	2016	2017	2018	2014-18
NR7	1.2	1.5	1.9	0.9	1.4	1.4
NR8	1.2	1.6	2.0	1.0	1.4	1.5
NR9	1.3	1.7	2.2	1.1	1.6	1.6
NR10	1.3	1.8	2.2	1.1	1.6	1.6
NR11	1.4	1.9	2.3	1.2	1.7	1.7
NR12	1.5	2.0	2.4	1.3	1.8	1.8
NR13	2.0	2.0	2.9	1.6	2.1	2.1
NR14	2.1	2.1	3.0	1.6	2.2	2.2
NR15	2.2	2.3	3.2	1.7	2.4	2.4
NR16	2.3	2.4	3.4	1.9	2.5	2.6
NR17	2.4	2.6	3.6	2.0	2.7	2.7
NR18	2.6	2.8	3.9	2.1	2.8	2.9
NR19	2.8	3.1	4.3	2.3	3.0	3.1
NR20	2.9	3.3	4.5	2.4	3.2	3.3
NR21	3.2	3.7	4.9	2.6	3.5	3.6
NR22	3.4	3.9	5.3	2.8	3.8	3.8
NR23	3.7	4.2	5.8	3.1	4.1	4.2
NR24	3.9	4.6	6.0	3.4	4.4	4.5
NR25	4.4	4.9	6.7	3.6	4.9	4.9
NR26	1.6	1.6	2.1	1.0	1.8	1.7
NR27	1.7	1.7	2.1	1.1	1.9	1.8
NR28	1.8	1.8	2.2	1.1	2.0	1.8
NR29	1.9	1.8	2.4	1.2	2.0	1.9
NR30	2.0	2.0	2.5	1.3	2.2	2.0
NR31	2.1	2.1	2.7	1.3	2.3	2.1
NR32	2.2	2.2	2.8	1.4	2.4	2.3
NR33	2.3	2.3	2.9	1.5	2.5	2.4
NR34	2.4	2.5	3.1	1.6	2.6	2.5
NR35	2.6	2.6	3.3	1.8	2.8	2.7
NR36	2.7	2.8	3.5	1.9	3.0	2.8
NR37	2.9	3.0	3.7	2.0	3.1	3.0
NR38	3.1	3.1	3.9	2.2	3.3	3.2
NR39	3.3	3.3	4.2	2.4	3.6	3.5
NR40	3.6	3.5	4.6	2.6	3.8	3.7

	2014	2015	2016	2017	2018	2014-18
NR41	3.9	3.8	5.0	2.9	4.1	4.0
NR42	4.3	4.2	5.5	3.2	4.4	4.4
NR43	4.7	4.6	6.1	3.5	5.0	4.9
NR44	5.3	5.0	6.7	4.0	5.4	5.4
NR45	6.0	5.5	7.5	4.6	6.1	6.1
NR46	6.7	6.5	8.7	5.6	7.0	7.0
NR47	7.7	7.9	10.4	6.8	8.2	8.3
NR48	1.3	1.2	1.6	0.7	1.4	1.2
NR49	1.3	1.3	1.7	0.8	1.4	1.3
NR50	1.4	1.3	1.7	0.8	1.5	1.3
NR51	1.4	1.4	1.8	0.8	1.5	1.4
NR52	1.5	1.4	1.9	0.9	1.6	1.4
NR53	1.6	1.5	2.0	1.0	1.7	1.5
NR54	1.7	1.5	2.1	1.0	1.7	1.6
NR55	1.7	1.6	2.2	1.1	1.8	1.6
NR56	1.8	1.7	2.3	1.1	1.9	1.7
NR57	1.9	1.8	2.3	1.2	2.0	1.8
NR58	2.0	1.9	2.4	1.2	2.1	1.9
NR59	2.1	2.0	2.6	1.3	2.2	2.0
NR60	2.2	2.0	2.7	1.4	2.4	2.1
NR61	2.4	2.2	2.8	1.5	2.5	2.2
NR62	2.5	2.3	3.0	1.6	2.6	2.4
NR63	2.7	2.4	3.1	1.7	2.8	2.5
NR64	2.8	2.6	3.3	1.8	3.0	2.7
NR65	3.0	2.7	3.5	1.9	3.1	2.9
NR66	3.2	2.9	3.7	2.0	3.3	3.1
NR67	3.4	3.1	4.0	2.2	3.5	3.3
NR68	3.7	3.3	4.3	2.3	3.8	3.5
NR69	3.9	3.6	4.6	2.5	4.1	3.7
NR70	4.2	3.9	5.0	2.7	4.4	4.0
NR71	4.5	4.1	5.4	3.0	4.6	4.3
NR72	4.9	4.5	5.8	3.3	5.0	4.7
NR73	5.3	4.9	6.3	3.6	5.4	5.1
NR74	5.7	5.3	6.8	3.9	5.8	5.5
NR75	6.2	5.8	7.5	4.3	6.3	6.0
NR76	6.8	6.4	8.4	4.8	7.0	6.7
NR77	7.5	7.2	9.4	5.5	7.8	7.5
NR78	1.1	0.9	1.0	0.5	0.8	0.8
NR79	1.1	0.9	1.1	0.6	0.9	0.9
NR80	1.2	0.9	1.1	0.6	0.9	0.9
NR81	1.2	1.0	1.2	0.6	1.0	1.0

	2014	2015	2016	2017	2018	2014-18
NR82	1.2	1.0	1.2	0.6	1.0	1.0
NR83	1.3	1.1	1.2	0.6	1.0	1.0
NR84	1.4	1.1	1.3	0.7	1.1	1.1
NR85	1.4	1.1	1.3	0.7	1.1	1.1
NR86	1.5	1.2	1.4	0.7	1.2	1.2
NR87	1.5	1.2	1.4	0.8	1.2	1.2
NR88	1.6	1.3	1.5	0.8	1.3	1.3
NR89	1.7	1.3	1.6	0.8	1.3	1.3
NR90	1.7	1.4	1.6	0.9	1.4	1.4
NR91	1.8	1.5	1.7	0.9	1.4	1.5
NR92	1.9	1.5	1.8	1.0	1.5	1.5
NR93	2.0	1.6	1.9	1.1	1.6	1.6
NR94	2.1	1.7	2.0	1.1	1.6	1.7
NR95	2.2	1.7	2.1	1.2	1.7	1.8
NR96	2.3	1.8	2.2	1.3	1.8	1.9
NR97	2.4	1.9	2.4	1.3	1.9	2.0
NR98	2.6	2.0	2.5	1.4	2.0	2.1
NR99	2.7	2.2	2.6	1.6	2.2	2.2
NR100	2.9	2.3	2.8	1.7	2.3	2.4
NR101	3.1	2.4	2.9	1.8	2.4	2.5
NR102	3.3	2.6	3.1	1.9	2.6	2.7
NR103	3.5	2.8	3.4	2.1	2.8	2.9
NR104	3.7	3.0	3.6	2.2	3.0	3.1
NR105	4.0	3.3	3.9	2.4	3.3	3.4
NR106	4.4	3.6	4.2	2.6	3.5	3.6
NR107	4.6	3.9	4.6	2.9	3.9	3.9

APPENDIX I

SCHOOL CAPACITY REPORT

[redacted]

Education Property Consultancy

[redacted]

Introduction

1. This report is commissioned by Redrow Homes to present an analysis of the existing pupil capacity in the Wotton cluster of 5 primary schools, as defined by Gloucestershire County Council (GCC) in its School Places Strategy (2018-2023)[1], and to present a potential long term solution to the school infrastructure requirements.

Current situation

2. The Table below presents the picture as it was in the last academic year. When pupil numbers for the current academic year become available it will be updated. It clearly shows that there is little spare capacity across the cluster as a whole with none available at Kingswood Primary School (KPS) and North Nibley C of E Primary School.

Primary School	**Postcode**	**Distance from Kingswood [1]**	**Capacity**	**Number on Roll [2]**	**Spare capacity**
Kingswood	GL12 8RN	100 yards	119	119	-
Blue Coat C of E	GL12 7BD	1.05 miles	315	296	19
The British	GL12 7JU	2.54 miles	210	167	43
Hillesley C of E	GL12 7RH	2.40 miles	56	37	19
North Nibley C of E	GL11 6DL	3.49 miles	105	110	-5
Total			805	729	76

[1] *The distances have been measured from the junction of Charfield Road (B4062) with Wotton Road (B4060) and Old Rectory Road in Kingswood village.*

[2] *This was the number of pupils on roll at January 2020 ie. the previous academic year.*

The impact of additional housing

3. The Table above focusses on Kingswood village because KPS is full, and there is no scope for increasing its capacity. A development of 51 new dwellings has recently been completed to the

[1] (https://www.gloucestershire.gov.uk/media/2085281/gloucestershire-school-places-strategy-2018-2023-final-web.pdf)

south-west of the village, which could generate an additional 21 primary age children[2] and will mean that KPS will become over-subscribed. (An over-subscribed school is one where there are more applicants for places in the YR [Reception year of entry] Year Group than the number of available places (the Published Admission Number) [PAN].

4. Furthermore, there are currently two pending planning applications for new houses relatively close to the School. One, S.20/0887/FUL (land at Cloverlea Barn, Wickwar Road), is for 58 units (which could be expected to produce about 24 additional primary age children if it is approved and when completed) and the other, S.20/1083/OUT (land south of Charfield Road), is for 50 units (an additional 21 children if approved). These proposals have prompted the Chair of Governors of KPS to write a letter objecting to both developments and requesting that the proposals be refused on the grounds that the School cannot cope with more children. However, it is believed there is an imperative to permit more housing in the District and in and around Kingswood and Wotton in particular, given the sustainable nature of these settlements which have a range of everyday facilities and a major employment source in the vicinity.

5. An interim solution to this primary school infrastructure problem would be to take advantage of the (fairly minimal) spare capacity in one of the other schools in the cluster. The distances in the Table show how far children would have to travel to a school with spare capacity, if they are unsuccessful in gaining a place at KPS – which would be their local school. A better permanent solution is required so that children can be educated in their local community rather than further afield, which also increases travel time for parents.

Possible long term solution

6. KPS is a small school on a confined site. From a curriculum and a financial point of view it would benefit from an increase in size to accommodate more children but this cannot happen on its existing site due to physical and land ownership constraints.

7. It is preferable if primary schools operate in whole forms of entry (FE) so that children of the same age can be taught in the same group. This requires at least 7 classrooms with associated ancillary facilities to support a PAN (Published Admission Number) of 30 (1FE). However, the ideal size for a primary school is generally regarded as 2FE with a capacity for 420 children.

8. In order to achieve either of the above preferences, a site would need to be available to GCC, as the local education authority, to re-locate KPS to new buildings with increased capacity.

9. Neither of the current proposers for new development, referred to in para. 4 above, can offer this possibility. There are also 3 other housing developers holding option agreements on land which they could promote for more housing in the Kingswood village area. It is believed that only one, however, would have the ability to offer a suitable area of land (GCC's preferred size of 2 hectares [ha]) on which a re-located KPS could be established with scope to be able to further increase in size up to a 2FE primary school.

10. This offer (2 ha. land for re-located and enlarged KPS) could be made by Redrow Homes who have an option agreement on land north of Charfield Road just west of the village. The offer would be made viable with a new development of up to 300 dwellings. This would provide a

[2] The calculation, used throughout this report, of the number of primary age children likely to be generated from a new housing development is 41 pupils per 100 dwellings. This is the current GCC pupil product based on data collected in 2018 and 2019 (Appendix 2, GCC Local Development Guide Update Consultation Draft – April 2020)

permanent solution to the cluster's infrastructure problem.

11. It would be for GCC, in conjunction with the Governing Body of KPS, to establish the initial size of a re-located KPS and that would be dependent on planning approvals. From the Table above, KPS has a current capacity of 119. A 300 dwelling development could be anticipated to 'generate' about 123 new primary age residents. From the proposed developments at para. 4, there could be a further 24 + 21 additional new children so that could already be as many as 308 (119 + 189 from the Table below) children before other proposed developments are considered.

Current and proposed developments	**KPS current capacity**	**KPS current NOR* + additional**	**KPS surplus (+) / deficit (-)**
Existing situation	119	119	0
Completed development (51 units SW of village)	119	+ 21	-21
Pending Application at Cloverlea Barns	119	+ 24	-45
Pending Application south of Charfield Road	119	+21	-66
Proposed development north of Charfield Road (300 dwellings)	119	+123	-189

*NOR – number on Roll

12. Therefore, a proposal, which includes new school buildings with scope to expand to a full 2FE (capacity 420 pupils), would seem to be most appropriate to address a current infrastructure issue and one which will become more acute as developments continue to be built in this location.

APPENDIX J

PREVIOUS ADDITIONAL HOUSING OPTIONS REPRESENTATIONS

ON BEHALF OF REDROW HOMES (SW) LTD

REPRESENTATIONS TO STROUD DISTRICT COUNCIL'S LOCAL PLAN REVIEW 'ADDITIONAL HOUSING OPTIONS' CONSULTATION

IN RESPECT TO LAND NORTH OF CHARFIELD ROAD, KINGSWOOD

December 2020

Grassroots

Grassroots Planning Ltd.

ON BEHALF OF REDROW HOMES (SW) LTD

REPRESENTATIONS TO STROUD DISTRICT COUNCIL'S LOCAL PLAN REVIEW 'ADDITIONAL HOUSING OPTIONS' CONSULTATION

IN RESPECT TO LAND NORTH OF CHARFIELD ROAD, KINGSWOOD

Ref: 603/A3/MK/CC
Date: 16th December 2020

1.0 INTRODUCTION

1.1 On behalf of Redrow Homes (SW) Ltd and the landowners, Grass Roots Planning have been instructed to prepare and submit representations to Stroud District Council's Local Plan Review 'Additional Housing Options' (AHO) consultation, currently taking place until the 16th December 2020. This is with particular reference to land north of Charfield Road, Kingswood, which is being promoted by Redrow Homes for development.

1.2 This document sets out our concerns to the emerging Stroud Local Plan Review and the strategy it contains, as further refined in the AHO document. The focus of these concerns relates to the spatial strategy currently adopted and the fact that it relies too heavily on strategic-scale sites and those selected are not underpinned by robust evidence to demonstrate why they are the most sustainable and viable options to accommodate housing growth in particular.

1.3 As part of this document we will set out how we consider the emerging plan fairs when considered against the tests of soundness that are set out in paragraph 35 of the NPPF which are as follows:

a) **Positively Prepared** – providing a strategy which, as a minimum, seeks to meet the area's objectively assessed needs, and is informed by agreements with other authorities, so that unmet need from neighbouring areas is accommodated where it is practical to do so and is consistent with achieving sustainable development;
b) **Justified** – an appropriate strategy, taking into account the reasonable alternatives, and based on proportionate evidence;
c) **Effective** – deliverable over the plan period, and based on effective joint working on cross-boundary strategic matters that have been dealt with rather than deferred, as evidenced by the statement of common ground; and
d) **Consistent with national policy** – enabling the delivery of sustainable development in accordance with the policies in this Framework.

1.4 In addition to our main concerns that the plan is relying too heavily on strategic-scale sites, we are concerned to see that there is no provision for the Wotton cluster which provides a significant existing concentration of employment and an established population, thereby it disregards a very sustainable location for new development at the Wotton/Kingswood cluster. We are specifically promoting a site for future allocation in the Local Plan at land north of Charfield Road, Kingswood (the site) for circa 300 homes, two-form entry primary school and extensive formal parkland. This could provide a suitable replacement site if existing proposed

allocations are found to be unsound, a broader portfolio of sites is required, or housing numbers need to be increased across the district.

1.5 The land at Kingswood and the proposals for it are set out in the accompanying documents listed below. In addition, a series of technical assessments have been undertaken in support of the development proposed and to inform the masterplan for land north of Charfield Road and these should be read in conjunction with this statement:

- Appendix A – Site Location Plan
- Appendix B – Vision Document
- Appendix C – Landscape Strategy
- Appendix D – Scoping Report Flood Risk & Drainage Strategy
- Appendix E – Preliminary Ecological Appraisal
- Appendix F – Odour Report
- Appendix G – School Capacity Report

1.6 In summary we have a range of concerns regarding the currently proposed spatial strategy and believe it to be unsound for the reasons we will describe. We have examined the previous representations submitted in respect to the Redrow site at Kingswood by Boyer Planning in January 2020 and are in broad agreement with their conclusions. As such, we have expanded on a number of their concerns and have responded to the questions raised as part of this consultation, which includes how SDC intend to allocate additional sites that are required to address increased housing numbers that have been identified as being needed as part of MHCLG's 'Standard Method' for calculating housing need.

1.7 Primarily we consider that the strategy in the Local Plan relies too heavily on strategic-scale sites, and some of the strategic sites it selects are not underpinned by robust evidence to show they are deliverable, particularly in terms of viability. There is also a serious lack of credible evidence to underpin the Council's views that the selected large strategic sites are suitable and sustainable locations for development, and therefore there is little to support a conclusion that the strategy is justified with reference to paragraph 35 of the NPPF.

1.8 To address these concerns, we consider that the flawed strategic allocations (such as Sharpness and Wisloe) need to be removed from the plan to reduce overreliance on larger sites and focus provided on the more appropriate location of Kingswood. Additionally a broader and more diverse portfolio of land should be allocated in varying sizes to deliver homes and other development over the next five years and beyond; this should include allocating land at settlements such as Kingswood which will diversify the portfolio of land

owners here, and hence potential production outlets, in this sustainable location. We consider that this more diverse portfolio solution presents the most sustainable and credible option for meeting the increase housing need set out by MHCLG.

1.9 Land north of Charfield Road, Kingswood offers a highly sustainable location for new development which can meet the needs of not only this settlement but nearby Wotton-under-Edge, which, due to its Area of Outstanding Natural Beauty (AONB) status, has received little growth over the last 10 years (circa 7% growth between 2011 – 2018 according to Kingswood Parish Council's representations submitted in 2020). As such, it is our view that there is a residual need for affordable housing and other infrastructure requirements which could be met on land in Kingswood.

1.10 The site is of a scale that could deliver the critical mass of development to provide new infrastructure for the settlement (including primary school provision and affordable housing), as well as sustaining everyday facilities and services in the area. It could also be delivered quickly, in advance of a larger strategic allocation elsewhere in the district, which will boost housing supply in the short term and address a lag in delivery that will inevitably come from the council's reliance on large scale sites that take many years to deliver based on available evidence.

2.0 THE HOUSING REQUIREMENT AND EXISTING SUPPLY

Housing Requirement

2.1 We are pleased to see SDC applying a pragmatic approach to the potential increase in housing numbers issued by the Ministry for Housing, Communities & Local Government (MHCLG) in August 2020 and are responding to this issue now, rather than progressing with the draft Local Plan Review 'as is'.

2.2 We agree that SDC should be looking to adopt the higher annual needs figure of 786 per annum (15,720 over the 20-year plan period) and we commend SDC for taking this positive approach to overall housing delivery.

Existing Supply

Windfalls

2.3 We agree with Stroud's inclusion of windfalls given that this has been monitored over the previous 13 years and shows that consistently they have delivered circa 75 dwellings per annum across the whole district. However, similar to the five-year housing land supply calculations, it is our view that this should only contribute 17 years' worth of delivery to avoid double-counting as small sites with permission must be included within the supply table.

2.4 Accordingly, 1,275 dwellings should be included within the supply and this should reduce by 75 dwellings per annum until the plan is adopted to avoid double counting – for example if the plan is adopted in 2022, 150 dwellings should be removed from the overall supply.

Reserve Supply

2.5 We support the provision of a reserve supply but would suggest that this needs to be quantified and allocated now, so that the plan has flexibility in the long-term should this be required. A clear policy mechanism could be established to set the trigger that would require a consideration of reserve sites; for example a deficit in five-year housing land supply, or if evidence shows that a site currently allocated will not come forward.

4.0 THE CURRENT SPATIAL STRATEGY

4.1 The Local Plan Review 2019 focuses growth on Cam and Dursley, Stonehouse, the southern Gloucester fringe and Stroud, followed by two new settlements at Sharpness and Wisloe. Employment growth has been focused on accessible locations within the A38 / M5 corridor, such as the allocation of land for economic development adjacent to the existing Renishaw campus northwest of Kingswood.

4.2 Settlements have been divided into tiers, with Kingswood described as a Tier 3a settlement.

4.3 An extract of the proposed allocations in the Local Plan Review is shown below:

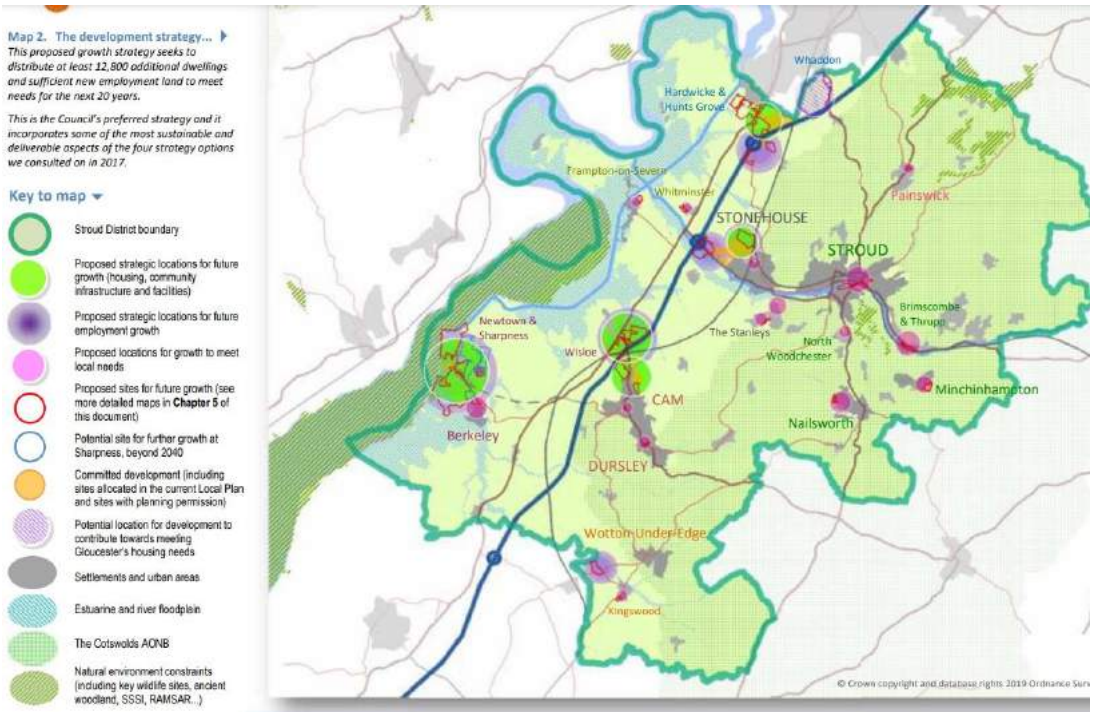


Figure 1. Proposed Development Strategy for Stroud

4.4 As the map clearly shows, there is no significant planned development for the Wotton cluster, which includes the settlements of Wotton-under-Edge, Kingswood, North Nibley, Alderley, Hillesley & Tresham, which range between Tier 2 and Tier 4b settlements according to the hierarchy. Between these settlements, which amounts to a significant population (over 8,600 residents according to the 2011 Census) there is practically no supply planned – only 50 dwellings at land south of Wickwar Road (allocation PS38). This is inappropriate given the scale of the existing settlement, the affordable needs that will be arising from this population (which we will go onto discuss in more detail later in this document) and the sustainability merits of the location in terms of the ability to maintain and strengthen public transport provision.

4.5 The objective for the Wotton Cluster according to the Local Plan Review (page 59) is to *"improve access to jobs, services and facilities in the south of the District, to boost local sustainability and community vitality".* A key issue identified is the number of people commuting to other areas such as Thornbury, Yate and Bristol for work. We agree that a key objective should be to reduce this level of out-commuting and we strongly support the provision of a large-scale employment allocation at Renishaw. However, it is our view that there needs to be supplementary housing growth to support this and address needs arising from within this area.

Strategic Sites

4.6 We have also considered the type and mix of supply anticipated to come forward over the next twenty years in Stroud. Housing need and anticipated supply is set out in the image below which is taken from the Draft Local Plan 2019:

Calculating our residual housing requirement up to 2040			
Supply	A	Large sites commitments, at April 2019 (on sites with permission / under construction)	5,044
	B	Small sites commitments, at April 2019 (on sites with permission / under construction)	532
	C	Other firm commitments, at April 2019 (on sites subject to resolutions to grant permission)	164
	D	**Total commitments (= A + B + C)**	**5,740**
	E	**Commitments (D) minus undeliverable sites**	**5,223**
Requirement	F	Housing requirement 1 April 2019 to 31 March 2020	456
	G	Draft housing requirement 1 April 2020 to 31 March 2040 (= 638 pa x 20 years)	12,760
	H	**Minimum residual housing requirement to 2040 (= F + G - E)**	**7,993**
		Allocated sites in Draft Local Plan	8,725
		Small sites allowance (75 pa x 18 years)	1,350
		Total housing supply in Draft Local Plan	**10,075**

Figure 2. Extract of Draft Local Plan 2019

4.7 Of the proposed allocations, there are a significant proportion of strategic sites which are set out below. This does not take into account existing strategic-scale commitments or allocations proposed as part of the Local Plan 2015, the proposed allocation at Whaddon put forward in the 2019 Local Plan Review document (2,500 homes) to meet the needs of Gloucester City, nor the AHO being considered in this consultation at Whitminster (2,250 homes) or Moreton Valence (1,500 dwellings).

Strategic sites	Number of dwellings at each
Cam North West	700
Cam North East Extension	180
South of Hardwicke	1,200
Hunts Grove Extension	750
Sharpness Docks	300
Sharpness	2,400 (5,000 by 2050)
Stonehouse North West	650
Wisloe	1,500
Local sites at smaller settlements	1,045 (cumulative)
Total	At least **8,700**

Figure 3. Proposed Strategic Scale Allocations in Draft Local Plan 2019

4.8 By removing extant permissions (some of which will be coming forward on strategic-scale allocations in any event), strategic sites make up 7,680 dwellings of the total new supply set out in the 2019 draft plan. This equates to 50% of the total number of dwellings anticipated to come forward (15,298 homes once existing commitments are taken into account) and 76% of the allocations and windfalls proposed as part of this plan (10,075), which is an extremely high proportion of overall growth and in our view represents an acute over-reliance on such sites.

4.9 We have compared this to other authorities within the region and note that the proportion attributed to strategic allocations is significantly lower, as shown below in table 1:

Table 1. Comparison of proportion of strategic-scale allocations in other authority areas

	Stroud Local Plan Review (2019 draft plan)	Cotswold District Council (2011 – 2031)	South Gloucestershire Council (2006 - 2027, adopted in 2013)	Tewkesbury, Cheltenham & Gloucester Joint Core Strategy
Housing Need	12,800	8,400	28,355	35,254
Total Supply	15,298	9,614	28,850	31,824
Number of dwellings from Strategic Allocations (over 500 units)	7,680	1,800	10,400	11,400
% of Total Supply	**50%**	**19%**	**36%**	**36%**

4.10 If the AHO sites at Whitminster and Moreton Valence are also allocated without any of the other unsuitable allocations removed such as Wisloe & Sharpness, the overall proportion of strategic sites goes up even further, as follows:

Table 2. Proportion of strategic-scale sites proposed if both AHOs are allocated

Housing Need (MHCLG revised standard method) (786 homes x 20 years)	15,720
Total Supply (includes extant permissions, allocated sites in Draft Local Plan, windfall allowance and potential options at Whitminster (2,250) and Moreton Valence (1,500)	18,420
Number of dwellings from Strategic Allocations (over 500 units)	11,430
% of Total Supply	**62%**

4.11 The inclusion of these sites on top of the existing strategic-scale allocations that have already been put forward would result in 62% of overall supply being from this type of site and 82% of the new allocations and windfalls proposed (11,430 homes would be allocated on strategic sites out of 13,825). This makes the overall reliance on such sites rise to a level which does not even come close to other districts in the area and represents an extreme risk to housing delivery in SDC.

4.12 SDC are therefore relying far too heavily on strategic sites to come forward in a timely fashion to deliver the housing required to meet objectively assessed need and 5YHLS targets. Evidence to date has demonstrated that this is difficult to achieve. The second edition of Lichfield's paper 'Start to Finish' published in February 2020 identifies that sites of over 500 dwellings are anticipated to take 5 – 8.4 years from the outline application being validated to the first home to be delivered. Given the lack of progress on detailed proposals for these sites, with no outline planning applications submitted as yet (with the exception of Sharpness Docks), it's clear from the Lichfields evidence that the overreliance on strategic sites will push the vast majority of housing delivery into the later part of the plan which will lead to an acute undersupply in its first ten years and then a glut of supply after that point, if the sites selected do actually prove viable.

4.13 With consideration of the table above, the number of strategic allocations proposed in Stroud is significantly higher than nearby authorities. South Gloucestershire Council and the Tewkesbury, Cheltenham & Gloucester authorities whose strategic allocations make up 36% of their overall supply, far lower than Stroud's, have repeatedly been found unable to

demonstrate a five year housing land supply despite having an up-to-date plan. We therefore have concerns over the ability for these sites to delivery identified housing requirements in a logical and sustained way. This is because there are fewer smaller allocations available, which can come forward more quickly and 'plug' the gap before large strategic sites come on stream and deliver.

4.14 We also have significant concerns about some of the strategic-scale sites proposed in the Draft Plan and the AHO, which we go on to describe in the next section. These mainly relate to the limited evidence provided to underpin their viability and / or deliverability.

4.15 In particular, the 'Assessment of Strategic Development Opportunities in Parts of Gloucestershire' undertaken by HDH Planning & Development which considers strategic development options in Stroud (Appendix 6 of this report (December 2019)) states at paragraph 10.52 that *"if the Councils proceed with the inclusion of the large greenfield sites in the future Plans, we suggest a cautious approach as it is not possible to capture the detail of viability (particularly in relation to the infrastructure requirements) of large strategic sites in a high level study of this type. It would therefore be prudent of the Councils to engage with the developers and landowners before relying on these types of site in the future".*

4.16 Paragraph 67 of the NPPF requires that when identifying land for homes, as part of a plan, authorities planning policies should:

'identify a sufficient supply and mix of sites, taking into account their availability, suitability and likely economic viability'.

4.17 Another new growth point, as indicated under Option C, is only viable if some existing strategic allocations, such as Sharpness and Wisloe (which are not sustainable and credible options), are removed and replaced with a single more suitable option, such as a strategic allocation at Whitminster. The housing that would be lost by removing these two strategic scale, but inappropriate allocations, should then be re-distributed as smaller-scale allocations at settlements such as Kingswood (and Whitminster) to provide a greater variety of sites that can come forward more quickly and thereby reduce the overreliance on strategic sites.

4.18 This is because we consider that there is limited evidence associated with the allocations proposed at Sharpness and Wisloe which undermines their credibility; furthermore we have concerns that they are not viable in terms of needing to deliver the infrastructure required to make these places sustainable whilst also delivering the affordable housing needed district-wide.

4.19 As we have seen limited evidence in this regard regarding certain particular sites, we consider that the evidence underpinning the Local Plan Review fails to meet PPG which states *"the role for viability assessment is primarily at the plan making stage"* (Paragraph: 002 Reference ID: 10-002-20190509). Therefore, the plan is unsound as it is not justified with such evidence nor can it be considered that it will be effective without this.

4.20 To address our concerns, we consider that three significant amendments to the plan strategy need to be considered:

- Some of the strategic sites selected need to be reconsidered and removed from the strategy, our view is that this should include Wisloe and Sharpness because the evidence underpinning them is not robust and the viability and commercial attractiveness of both sites has not been proven;
- We consider the ability of Moreton Valence to deliver housing is overstated and also provides supply where significant growth at Hunts Grove has already occurred;
- To compensate for the loss in housing numbers resulting from the reconsideration of these three strategic sites we suggest the following approach is adopted:
    - A much broader portfolio of sites should be included in the plan including sites that can be delivered without the sort of scale of infrastructure that the current strategic allocations require, such as land north of Charfield Road in Kingswood;
    - The proposed capacity of Whitminster, the evidence for which is much more robust and compelling, be increased and Redrow's land interest at this location included in an expanded allocation to circa 2,500 homes.

4.21 In our view, a broader portfolio of sites is required to achieve a balanced range of site sizes and types which will allow development to come forward in future years to meet the need required, including affordable housing. Currently we do not consider the portfolio, with its significant overreliance on strategic sites, meets the Economic Objective set out in the NPPF (Paragraph 8) to:

'help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth'.

4.22 When considering the four different spatial options set out in the 'Additional Housing Options' consultation paper for allocating additional housing land therefore, we are of the strong

opinion that Option A (intensifying existing allocations) is not credible unless there has been significant technical work and masterplanning undertaken to demonstrate the increase in units is achievable without resulting in adverse effects, as otherwise it will involve placing further pressure on existing allocations, mainly strategic allocations, to deliver the housing needed to ensure the plan is sound. This does not achieve the NPPF's guidance which requires a balanced portfolio of sites to be delivered and that the strategy be underpinned by evidence – because the evidence around such a strategy (the Lichfield's 'Start to Finish' paper in particular) suggests it will push housing delivery to the back end of the plan period which is not an effective and justified strategy, and is therefore unsound.

4.0 COMMENTS ON SPECIFIC ALLOCATIONS

Cam / Wisloe

4.1 There is an existing allocation in Cam for 450 dwellings to the north-east which has been granted planning permission under application ref: S.15/2804/OUT, of which 3 dwellings have been completed to date, according to the most up-to-date 5YHLS paper. The Local Plan Review seeks to allocate a further 700 dwellings under the 'Cam North West' allocation and 180 dwellings at the 'Cam North-East Extension', equating to a strategic allocation of 1,604 homes over the next 20 years.

4.2 In addition to this, the proposed allocation at Wisloe for 1,500 also lies in close proximity (circa 800m from Cam's boundary) to the northern edge of Cam and effectively will be the same market. The brings a total of 3,180 dwellings over the next twenty years which is a significant expansion of this settlement and in our view is an oversupply in a tightly defined geographic area.

4.3 We do not consider that the allocation at Wisloe is credible at this time for a number of reasons.

Deliverability

4.4 Firstly, the land ownership plans and promotion material submitted to date is extremely limited and no technical evidence appears to have been provided to underpin its ability to be viable and deliverable. An extract of the land ownership plan is below; whilst the document states it is 'jointly' owned by the Ernest Cook Trust and Gloucestershire County Council (GCC) this is somewhat misleading as they actually own different land parcels which make up the site.

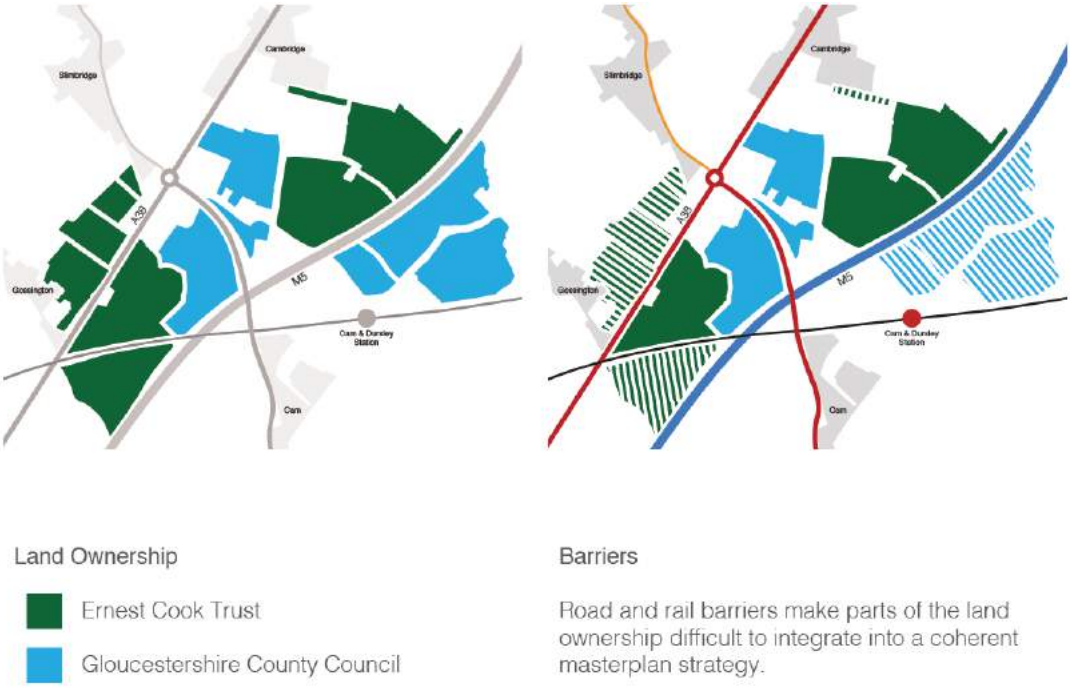


Figure 4. Extract of promoter's material which shows the land ownership parcels at Wisloe Garden Village

4.5 It is also unclear from the information available whether any sort of agreement has been reached between the owners in respect to equalisation, to ensure the site will be delivered comprehensively with infrastructure properly planned and paid for, rather than in a piecemeal fashion. There is no framework masterplan available within the Vision Document which shows how the constraints have informed the layout for the site, and that the delivery of 1,500 is actually achievable. There also appears to be no partnership with a housebuilder or an affordable housing provider to deliver these houses.

4.6 Accordingly, we have significant issues with this allocation given the clear lack of evidence associated with it relating to viability or deliverability.

Land Uses Proposed

4.7 Paragraph 2.52 of the Draft Local Plan Review 2019 states that *'the latest job forecasts for the District suggest the need to plan for between 2,300 and 6,300 net new jobs'.* This is a very broad target and it is our view that SDC needs to be planning for the higher level of jobs to have an ambitious plan that will address issues of out-commuting to other areas in the region. It is then stated that 14.4 hectares of employment land will need to be delivered but this is not translated into numbers of jobs; it is therefore unclear whether the targets set out in paragraph 2.52 are being achieved.

4.8 According to the Settlement Role and Function Study Update (2018) prepared by SDC we note that Cam and Dursley currently has an imbalance in respect to jobs and economically active people, with a ratio of 0.47 jobs to 1 economically active resident. Therefore, any development in this location should seek to redress the imbalance of jobs and workers and reduce the level of out-commuting to other settlements which contributes to significant CO_2 emissions and congestion from those travelling to and from work via private car.

4.9 The significant allocations at Cam and Wisloe therefore should be including employment land within them, currently we note that the extent of this is extremely limited and our view is that the delivery of these sites will result in significant numbers of economically active people having to travel outside of the settlement for work. This needs to be rectified either through removing these sites (which for other reasons, we do not think Wisloe is credible anyway) or the policy requirements changed to include further allocations of employment land. In turn, this will likely have a knock-on effect on the masterplanning for these sites and a reduction in their potential housing yields.

4.10 We have calculated this based on a number of reasonable assumptions which are as follows:

- According to the Settlement Role & Function Study prepared by SDC, there were 4,150 local workers (economically active people) and 1,980 local jobs in 2018 at Cam/Wisloe, equating to a ratio of 0.47 : 1.
- Within the Draft Local Plan 2019 (Table 1, page 12), it states that there are 53,078 dwellings in Stroud and 66,700 economically active people, equating to a ratio of 1.25 economically active resident per dwelling;
- National statistics state there are 24.4 million dwellings (Dwelling Stock Estimates 2019) and 34.1 economically active people (NOMIS labour market), equating to a ratio of 1.4 economically active residents per dwelling;
- The new allocations at Cam (880 dwellings) plus Wisloe (1,500 dwellings) therefore results in between 2,975 and 3,332 additional economically active people in the area (using either a ratio of 1.25 or 1.4). In addition, the existing allocation at NE Cam will produce a further 563 – 630 local workers because this is yet to be built out.

4.11 General guidance from the Roger Trym Report (2004) states that only a third of any employment allocation land take is actually used for employment purposes. Therefore, despite the existing allocation for NE Cam incorporating 10 hectares of employment land in the policy requirements, the masterplan for the application only shows 34,665m² of employment space for B1, B2 and B8 purposes, which is significantly lower.

4.12 Taking an average of the Employment Densities Guide 2010 full-time employee per m² for these uses, this equates to 990 jobs being delivered from the existing NE Cam allocation adopted in the 2015 Local Plan. The allocation at Wisloe incorporates 5ha of land – taking the same assumptions, this will equate to circa 430 jobs. The other allocations at Cam do not include any employment land provision.

4.13 On a very basic level therefore, the proposals at Cam when completed could provide a total of 8,000 economically active residents in an area with only 3,400 jobs available, worsening the ratio of jobs to workers to 0.42 : 1, further exacerbating the issue of out-commuting, an outcome which national planning policy seeks to avoid. It should also be noted that the Scoping Report issued for the north-western allocation at Cam states that they intend to deliver 1,100 dwellings at this allocation, rather than 880, which means this issue could be even further exacerbated.

4.14 The plan needs to be more ambitious in its ability to address this issue if SDC are serious about addressing the Climate Change Emergency; in our view the current strategy for the Cam area is an unsustainable approach and will exacerbate existing problems associated with out-commuting. This does not appear to have been considered in any of the representations or work undertaken by SDC to date and has not been considered from a masterplanning perspective in terms of land-take, and whether these sites should be incorporating employment land.

4.15 We also have concerns relating to the technical work underpinning the allocation and the constraints associated with the land, including highways, landscape, agricultural land, noise, and utilities.

Highways Impact

4.16 As highlighted above, Cam is going to experience a significant amount of development over the next twenty years. In addition, the allocation of land at Wisloe will put further pressure on the existing highways and to date we have seen no evidence to demonstrate that this will not cause significant adverse effects on the road network from the provision of over 3,000 dwellings at this location.

4.17 Paul Basham Associates who are supporting Redrow Homes on technical highways matters have considered this issue and note that, whilst improvements to the north-bound on-slip at Junction 13 of the M5 were secured as part of an application in 2014, the Infrastructure Delivery Plan (2020) notes that traffic at the junction is expected to increase 'substantially'.

The impact of additional allocations in this area is likely to significantly burden this junction to around 90% capacity in the morning peak and 92% capacity in the evening peak.

Landscape / Coalescence

4.18 The allocation at Wisloe does not appear to have been assessed as part of any landscape sensitivity assessment undertaken by SDC. The evidence underpinning the allocation in this regard is therefore significantly lacking – as the map shows the last work undertaken was in 2016 and did not assess any land beyond the M5 to the north-west. The 2019 update does not reference the land at Wisloe and the site therefore does not appear to have been assessed in landscape terms. The evidence prepared by the promoters to date is extremely limited, with the exception of the vision document which states *"the surrounding is very flat with ground only rising another 2-3km to the east. This allows long distance views to the horizon. On site, hedgerows are fragmented and poor quality".* It can be seen from the image below that the land on the south-eastern edge of Slimbridge was given a medium/high sensitivity to change in 2016 – it is therefore possible that the allocation at Wisloe also has a similar sensitivity, or potentially higher.

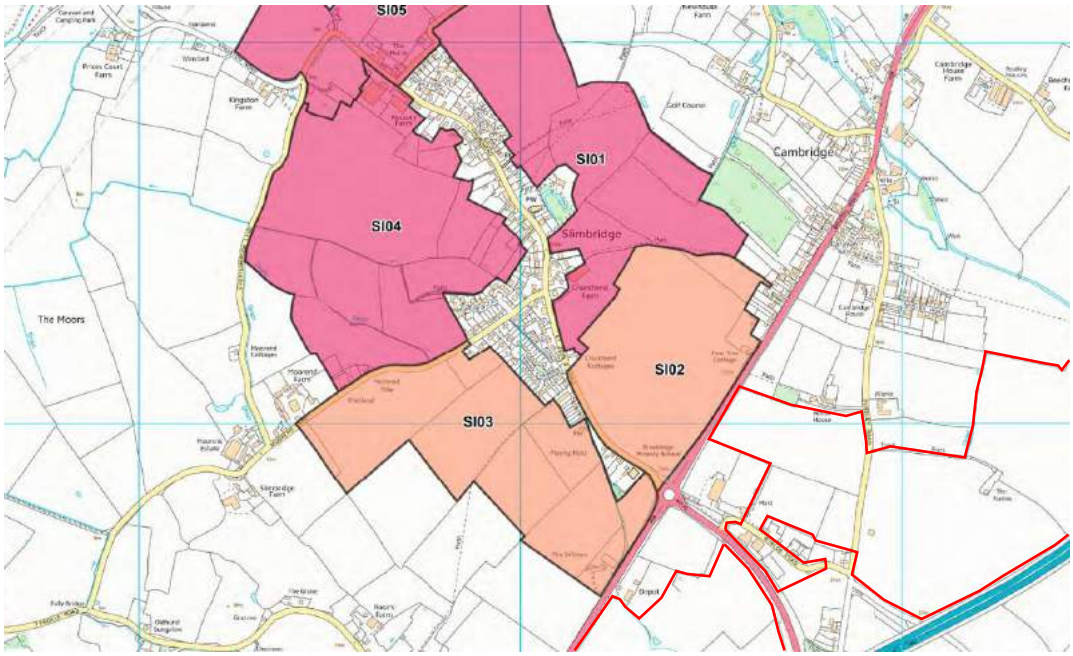


Figure 5. Extract of SDC's Landscape Sensitivity Assessment 2016 (part of Wisloe allocation shown in red) – no updates appear to have been undertaken in support of the Local Plan Review

4.19 Before any decision on such a large scale allocation is made a full and objective assessment of the landscape sensitivity of the site needs to be undertaken by SDC which would inform the masterplan of any constraints. Without this information, it is unclear how credible it is to say that 1,500 dwellings will be delivered in this location without significant adverse landscape impacts.

4.20 Further to this, the proposed allocation at Wisloe sits between existing settlements, including Slimbridge, Cambridge, and Cam / Dursley. No assessment of the issue of coalescence, or perceived coalescence, appears to have been undertaken. Again there could be significant negative impacts which are yet untested in regard to this issue.

Agricultural Land Quality

4.21 The majority of the land appears to be Grade 2 Agricultural Land Quality, as shown below in figure 6 (MAFF data, extract taken from ArcGIS mapping system). We note the Wisloe Action Group's previous representations which state that an independent assessment has been undertaken by Soil Environmental Services Ltd which states the land is Grade 3b – we have been unable to obtain a copy of this but would raise this as a potential constraint to the land's development. Grade 2 land is considered to be the Best and Most Versatile Agricultural Land and The NPPF advises against its loss for development (see paragraph 170).

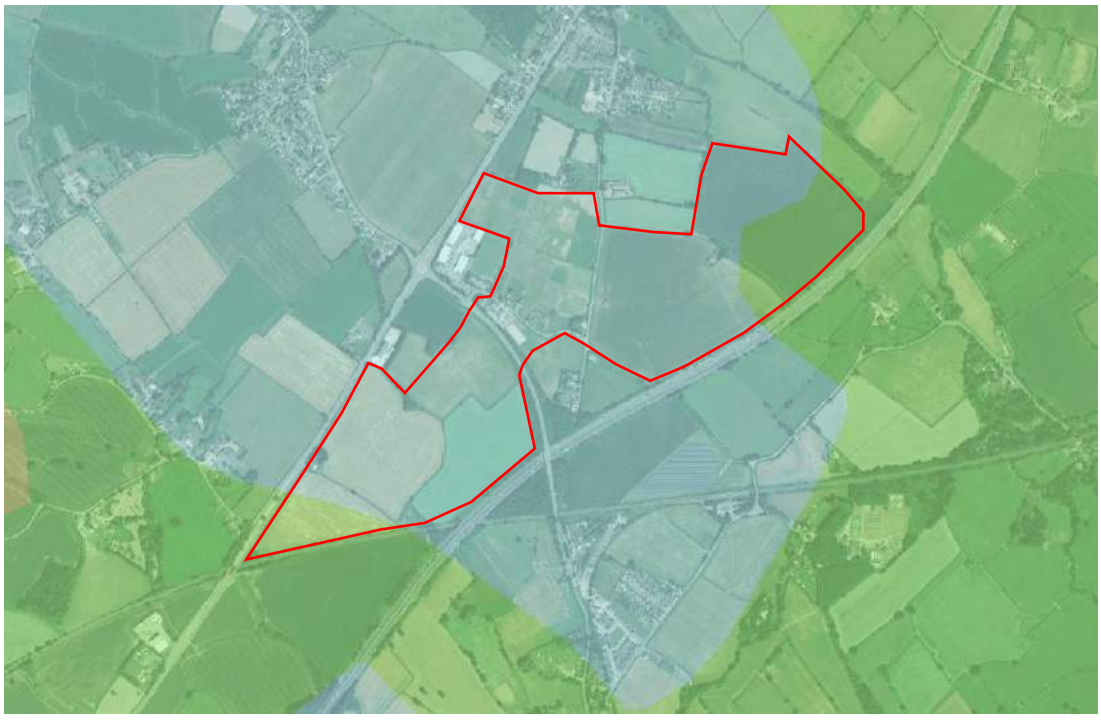


Figure 6. Extract of Agricultural Land Quality Maps which show the majority of the Wisloe allocation is Grade 2 (light blue) with a small proportion Grade 3 (approximate site area shown in red)

Noise

4.22 We have been unable to find any technical assessment of noise issues at the site despite there being reference to such an assessment being made in the Peter Brett Associates (now Stantec) representations. Whilst we don't believe that this will create an undeliverable scheme it does present a constraint to the development and it is highly likely that a substantial buffer,

bund and / or barrier will need to be created adjacent to the M5 to ensure there will be no adverse impact in terms of amenity on future local residents. This in turn will have a knock-on effect on the masterplan for the site and we question whether 1,500 is actually achievable once this constraint is taken into account.

Utilities

4.23 We note that there are a number of utilities services which cross the bulk of the land at Wisloe, none of which have been referenced as a constraint in the promotion material put forward by the promoters of the land. This includes a High Pressure Gas Main (Wales and West Utilities (WWU) controlled) and overhead electricity cables owned by Western Power Distribution (WPD). These are shown on the maps below in figures 7 and 8.

Figure 7. Route of High Pressure Gas Pipe owned by WWU crossing the allocation at Wisloe (shown with orange broken line)

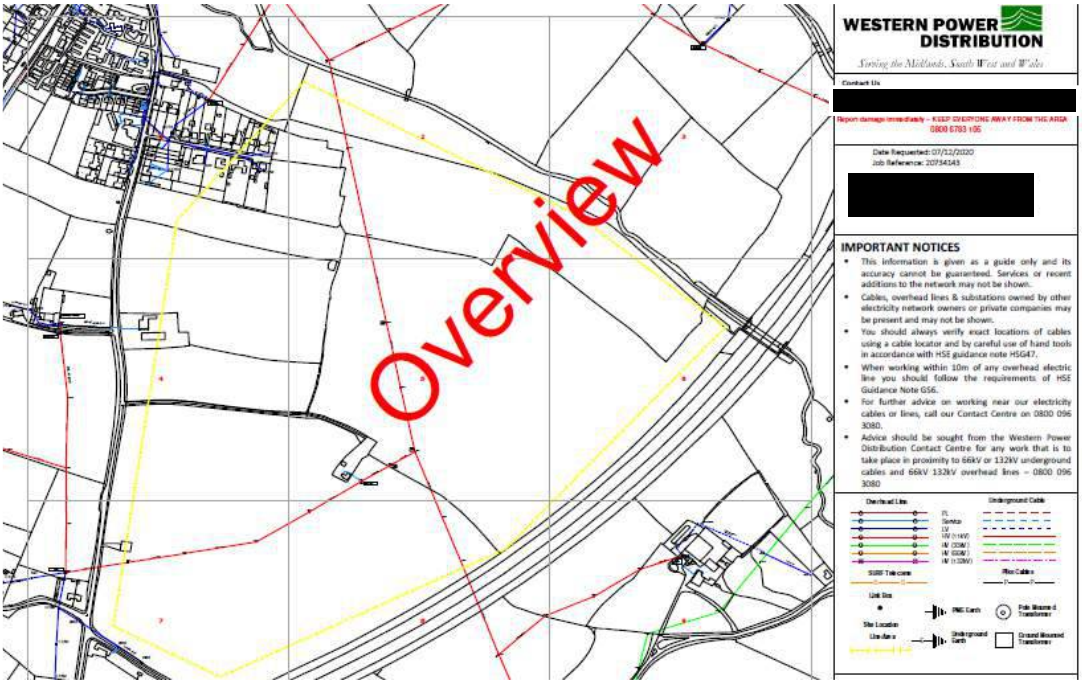


Figure 8. Extract of WPD showing overhead lines / underground cables owned by WPD (red line)

4.24 We can find no evidence of these constraints being considered and how it will impact the masterplan for the allocation, nor any evidence that discussions have been held with the various utilities companies to ascertain how this will be addressed, and if relocation is required, how much this will cost and how it will be paid for. As such, we again question whether the site is deliverable in the format currently being suggested or whether this will result in a major constraint to the development and therefore the number of homes being able to be delivered in this location.

Conclusion on the allocation at Wisloe

4.25 Consequently, we consider that there is an insufficient amount of evidence which underpins the allocation at Wisloe. The limited technical work prepared to date means that its allocation for 1,500 dwellings is unjustified and it cannot be said with any certainty that it can be delivered taking into account the various constraints that apply to the land. We are therefore of the opinion that this allocation should be removed from the Draft Local Plan Review.

Sharpness

4.26 Land at Sharpness is separated into two allocations – Sharpness Docks for 300 dwellings and Sharpness for 2,400 homes. As set out within the introduction we have concerns over the lack of technical evidence to date and the commercial viability of this allocation.

Sustainable Transport Links

4.27 Our primary concern relating to this allocation is the unsustainable location of the site, as highlighted in the evidence presented by Stagecoach buses as part of the Regulation 18 consultation to the Local Plan.

4.28 In particular we have picked up on the comments by them which state the following:

"We have already made plain to the Councils, as a major rail and bus operator (including of tram and tram-trains) that ***we see no business case for such links*** [to Sharpness] *principally because this very isolation means that they could not credibly offer enough residents a sufficiently attractive and relevant choice to begin to defray the very high fixed costs of operation, whatever delivery mode was used"…*

"As far as the Sharpness Branch Line is concerned, draft policy 5.1 goes as far only to state that the County will "protect the freight lane at Sharpness for future uses". This is no more practical value than the effective policy that the rail industry has had for the line for over 25 years… Simply put, improved services and facilities on the railway through Stroud District lie beyond the power of any local stakeholder to deliver, and there are no well-defined or funded rail industry plans at this time to bring any of the aspirations forward."

"Given the way that the railway has been a key articulating and structuring principle behind some major aspects of the Local Plan strategy, not least the new town at Sharpness Vale, justified until very recently by the claims that it could be sustainably be facilitated by the re-opening of the Sharpness Branch, this ought to give both the Councils pause for some very serious thought indeed".

"…We would be quite astonished if the GRIS has concluded that re-opening the Sharpness Branch line to passenger rail services will ever present a justifiable business case, especially when to do so would prejudice future capacity and frequency upgrades on the whole line between Bristol, Gloucester and beyond, serving a vastly wider range of potential trip demands".

4.29 The evidence presented by one of the key bus operators in the District is particularly damning and we have serious concerns over the credibility of Sharpness as an allocation if there is no bus operator willing to provide services to and from the area. The Sharpness Growth Point Transport Strategy undertaken on behalf of Green Square by Peter Brett Associates states that *'the provision of a comprehensive bus strategy <u>will be vital</u> to ensure the development*

at Sharpness encourages residents, employees and visitors to use sustainable development modes… it is likely that at least one new bus service will be required' (our emphasis). Without this therefore, it is our view that the proposals are unviable and will not adequately contribute to sustainable transport goals. As Stagecoach highlight, whilst Gloucestershire County Council may provide some services, these are "policy-driven rather than demand-driven service designs" (page 17 of their comments), meaning that they only provide very basic routes for essential needs, i.e. those that cannot drive a car. We therefore fail to see how the allocation of land at Sharpness will encourage sustainable transport provision and respond to the Climate Change Emergency.

Viability

4.30 In light of the above which in our view is significant and damning evidence that there will be no extensive bus provision at the site, we have also examined the general viability of the scheme at Sharpness in terms of other infrastructure provision. This includes the re-opening of the railway line for a regular service to Cam & Dursley and onwards to Gloucester, and localised road improvements.

4.31 We have already set out that there is a lack of jobs available at Cam & Dursley compared to economically active persons which will be exacerbated by the allocations proposed; therefore, it seems illogical to re-open the train line and focus on this connection when the key connectivity will need to be to larger settlements, such as Bristol, which is highlighted in the transport strategy report prepared by Peter Brett Associates.

4.32 The promoters of land at Sharpness only discuss localised road improvements as part of the development proposed, when, due to this lack of connectivity by rail to the settlements residents will actually need to travel to for work, will force them to travel via private car. This will exacerbate existing issues an create a significant strain on Junctions 13 and 14 of the M5, none of which appears to have been considered in the limited technical work undertaken to date.

4.33 There is also limited evidence to demonstrate that the re-opening of the rail line is feasible, in fact we note the following from the Network Rail representations submitted in January 2020 which state:

'It should be noted that whilst Network Rail is happy to work with the Council and developer to progress this, until the various feasibility studies have taken place, including how this would

fit within the timetable, we cannot guarantee this would be plausible. Should the provision of this service and station be feasible, this would be subject to third-party funding'.

4.34 This is significant and suggests that despite the proposals being a draft allocation since November 2018 there has been no progression on these discussions with Network Rail that gives us the confidence that the re-opening of this line is achievable. Their comments also highlight that this will be subject to third party funding; it is not clear whether this will be government funding or developer funded, again which causes significant concerns that the project may not be viable.

4.35 Within the Peter Brett Associates Sharpness Growth Point Transport Strategy prepared in 2017, which includes the vital evidence on the suggested infrastructure requirements for the development, they state that the following would be required:

- Upgrade the existing single track route, which is considered to be unsuitable for a regular passenger service and would require a full upgrade along the 6km length of track;
- Re-establishing the Berkeley loop, which allows for trains to travel south to Bristol which would require a rail bridge over the A38 or a bridge to carry the A38 over the railway; and
- A minimum of one new station to be located in the centre of the proposed development.

4.36 This is a significant level of infrastructure that will require many millions of pounds in investment and the proposals to date put forward by the promoters have only suggested that the line will be re-opened to Cam & Dursley. Peter Brett Associates stated that the above were minimum requirements; without the provision of a good quality rail network to Bristol and a commitment that the developers of this site will be able to fund it without causing viability concerns, including the provision of affordable housing, we fail to see how this is a sustainable option for growth.

4.37 We therefore consider that land at Sharpness should be removed as an allocation because there is little to no evidence demonstrating that the infrastructure required to make it sustainable will come to fruition and there is no viability evidence put forward by the developers of this site to suggest how the infrastructure will be paid for.

Moreton Valence

4.38 This site lies within close proximity to the initial plan review strategic allocation of land South of Hardwicke (G1) and the additional expansion to Hunts Grove (PS30). We have not seen any robust evidence to suggest that locating such a large amount of development in the same geographical area is commercially viable and will not lead to these various sites competing with each other to a degree that will slow delivery rates and potentially make the delivery of infrastructure to serve them difficult.

4.39 The development proposals for the Land to the South of Hardwicke (G1) are very well advanced and the site is supported by a detailed and fully informed constraints and opportunities plan, as well as illustrative masterplan options to demonstrate how the site could be sustainably developed. In addition, EIA Screening & Scoping has been submitted and a response from SDC has confirmed that an EIA is required. A planning application is currently being prepared; therefore, this site should remain in the plan.

4.40 The new proposed allocation at Moreton Valence (PGP2), which would compete with site G1, is not underpinned by any robust evidence and there is no technical information available as part of this consultation. This is the opposite to the Kingswood proposals which are accompanied by such information.

4.41 Separate to the issue relating to the absence of any underpinning technical work, we have the following concerns about site PGP2:

- The site is within multiple ownerships and it is our understanding that it is not associated with a developer, nor has it actively been promoted by a consortium of landowners to the Council in any co-ordinated or meaningful way. Development proposals for the site are therefore not well progressed.
- The site represents a fragmented potential growth point, with intervening land in multiple ownerships severing the proposed site, and is not capable of being connected across all land parcels and therefore does not allow for a comprehensive development to be planned for or delivered.
- The land is subject to both fluvial and surface water flood risk as figures 9 and 10 below show. NPPF policy (paragraph 155 in particular) requires that such areas should be avoided, and both the surface water and fluvial flow paths sever the site and exacerbate our concerns regarding connectivity and comprehensive development.

Figure 9. Extent of Surface Water Flooding

Figure 10. Extent of Fluvial Flooding

4.42 Therefore, we consider that site G1 should remain within the plan, but the removal of site PGP2 should be carefully considered.

Land south of Wickwar Road, Kingswood

4.43 Land south of Wickwar Road has been proposed for allocation within the Local Plan Review for 50 dwellings – an extract of the proposals are shown below in figure 11:

Figure 11. Extract of proposed allocation for land south of Wickwar Road, Kingswood (50 dwellings)

4.44 It is our view that both this site and the land controlled by Redrow Homes to the north should be allocated for development, to provide the critical mass required to greatly enhance the bus

operation services envisaged by Stagecoach within their representations, better linking Thornbury, Charfield, Kingswood and Wotton-under-Edge.

4.45 However, we do note Persimmon's most recent representations from January 2020 which seek to remove any provision of community benefits despite there being strong representations from both the Council and the Primary School which suggests that there is a strong need for additional primary school places in the area. To alleviate this Redrow Homes are happy to provide land for a new primary school within the site north of Charfield Road, which will address current and future capacity issues.

4.46 As such, we are of the view that whilst both sites are required and can address need for the Wotton cluster, if compared, land north of Charfield Road is a better option because it can deliver significant community benefits in terms of land for a two-form entry Primary School, which we will go on further to discuss in the next section.

5.0 THE WOTTON CLUSTER

5.1 As set out in the introduction the Wotton Cluster comprises the settlements of Wotton-under-Edge, Kingswood, North Nibley, Alderley, Hillesley & Tresham. It is our view that due to the extensive facilities and services provided within Wotton-under-Edge, it should be classified as a Tier 1 settlement in the hierarchy.

5.2 With consideration of the Role and Function Settlement Study undertaken by SDC in 2018, an extract of which is shown below, Wotton-under-Edge is easily comparable in terms of accessibility to services and facilities compared to those settlements which are put forward as Tier 1 (Stroud, Cam, Stonehouse and Dursley):

	Settlement size / size of population [a]	Number of dwellings 2018 [b]	Proportionate housing growth 2011-18 [c]	Access to key services & facilities: Overall rating [d]	Driving score [e]	Bus / walk score [f]	Services & facilities [g]: Strategic	Services & facilities [g]: Local	Retail provision [h]: Strategic	Retail provision [h]: Local	Employment Role [i]	Local workers [j]	Local jobs [k]	Net importer or exporter of workers? [l]	Ratio of jobs : workers [m]
Stroud	LARGEST	11,944	5%	V.GOOD	0	1	V.STRONG	V.STRONG	STRONG	STRONG	yes	13,900	11,720	-2,180	0.84 : 1
Cam	V.LARGE	4,021	10%	BEST	0	0	BASIC	V.STRONG	BASIC	STRONG	yes	4,180	1,980	-2,200	0.47 : 1
Stonehouse	V.LARGE	3,443	5%	GOOD	0	3	STRONG	V.STRONG	STRONG	BASIC	yes	4,150	7,280	+3,130	1.75 : 1
Dursley	V.LARGE	3,131	3%	BEST	0	0	V.STRONG	V.STRONG	STRONG	BASIC	yes	3,510	2,420	-1,090	0.69 : 1
Nailsworth	V.LARGE	2,674	3%	GOOD	0	4	BASIC	V.STRONG	STRONG	BASIC	yes	3,060	2,380	-680	0.78 : 1
Wotton Under Edge	V.LARGE	2,300	6%	V.GOOD	0	2	V.STRONG	V.STRONG	STRONG	BASIC	yes	2,590	1,370	-1,220	0.53 : 1

Figure 12. Extract of SDC's Settlement Role and Function Study 2018 Update showing comparison of settlements in Tier 1 and Tier 2

5.3 It is unclear why Wotton-under-Edge remains a Tier 2 settlement when it clearly performs well in terms of accessibility and employment, which is highlighted in the report. A settlement can be considered within Tier 1 whilst also recognising that there are significant constraints to its development and it is important not to artificially constrain these areas and disregard the very important sustainability role they play.

5.4 It is acknowledged that Wotton-under-Edge is significantly constrained in terms of environmental, physical and topographical constraints, making expansion difficult, with the AONB providing the main constraints to growth here. It therefore seems reasonable to consider other settlements which have reasonable transport links to the facilities and services Wotton provides, and/or those within walking distance, such as Kingswood.

5.5 Kingswood is identified by SDC as a 'Tier 3a Accessible Settlement with Local Facilities' settlement. The draft Local Plan acknowledges that these are *'relatively sustainable locations for development, offering the best opportunities outside the District's Main Settlements and Local Service Centres for greater self-containment'*, however then goes onto state that the strategy will seek to deliver lesser levels of development in this location.

5.6 This seems illogical when the previous representations undertaken by Boyer are taken into account. They have considered the accessibility of Kingswood as a settlement in paragraphs 4.24 – 4.45 of their representations in January 2020 utilising the evidence base prepared by SDC (the Stroud District Settlement Role and Function Study – Update 2018). They highlight the arbitrary assessment undertaken by SDC and shows that Kingswood, when considered properly in the context of nearby employment areas, performs highly in terms of accessibility and should be considered for further growth. The key points which we agree with in particular are as follows:

- Kingswood is identified as one of the best performing settlements, with a score rating of 'very good';
- Kingswood out performs the Tier 1 settlement of Stonehouse and a number of Tier 2 settlements, such as Nailsworth and Minchinhampton;
- The settlement is also one of the best performing in terms of access to employment;
- Distributing growth based on the amount of growth a settlement has previously received, is not a sound strategy for sustainable development – the work undertaken seems to indicate that Kingswood's growth has been restricted due to previously completed and committed development which equates to 16% growth over the last 10 years;
- Instead of constraining growth in these locations where there is already completed and committed development there should be a focus on providing the necessary infrastructure to ensure the settlement will be better self-contained and provide adequate links to sustainable transport;
- Aspects of the Settlement Role and Function Study appear to be flawed – with the Kingswood assessment ignoring the nearby Secondary School and the proximity of the Wotton Sport Centre; and
- Due to the constrained nature of Wotton-under-Edge, Kingswood should contribute towards the needs arising from this area.

5.7 The sustainability of the settlement is also highlighted by the Stagecoach representations, which we have referenced in the preceding sections of this report. They show the approach undertaken by SDC in terms of their assessment of accessibility is fundamentally flawed, ignoring the role and function of settlements and their interrelationship with one another – such as the case between Kingswood and Wotton-under-Edge. The above evidence leads us to consider that Wotton-under-Edge should be a Tier 1 settlement, with Kingswood proposed as a Tier 2 settlement, given its accessibility to a wide range of services and facilities, as well as its strong employment function.

5.8 As Boyer have stated in previous representations (paragraph 4.29), Kingswood has a strong economic role which has a net importer of workers (1.63 jobs per economically active residents), compared to other settlements in the District which see a net export of workers (as table 3 shows below which is an extract of data taken from Stroud's Settlement Role and Function Paper Update 2018).

Table 3. Number of Jobs to economically active residents

Settlement	Ratio of Jobs : Workers
Stonehouse	1.75 : 1
Kingswood	**1.63 : 1**
Whitminster	1.41 : 1
Brimscombe	1.06 : 1
Eastington (Alkerton)	1.06 : 1
Frampton on Severn	1.04 : 1
Upton St Leonards	0.98 : 1
Minchinhampton	0.88 : 1
Stroud	0.84 : 1
Painswick	0.82 : 1
Nailsworth	0.78 : 1
Berkeley	0.72 : 1
Dursley	0.69 : 1
Newton & Sharpness	0.65 : 1
Chalford	0.56 : 1
Uley	0.56 : 1
Wotton-under-Edge	0.53 : 1
Hardwicke	0.51 : 1
Cam	0.47 : 1
Leonard Stanley	0.42 : 1
Kings Stanley	0.41 : 1
Whiteshill & Ruscombe	0.38 : 1
Manor Village (Bussage)	0.36 : 1

5.9 We therefore agree with the proposed allocation of land at Renishaw which seeks to expand employment provision, however, there needs to be complementary housing and infrastructure growth to respond to this planned expansion, to address the balance of net importation of workers to the area. Development here would reduce travel times and provide options for those already working in the area to live nearby.

5.10 Stagecoach appear to be supportive of development in locations such as Kingswood, commenting the following in their representations:

"We would add a third lesser but important eastern limb leading from the A38 at Falfield across the M5a at junction 14 to Charfield within South Gloucestershire, before passing into the District West of Kingswood and passing a major employment focus at New Mills, before reaching the significant albeit rather smaller market town of Wotton-under-Edge. There are already significant flows along the route, followed by the B4509 and B4062/B4060. These relate to trips of varying lengths including to and from secondary and post-16 education, employment within the area and beyond it, and retail, leisure and other amenities. Whilst public transport along this corridor is today very limited in availability and relevance, ***we had some time ago identified the significant potential that exists here to kick-start a greatly more attractive level of service, particularly if it could be catalysed and anchored by additional development on an appropriate scale****". (our emphasis).*

"We have already agreed a costed strategy to improve the bus service between Thornbury, Charfield and Kingswood to every 30 minutes, extending beyond to Wotton, and potentially alternately every hour to Yate".

5.11 As the infrastructure has already been planned and costed, it would seem logical to leverage off the planned improvements and allocate development where there are already significant costed public transport improvements and existing employment provision in place. The alternative approach of seeking to create such improvements in an area like Sharpness, where providers such as Stagecoach have confirmed it would be unviable, is not a justified strategy and is therefore unsound.

5.12 Simply stating that Kingswood is a 'dormitory settlement' and then seek to constrain development on this basis is not a credible strategy for development, particularly with such a large and expanding employment site (Renishaw) within walking distance of the settlement. Allocations in this area would promote self-containment and address the imbalance of jobs to economically active residents evident this location.

5.13 In addition to this, we have also examined the provision of affordable housing across Stroud and in particular in the Wotton cluster; having studied this it is our view that the lack of delivery in Wotton-under-Edge in previous years and in future will have an impact on the ability to meet general market and affordable housing need in this location, which will in turn affect affordability.

5.14 The Parish Council's representations from January 2020 indicate the number of completions and commitments that have occurred in Wotton-under-Edge and Kingswood since 2011. An extract of these representations is shown below in figure 13.

	Wotton-under-Edge	**Kingswood**
2011 Total existing dwellings	2,192	542
Dwellings delivered 2011-2018	108	33
% increase 2011-2018	4.9%	6.1%
Total dwellings at 2018	2,300	575
Committed new dwellings (2018)[2]	45	54
Total dwellings (2018) + commitments	2,345	629
Increase 2011-2018 (including commitments)	**153 (6.98%)**	**87 (16.05%)**
Additional dwellings proposed in Draft Local Plan	**0**	**50**
Total increase in dwellings 2011-2040	**153 + 0= 153**	**87 + 50= 137**
Total % increase 2011-2040	**6.98%**	**25%**

Figure 13. Extract of the Parish Council's representations which show number of completions over previous years (since 2011) and anticipated level of growth up to 2040

5.15 Whilst we acknowledge the Parish Council's concerns over the level of development occurring in Wotton-under-Edge and Kingswood, in our view this is proportionate given that Wotton should be a Tier 1 settlement and Kingswood a Tier 2 settlement and are suitable locations for growth.

5.16 Having reviewed the historic applications in Wotton-under-Edge since 2011 it is noted that the majority of these are 10 units and under, meaning that no affordable housing has been provided. We have been able to find three examples of major development sites in Wotton; however, as they have all been brownfield redevelopment opportunities - two were submitted with viability assessments which reduced the level of affordable housing provision to zero, with the third providing policy compliant levels. The reduction in affordable housing provision is not unsurprising given that brownfield sites are usually always associated with abnormal costs, including ground contamination problems, the need for demolition, or other issues such as asbestos.

5.17 We were able to find one further application for an affordable-led scheme of 8 units which was approved in 2019 (Application Ref: S.19/1054/FUL).

5.18 We therefore estimate that only 16 affordable homes have been either completed or are committed in Wotton-under-Edge since 2011; due to the settlement being surrounded by the AONB it seems very unlikely that there will be significant delivery of affordable homes in this location as delivery in this location will rely primarily on brownfield sites and windfalls of 10 units and under.

5.19 This is particularly concerning with consideration of the level of affordable housing need in Wotton-under-Edge; the Affordable Housing Team at Stroud has confirmed that as of December 2020 there are 237 applicants which have stated a preference for housing at this settlement on the Homeseeker Plus register. An important note to be made is that whilst this is a helpful indicator of need, the 'preference' figure is not likely to fully reflect the number of households seeking accommodation as not all people in housing need are registered with Homeseeker Plus.

5.20 This level of need is significant and if it can't be met within the confines of the settlement of Wotton-under-Edge (which is extremely likely given the planning constraints), housing needs to be delivered in an area which has a functional relationship with the town and which has available transport links to and from the settlement – such as at Kingswood. Greenfield development, such as the land north of Charfield Road, will be able to deliver 35% affordable housing in compliance with policy requirements due to its limited constraints.

5.21 It should also be noted that there is affordable housing need arising in Kingswood itself, equating to 72 applicants on the Homeseeker Plus register as of December 2020. This need also needs to be met albeit we recognise that some existing commitments will go some way to addressing this.

5.22 Accordingly, we consider further growth is required within the Wotton cluster to address the critical issue of a lack of affordable housing delivery in Wotton-under-Edge over the last 9 years. Given the constraints that affect Wotton itself some of this growth will need to be catered for at Kingswood, lying in very close proximity to Wotton and thereby well located to address some of the overspill housing need arsing there.

6.0 OUR PREFERRED SPATIAL OPTION – ANSWERS TO SPECIFIC QUESTIONS

6.1 Taking the findings of the preceding sections of this statement, and the previous representations undertaken by Boyer Planning in support of the land at Charfield Road, we have set out our responses to the questions presented in the 'Additional Housing Options' consultation paper below.

Question 1 – Which strategy option(s) would you support, if additional housing land is required?

6.2 As set out, we commend SDC for taking a pragmatic approach to the increase in housing numbers that will arise from MHCLG's revisions to the prosed standardised method. We therefore consider that additional housing land is required.

Q1a – Option A Intensify

6.3 We have identified a range of factors that have not been properly considered in respect to some of the sites currently selected such as Wisloe and Sharpness (i.e. noise, utilities etc.) and can only accept such an approach where there has been technical work and a comprehensive masterplanning exercise carried out which demonstrates that an uplift in numbers is achievable without compromising the other objectives for the site, or resulting in adverse effects. We are aware that this has been achieved at emerging allocations such as Hardwicke and Stonehouse. Without this evidence, selecting this option would in effect be predetermining a strategy which is an unsound approach.

Q1b – Option B Towns and Villages

6.4 We support this approach but suggest it is combined with another in a 'blended' approach.

Q1c – Option C Additional Growth Point

6.5 We agree that a new growth point can be delivered but it needs to replace currently unsound options, such as Wisloe and Sharpness. We do not consider that there should be further provision over and above what is already proposed as otherwise the plan will rely too heavily on strategic-scale sites. It is our view that Whitminster is a credible location for such growth which we discuss in our other representations on behalf of Redrow Homes.

Q1d – Options D Wider Dispersal

6.6 We again broadly agree with this approach but suggest it is combined with another in a 'blended' approach.

Q1e – Would you support a hybrid / combination option?

6.7 Yes

Q1f – Can you suggest another strategy / spatial option for the identification of additional housing land?

6.8 See answers to Question 2.

Question 2 – If you answered yes to Q1e above, please explain which of the spatial options (A-D) you would like to see combined in a hybrid strategy, and why?

6.9 We consider that a blend of all options is the most appropriate, but in terms of allocating additional sites this should be on the edge of settlements which are sustainable and have access to everyday facilities and services, or have an interlinking role with another settlement nearby that provides supporting facilities and employment. Intensification of existing allocations can reasonably occur where there has been an evidence base and masterplanning undertaken to confirm this, such as at Stonehouse and Hardwicke.

6.10 Our views are that the strategy should involve the removal of land at Sharpness and Wisloe due to them being unsuitable locations for development which are not underpinned by technical evidence. These should be replaced with a single strategic allocation of land at Whitminster, supplemented by a significant number of non-strategic scale site allocations which can be delivered more quickly, ensuring a five-year housing land supply is maintained and addressing the balance in portfolio of sites. These smaller-scale allocations should include land north of Charfield Road, Kingswood, for reasons we have already and will go onto set out.

Question 3 – Do you support the approach of identifying a reserve site or sites, if housing development on the sites that will be allocated in the Local Plan should fail to come forward as envisaged?

6.11 Yes, we agree with this approach, but the reserve capacity needs to be quantified. This ensures further competition in the market and builds-in flexibility in the plan in accordance with the NPPF, ensuring that the tests of soundness to be met and providing a strategy to meet the area's objectively assessed need.

Question 4 – Which strategy option(s) would you support, if a reserve site (or sites) is required?

6.12 We have answered this question underneath at Question 5.

Question 5 – If you answered yes to question Q4e above, please explain which of the spatial options (B – D) you would like to see combined in a hybrid strategy, and why?

6.13 For similar reasons to the above, we consider that a blend of all options is required, where there is sufficient evidence to demonstrate that the sites are credible and viable. This is to ensure there is in-built flexibility to the plan and to ensure that sufficient homes and other development will be delivered to meet objectively assessed need over the plan period.

Question 6 – What should trigger a reserve site (or sites) coming forward?

- **A delay in an allocated Local Plan site receiving planning permission?**
- **Failure to deliver housing at the built rates set out in the Local Plan?**
- **Another trigger**

6.14 It is our view that it should be a combination of the options above, plus if a 5YHLS deficit is found to occur. This will allow for a reserve site to quickly come forward to supply any deficiencies in the delivery of homes in the plan.

6.15 For example, if the trajectory assumes that an allocated site will start delivering homes in 2023, in our view if this site hasn't received full planning permission by 2022 a reserve site should be triggered to plug the gap.

Question 7 – Do you support or object to the development of the sites identified?

7a – BER016 Hook Street Farm, Berkeley
7b – BER017 Bevans Hill Farm, Berkeley

6.16 We support growth at Berkeley as a Local Service Centre which has significant facilities, services and employment available. We would refer readers to the representations undertaken by Avison Young in respect to specific allocations at Berkeley but agree with their comments that land controlled by Redrow Homes (SW) Ltd is the most suitable option for growth.

7c – HAR017 Land at Sellars Road, Hardwicke

6.17 We have no objections to the inclusion of this site given it is a small-scale development on the edge of an existing town which should easily be able to be delivered within five years and is likely to be built by a small to medium-scale housebuilder, which is supported by the NPPF.

7d – STR065 Beeches Green Health Centre

6.18 As it has been confirmed that the site is no longer required for operational reasons we support the loss of this health centre to make way for residential development and health and community uses on this brownfield site.

7e – Land south of Hyde Lane, Whitminster

6.19 We strongly support growth at Whitminster and would refer officers to our detailed representations on this site and the settlement in general. As set out in the Stagecoach representations Whitminster has been overlooked in terms of its ability to accommodate growth, its functional relationship with other settlements in terms of the provision of facilities and services and public transport links which are available in the area.

6.20 We consider that land north of Hyde Lane and west of the A38, controlled by Redrow Homes, is a suitable option for development and should also be considered alongside the other allocations being considered in this location.

Question 8 – Are there any other sites that you would like to be considered for future housing development?

6.21 We will go onto discuss the benefits of allocating land north of Charfield Road, Kingswood, in the next section of this statement.

Question 9 – Do you support or object to the development of the potential growth points identified, or any sites therein?

9a – PGP1 – Land at Grove End Farm, Whitminster

6.22 As set out we support growth at Whitminster given its sustainability credentials and links to the Transport Movement Corridor, which can be more easily enhanced than the infrastructure proposed at Sharpness. Development at Whitminster is supported by Stagecoach who are a major bus operator in the region, whereas they have confirmed there is no business case for extending service provision to Sharpness. This is compelling and damning evidence against this proposal.

6.23 For the reasons set out we suggest that both Wisloe and Sharpness are removed and replaced with strategic growth at Whitminster, the extent of which should be expanded to include land north of Hyde Lane.

9b – PGP2 – Broad location at Moreton Valence

6.24 We do not support this proposed allocation for the reasons described in paragraphs 4.38 – 4.41 of this document, in summary our concerns are:

- The site is within multiple ownerships and it is our understanding that the site is not associated with a developer, nor has it actively been promoted by a consortium of landowners to the Council in any co-ordinated or meaningful way. Development proposals for the site are therefore not well progressed.
- The site represents a fragmented potential growth point, with intervening land in multiple ownerships severing the proposed site, and is not capable of being connected across all land parcels and therefore does not allow for a comprehensive development to be planned for or delivered.
- The land is subject to both fluvial and surface water flood risk as figures 9 and 10 below show. NPPF policy (para 155 in particular) requires that such areas should be

avoided, and both the surface water and fluvial flow paths sever the site and exacerbate our concerns regarding connectivity and comprehensive development.

- No evidence has been prepared to demonstrate that providing another large source of supply in close proximity to two existing strategic allocations will not flood the market and lead to a delay in housing delivery.

Question 10 – Are there any other sites that you would like to be considered as a future growth point?

6.25 We do not consider that further growth points are needed in addition to Whitminster; in fact, the number of strategic sites should be reduced to avoid an overreliance on this source of supply that has acknowledged extensive lead in times and funding challenges. We consider that this should be supplemented by non-strategic sites such as land north of Charfield Road, Kingswood, which will be a sustainable enhancement of the existing settlement.

Question 11 – Do you have any comments to make about the Sustainability Appraisal that accompanies this consultation document?

6.26 We do not have any comments regarding the additional Sustainability Appraisal work which accompanies the consultation document; however, we have some concerns over the original documents in support of the Local Plan which seems to underestimate the lack of credible transport options available at Sharpness.

7.0 LAND NORTH OF CHARFIELD ROAD, KINGSWOOD

Introduction

7.1 Redrow Homes (SW) Ltd have a commercial agreement in place with the landowners of land north of Charfield Road. A site location plan is enclosed as Appendix A to this document and amounts to circa 23 hectares of land.

7.2 The site has been presented as part of representations made on behalf of Redrow Homes during previous consultation stages including the 'Draft Local Plan' consultation undertaken in January 2020.

7.3 The site comprises five parcels of agricultural land which are irregularly shaped and divided and bound by hedgerows. To the north-west is Renishaw, to the east are residential dwellings. Two bus stops lie on Charfield Road.

Accessibility

7.4 We consider that the development proposed at Charfield Road could form a sustainable extension to the village and provide the critical school infrastructure required to address the existing capacity issue cited by the Primary School itself and the Parish Council.

7.5 The site is well located and lies between the urban edge of Kingswood and the major employer Renishaw, which is allocated for further development of 10 hectares of land for commercial uses.

7.6 Kingswood itself contains a number of everyday facilities, including a convenience store, village hall, playing fields, primary school, churches, public house, MOT garage and car home. Katharine Lady Berkeley's Secondary School lies to the north-east, approximately 0.6km east of the site.

7.7 Beyond this to the north lies the settlement of Wotton-under-Edge, where there are a multitude of everyday facilities and services capable of meeting everyday needs. The site sits circa 2.3km walking distance to the centre of Wotton-under-Edge from the centre of the site, using main roads which have pavements. This is only marginally over the maximum walking distance that the CIHT guidance refers to (2km), and many facilities within Wotton lie within the 2km distance (swimming pool, secondary school and doctor's surgery).

7.8 As set out above, there are existing bus stops in proximity to the site which carry the 60, 63, 84, 85, 626, 860 and S8 bus routes, which provide regular services to Thornbury, Wotton-under-Edge, Charfield, Yate and Wickwar. The Stagecoach representations submitted earlier this year highlight the potential to expand and improve these services which already see a significant amount of traffic flow in this location with ease, with the strategy for improving this already agreed and costed.

7.9 Proportionate development in this location could therefore support, sustain and enhance existing facilities and services through the provision of the critical mass required to make a viable business case for enhancing and improving infrastructure.

Statutory Designations

7.10 The site lies adjacent to the development boundary of Kingswood but is not designated within the Green Belt, Flood Zone, Conservation Area, SSSI, AONB, Special Landscape Area, Air Quality Management Area or otherwise. The site is therefore unconstrained in in terms of policy designations.

Historic Assessment of the Site

7.11 The site was assessed as part of the Strategic Assessment of Land Availability (SALA) in 2019 (Ref: KIN013). The site was rejected for the following reason:

"Site forms part of larger site previously assessed as KIN008. The land is not suitable for housing, employment or community development because of the high landscape sensitivity of the site including the visual setting of the listed Langford Mill House in a key view from Wotton Road. Development would extend the settlement form into the open vale countryside on higher ground and is inappropriate within the wider landscape. There are potential impacts therefore that would prevent sustainable development in this location".

7.12 We have considered this assessment in the following sections of our report. It should be noted that Redrow Homes have secured an agreement with the landowners to the west which results in a bigger parcel of land being available for development and which, if required, can overcome the issues raised above relating to landscape and heritage.

Landscape

7.13 As the proposed site lies adjacent to the established boundaries of Kingswood and has the potential to influence long range viewpoints from the AONB, the landscape impact of the development and the setting of the site has been an important consideration when considering the extent and form of development that is possible here.

7.14 Accordingly, landscape advice has informed the design process so far and this has been summarised in the Landscape Strategy document prepared by Pegasus which is provided in Appendix C.

7.15 The initial work set out a range of key recommendations that the development must adhere to in order to minimise landscape impacts to acceptable levels, these included:

- The development should be set within a landscape framework that works with the topography of the site and site context and provides a lower density edge to it, to provide an appropriate transition to the rural areas and AONB beyond;
- Provide POS that breaks the mass of the development up and provides mitigating screening;
- Carefully consider the nearby viewpoints, such as the PROW to the north and provide parkland areas that screen and filter views of the development;
- Integrate SUDs into a POS scheme for the site that respects the current water-based infrastructure that serves the site;
- Provide an appropriate landscape buffer to existing development in Kingswood, in particular in respect to the adjacent listed Langford Mill House building;
- Utilise and integrate existing landscape features such as trees and hedges into the new proposed landscape strategy for the site; and
- Propose the most extensive POS areas to the north of the site to provide an appropriate buffer between the site / Kingswood and the Renishaw employment site.

7.16 These recommendations have guided the emerging master plan proposals and the extent of the development footprint and its structure. Essentially the strategy now seeks to create a generous parkland setting around the housing development which 'bleeds' into the housing site via existing hedgerow and ditch corridors. Extensive planting is proposed within the parkland which will be multi-functional in making this area attractive and useable for all existing and new residents of Kingswood, greatly enhance the biodiversity value of the site

and visually break up and screen the development from key views nearby, and from the AONB.

7.17 The resulting landscape strategy plan is set out in figure 14 below and it is considered that if this is implemented the landscape and visual effects of the development will be acceptable and an attractive and useable new publicly accessible park provided for all residents, and nearby employees, to use.

Figure 14. Extract of the Landscape Strategy prepared by Pegasus

Highways

7.18 Accessibility has already been discussed above, however in terms of highways safety Paul Basham Associates (PBA) have assessed the potential access into the site including visibility splays and are comfortable that up to 350 dwellings can be delivered in this location (up to 350 was considered to allow for flexibility in case the proposals go over 300).

7.19 It is acknowledged that there are existing capacity issues at J14 of the M5; solutions are already been discussed to create a roundabout which will ensure there is reserve capacity to accommodate committed and future development. It is our view that further development in this location will capture obligations towards improving the junction which can be secured via s106 or CIL.

Flood Risk & Drainage

7.20 The site lies within Flood Zone 1 and is at low risk from flooding, as well as at a low risk from surface water flooding. As such soakaway testing will be undertaken to ascertain whether infiltration is possible across the site as a method of drainage, if not attenuation will be used and discharge to an existing outfall in close proximity to the site.

Ecology

7.21 A Phase 1 Ecological Assessment has been undertaken by Green Ecology for the land to the east in December 2019 and across the whole of the site in October 2020. This report accompanies these representations and can be found in Appendix E. The assessment however identified that there are limited ecological constraints to this land and additional surveys were required for birds, bats and reptiles (including Great Crested Newts) only. It has also been noted that a buffer to the stream to the north should also be incorporated to protect these habitats.

7.22 A minimum 10% net gain will be achieved on the site in line with Biodiversity Impact Assessment regulations and the conversion of sterile agricultural fields top more diverse parkland should be viewed as a significant benefit to biodiversity and ecology.

Heritage

7.23 We are aware of the Grade II Listed Building to the east of the application site known as the Landford Mill House. Whilst further technical work is underway the landscape strategy document prepared by Pegasus has considered this issue and proposed a significant planted buffer along the southern edge of the building to mitigate any potential impact of the proposed development on the setting of this asset. In light of the fact that the building was an old mill, we consider that the key setting and views to be retained are between this and the stream running along the northern boundary of the site.

Odour

7.24 The Kingswood Wastewater Treatment Works (WTW) lies to the north of the Redrow site. Therefore, the potential for odour to cause a negative impact on, and potentially preclude development, has been assessed by technical consultants Isopleth Ltd.

7.25 Their report is included as Appendix F to this document and the assessment undertaken used information provided by Wessex Water to consider the odour emissions from the WTW and produced a contour plan that models the potential impacts arising from the WTW.

7.26 The results of the assessment have identified that the average odour impact associated with the WTW is within acceptable parameters at all locations within the potential development site except for those closest to the WTW on the site's northern edge. These fringe areas of the site are to be proposed as parkland so no adverse effects on residents will occur.

7.27 In light of the assessment undertaken the presence of the WTW to the north of the site presents no constraint to the proposed development and would not result in any adverse impacts in relation to odour.

School Capacity

7.28 As set out in previous sections of this statement, we are aware of an existing school capacity issue at Kingswood Primary School, noted by both the Primary School itself and the Parish Council. Additional housing applications in this location have been objected to by Gloucestershire County Council (GCC) due to the lack of provision in this location. A separate note has been prepared by Mike Melton, who is an education property specialist, in relation to this issue. This can be found as Appendix G at the end of this report, however we have summarised this below for ease of reference:

- Kingswood Primary School (KPS) is already at capacity and there are future development sites in this location which will result in new children requiring a school place;
- Due to existing land ownership constraints and physical constraints there is no possibility of expanding the existing school;
- The best solution would be to relocate the existing school and provide land for a 2FE primary school which provides sufficient capacity should the school need to expand in future;
- None of the other options for growth are currently committing to provide a primary school to address this issue;
- This would allow for the currently anticipated deficit in places to be addressed on a more suitable site which can meet the guidelines on design for schools.

7.29 As various meetings the Parish Council has been considering a solution with GCC since the beginning of this year (2020). A number of options were considered at the January 2020

meeting, one of which determined that the minimum level of development required to fund a new 1FE village school would be to plan growth for 250 homes. It was noted at this meeting that without the potential to expand the 1FE school could be nearly full on completion, therefore ending up in the same position as currently. As such, if land for a 2FE were to be provided, this would give the flexibility to expand if and when required.

7.30 It is noted in the Public Meeting Minutes from the same meeting in January 2020 that the Head Teacher of Kingswood Primary School, Dan Johnson, urged local residents to consider the positives of planning gain from development, outlining that children were already being turned away and there is no room to expand.

7.31 The minutes also note that Kingswood local residents are opposed to any growth within their village, and had only selected the Persimmon site as it was the least amount of development.

7.32 Within the March 2020 meeting, GCC acknowledged that it would be logical to have a larger-scale development in the village which can contribute obligations. They have also stated that whilst they are unable to specify support for residential development, no other sites have been put forward as an option aside from the Redrow land to the north of Charfield Road.

7.33 The Sustainability Appraisal (SA) Report which accompanies the Draft Local Plan also highlights this issue and the impact this could have on sustainability objectives in this area. Paragraph 5.33 of the Report states:

"In the Wotton-under-Edge area, new housing developments local to Kingswood Primary School should be monitored as there are short term capacity issues due to this school's site restrictions. There is likely to be a requirement to continue to hold discussions with developers to inform how they will make provision available locally. There may be primary school capacity within the wider planning area, at Wotton-under-Edge, however, this would require parents and children to travel out of Kingswood village for primary education".

7.34 The evidence base has identified that there are also capacity issues at the schools in Wotton-under-Edge and this has been significantly downplayed in the SA Report that accompanies the plan.

7.35 This is therefore a critical issue which needs to be addressed now to avoid worsening capacity issues at KPS and resulting in primary school-aged children having to travel via bus or car to get to school each day. This is inappropriate and land north of Charfield Road can provide an immediate solution to this problem if allocated for development.

Proposed Development

7.36 The technical work undertaken to date which is primarily landscape-led has informed and shaped the masterplan presented in the Vision Document which is enclosed with these representations in Appendix B.

7.37 The proposals can accommodate circa 300 dwellings, land for a 2FE primary school and extensive parkland / recreational opportunities on the site. The masterplanning of the site can also provide a direct pedestrian and cycle access to Renishaw out to the west, providing a more attractive route for non-car users than the current alternative along the main road.

7.38 The proposals will incorporate a mix of dwellings and policy compliant affordable housing to meet both Kingswood and Wotton-under-Edge's need, which is significant given the issues we have discussed in previous sections of this statement.

8.0 CONCLUSION

8.1 In summary, we consider that the current Local Plan strategy relies too heavily on strategic-scale sites which have little evidence to underpin them. In particular we have significant concerns over the evidence underpinning both Sharpness and Wisloe, and their ability to meet wider sustainability objectives.

8.2 It is our view that these allocations should be removed and allocations distributed in more sustainable and suitable locations, such as Kingswood, to provide supply to meet objectively assessed need for the Wotton cluster, which has seen little delivery over the last 10 years, and practically no new affordable housing.

8.3 These locations already have planned transport improvements which have been agreed and costed with a major bus operator, there will therefore be vast opportunities for alternatives to the private car to access everyday facilities, and in particular, major employment.

8.4 Redrow wholly support the allocation at Renishaw to expand the provision of employment land in this location, reducing out commuting and allowing a business to thrive. However, in conjunction with this, there needs to be proportionate housing growth to balance the number of jobs to economically active people in this location. This will give residents the opportunity to work and live in the same location, a significant benefit in transport and sustainability terms.

8.5 The land already allocated at Kingswood for only 50 dwellings is insufficient to match the number of people with jobs available in this area; furthermore the identified school capacity issue requires resolving according to the draft policy proposed. The land north of Charfield Road can provide a robust solution to this, with the masterplan easily accommodating a new two-form entry primary school. This addresses a significant existing issue in the area which has been acknowledged by plan makers and statutory consultees.

8.6 Technical work to date has not identified any significant constraints to the site's development, with the proposals underpinned by a landscape-led strategy to ensure there will be no adverse effects of the development.

8.7 With respect to the Additional Housing Options, we consider that a 'blend' of all the spatial options is the most appropriate but only where there is sufficient technical evidence underpinning the proposed allocations.

8.8 We consider that the provision of additional housing should be distributed across existing towns and villages at Tiers 2 – 4 (this is a blend of spatial options and could also be considered as 'dispersal'), with Sharpness and Wisloe removed, and replaced by a single strategic allocation at Whitminster.

8.9 We therefore conclude that land north of Charfield Road, Kingswood should be allocated for circa 300 dwellings, two-form entry primary school, and extensive parkland / recreation space, to achieve a mixed and balanced portfolio of sites in accordance with the NPPF as well as delivering homes in an accessible location adjacent to a major employer of Stroud District and in an area where there are already planned transport improvements.