Land East of New Road, Egerton

Flood Risk Assessment

On behalf of **Jarvis Homes**

Project Ref: 48386/4001 | Rev: D | Date: June 2021

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Lakeside House, Blackbrook Business Park, Blackbrook Park Avenue, Taunton TA1 2PX
T: +44 (0)1823 218 940 E: PBA.Taunton@stantec.com

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	Name	Position	Signature	Date
Prepared by:	Gemma Nelmes	Assistant Engineer	*GN*	14/04/2021
Reviewed by:	Richard Laker	Senior Engineer	*RL*	14/04/2021
Approved by:	Elisabetta Torricelli	Director	*ET*	14/04/2021
For and on behalf of Stantec UK Limited				

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Stantec of behalf of our Client, Jarvis Strategic Land Ltd, to support a full planning application for the development of up to 15 residential properties at Allotment Field, Egerton.

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), this FRA demonstrates that:

i. The development is safe.

ii. The development does not increase flood risk.

iii. The development does not detrimentally affect third parties.

The Environment Agency (EA) '*Flood Map for Planning'* shows the site lies entirely within Flood Zone 1 as defined in the Planning Practice Guidance (PPG) *'Flood Risk and Coastal Change'* Table 1 as follows:

> **Flood Zone 1 –** *Low Probability: Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)*

The proposals for residential development constitute a **more vulnerable** land use, which is considered appropriate within Flood Zone 1 (reference PPG: Tables 2 in *Paragraph 066 Reference ID: 7-067-20140306* and Table 3 in *Paragraph: 067 Reference ID: 7-067-20140306*).

As defined in Table 3 of the PPG, the location of the site within Flood Zone 1 means neither the Sequential nor Exception Tests are applicable.

The Surface Water Drainage Strategy has been developed using best practice Sustainable Drainage System (SuDS) techniques. Guidance on suitable techniques and methods has been obtained from the EA, the Non-Statutory Technical Standards for Sustainable Drainage Systems, Ashford Borough Council's Surface Water Management Plan and *'The SuDS Manual'* (CIRIA C753) amongst other sources.

The proposed Surface Water Drainage Strategy for the development with manage surface water runoff via infiltration. The outline strategy consists of a combination of source control and strategic site control measures which will all make use of the infiltration potential of the ground. The surface water runoff will be attenuated up to the 1 in 100-year storm event plus a 40% additional allowance for climate change.

In summary, the FRA demonstrates that the proposed development is safe and in accordance with the requirements of National and local planning policy.

1 Introduction

1.1 Scope of Report

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Stantec of behalf of our Client, Jarvis Strategic Land Ltd, to support a full planning application for the development of up to 15 residential properties at Allotment Field, Egerton.

1.1.2 The report is based on available information for the site as detailed in section 2 and prepared in accordance with the planning policy requirements set out in section 1.3. The scope of the FRA is consistent with the 'site specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) Planning Practice Guidance.

1.2 Sources of Information

1.2.1 The FRA has been prepared based on the following sources of information:

- Topographic survey of the site undertaken by JC White Geomatics Limited, in June 2020;
- Development proposals by Ian Bull Consultancy;
- Environment Agency (EA) published **'Open Data'** datasets available online, reproduced with OS mapping under licence to Stantec (contains Ordnance Survey data © Crown copyright and database right [2017], contains Environment Agency information © Environment Agency and database right);
- The **Environment Agency (EA) Online Flood Maps** for Planning [1] and Long Term Flood Risk [2];
- **EA Product 4 data** (reference, date etc etc);
- FEH13 rainfall data and point descriptors, extracted from the FEH online service;
- Ashford Stage 1 Surface Water Management Plan (SWMP), prepared by JBA consulting dated October 2013;
- Kent Local Flood Risk Management Strategy 2017-2023; and
- Kent County Council Drainage and Planning Policy – a Local Flood Risk Management Strategy Document, December 2019.

1.3 Relevant Planning Policy

1.3.1 This FRA has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:

- National policy contained within the revised **National Planning Policy Framework (NPPF)** dated February 2019, issued by Ministry of Housing, Communities and Local Government, with reference to Section 14 '*Meeting the challenge of climate change, flooding and coastal change*'.

[1] https://flood-map-for-planning.service.gov.uk/

[2] https://flood-warning-information.service.gov.uk/long-term-flood-risk/

- The **Planning Practice Guidance (PPG)** for Flood Risk and Coastal Change released in March 2014 and updated in July 2020 to incorporate the EA **'Flood Risk Assessments: Climate Change Allowances'** guidance.

- The **Water Framework Directive** (WFD) (Commission of the European Communities, released 2000) (ref 13.2) establishes a framework for a European-wide approach to action in the field of water policy. Its ultimate aim is to ensure all inland and near shore watercourses and water bodies (including groundwater) are of *'Good'* status or better, in terms of ecology, and also chemical, biological and physical parameters, by the year 2027. Therefore, any activities or developments that could cause detriment to a nearby water resource or prevent the future ability of a water resource to reach its potential status, must be mitigated so as to reduce the potential for harm and allow the aims of the Directive to be realised.

- **Design and Construction Guidance, also referred to as Sewers for Adoption 8th Edition (SfA8)**. On 25 October 2019, Ofwat approved the revised adoption documentation submitted by Water UK. The documentation includes the "Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code")". This new sewage adoption arrangement came into effect on 1 April 2020 and wholly replaces previous editions of Sewers for Adoption. For the first time, specific SuDS components are included as adoptable elements of a drainage system.

- Local planning policy contained within the Ashford Borough Council **'Local Plan'** (adopted February 2019), with particular reference to policy S30 – Egerton, Land on New Road.

1.3.2 The local planning authority will make decisions with regards to any planning application within any floodplain or flood risk area. The EA is a designated statutory consultee for areas within Flood Zones, areas with critical drainage problems, and plays a key role in providing advice on development and flood risk issues. The Lead Local Flood Authority (LLFA) is a statutory consultee for major developments which have surface water or other local flooding impacts.

1.3.3 This FRA should be read in conjunction with other planning application supporting documents.

1.4 Caveats and Exclusions

1.4.1 This FRA has been prepared in accordance with the NPPF and Local Planning Policy. The proposed flood management (including ground floor level recommendations) and surface water management strategies are based on the relevant British Standards (BS8533:2017), the standing advice provided by the EA or based on common practice.

1.4.2 The Construction (Design and Management) Regulations 2015 (CDM Regulations) will apply to any future development of this site which involves "construction" work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.

1.4.3 The approach for the FRA and proposals for the surface water management strategy are based on the requirements of the EA and Kent County Council (KCC) in its role as Lead Local Flood Authority (LLFA).

1.4.4 The findings of this FRA are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals.

1.4.5 The EA Product 4 flood data on which the FRA is based is valid under a 12-month licence. As such, the FRA is accurate at time of issue, but we would recommend the end user reviews the validity of the flood data on an annual basis with the EA.

1.4.6 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development. Stantec does not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

2 Proposed Development Site

2.1 Site Description

2.1.1 The 1.7-hectare (ha) site is located adjacent to New Road in the village of Egerton in Kent (postcode TN27 9DN, site centre Ordnance Survey (OS) grid reference 590,982m E, 147,260m N.

2.1.2 The village of Egerton lies within the administrative boundary of Ashford Borough Council (ABC).

2.1.3 The site currently consists of and is surrounded by agricultural land and is bound to the southwest by “New Road”, and to the northwest by existing residential properties.

2.1.4 A site location plan is provided in **Appendix A**.

2.2 Existing Topography

2.2.1 A topographic survey of the site has been undertaken by JC White Geomatics Limited and indicates that the land falls in a generally northern direction. The site falls from a highpoint of approximately 98.79mAOD in the south-eastern corner, to a low point of 89.95mAOD in the north.

2.2.2 Topographical survey information can be found in **Appendix B**.

2.3 Hydrological Setting

2.3.1 An Ordinary Watercourse named the “Great Stour” lies approximately 1km northeast of the site and broadly flows from northwest to southeast, towards Ashford. The Great Stour is designated by the Environment Agency as a Main River, immediately east of the village of Little Chart. A second watercourse, a tributary of the Great Stour, lies approximately 595m northeast of the site.

2.3.2 There are no watercourses located within or adjacent to the site boundary.

2.4 Geology and Hydrogeology

2.4.1 The British Geological Society (BGS) online mapping indicates that the site is underlain by Hythe Formation – Sandstone and Limestone, Interbedded.

2.4.2 The BGS states:

“*In the western Weald, the formation comprises mainly fine- to medium-grained, sparsely glauconitic sands, sandstones and silts, locally pebbly, with calcareous or siliceous cement in beds or lenses in some areas. Some clay interbeds, including Fuller's Earth. In Kent and eastern Sussex the formation comprises, alternating sandy limestones ("Ragstone") and glauconitic sandy mudstones (Hassock).*”

2.5 Existing Drainage Arrangements

On-Site Drainage

2.5.1 The site consists primarily of open agricultural land, such that surface water would either drain via natural infiltration into the ground or would drain via the existing surface water drainage measures within the site.

2.5.2 At present there are no impermeable areas thought to be within the site boundary, it is comprised entirely of greenfield land.

3 Assessment of Flood Risk

3.1 Environment Agency Flood Mapping

3.1.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the '*Flood Map for Planning'* hosted on the GOV.UK website [1]. This website presents the Flood Zones, which are the starting point for assessing the probability of flooding from rivers and/or the sea. They are also used as the basis for determining which development types are appropriate within a given location and whether the Sequential Test or Exception Test need to be applied.

Flood Map for Planning

3.1.2 Flood Zone definitions are set out in Table 1 of the online PPG (Paragraph: 065 Reference ID: 7-065-20140306) as below:

- "**Zone 1 – Low Probability:** *Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3);*
- **Zone 2 – Medium Probability:** *Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map);*
- **Zone 3a - High Probability:** *Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map);*
- **Zone 3b – The Functional Floodplain:** *This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map);*

  Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment [2] when considering location and potential future flood risks to developments and land uses."

3.1.3 The Flood Zones are predominantly based on hydraulic modelling work, although Flood Zone 2 can extend to include recorded flood outlines. Where detailed modelling has not been carried out, the Flood Zones are based on the 'National Generalised Flood Model'. This model does not explicitly represent channel geometry or structures such as culverts, bridges and weirs and hence may not provide an accurate estimation of the probability of flooding.

[1] https://flood-map-for-planning.service.gov.uk/

[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change#Strategic-Flood-Risk-Assessment-section

3.1.4 The site is shown by the EA's '*Flood Map for Planning'* to lie within **Flood Zone 1 'Low probability'.** As can be seen in **Figure 3.1** below.

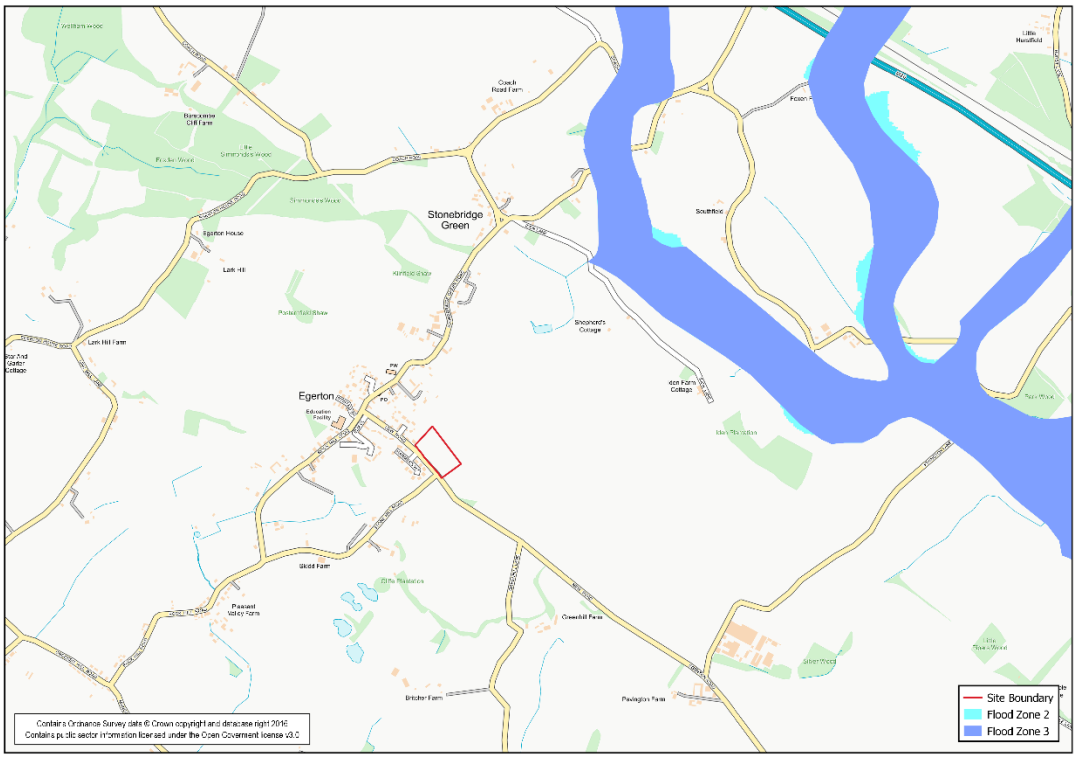


Figure 3.1 – Flood Map for Planning

3.1.5 The flood zone map is included within **Appendix C**.

Flood Risk from Surface Water mapping

3.1.6 The '*Flood Risk from Surface Water'* mapping, hosted on the flood warning information service website[1], show areas which could be potentially susceptible to surface water flooding in extreme rainfall events.

3.1.7 The mapping has been derived by broadscale modelling using ground levels defined on a 2m square grid with building footprints raised by 0.3m, roads lowered by 0.125m and variable roughness values used to account for different land uses. Rainfall events of various likelihoods and durations where then simulated to determine likely flood depths and velocities for different risk categories.

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

[1] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

3.1.8 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

3.1.9 The mapping indicates that there is an area in the north of the site of "low" and "medium" risk of flooding from surface water, however the majority of the site is shown to have a "very low" risk, as can be seen in **Figure 3.2** below.

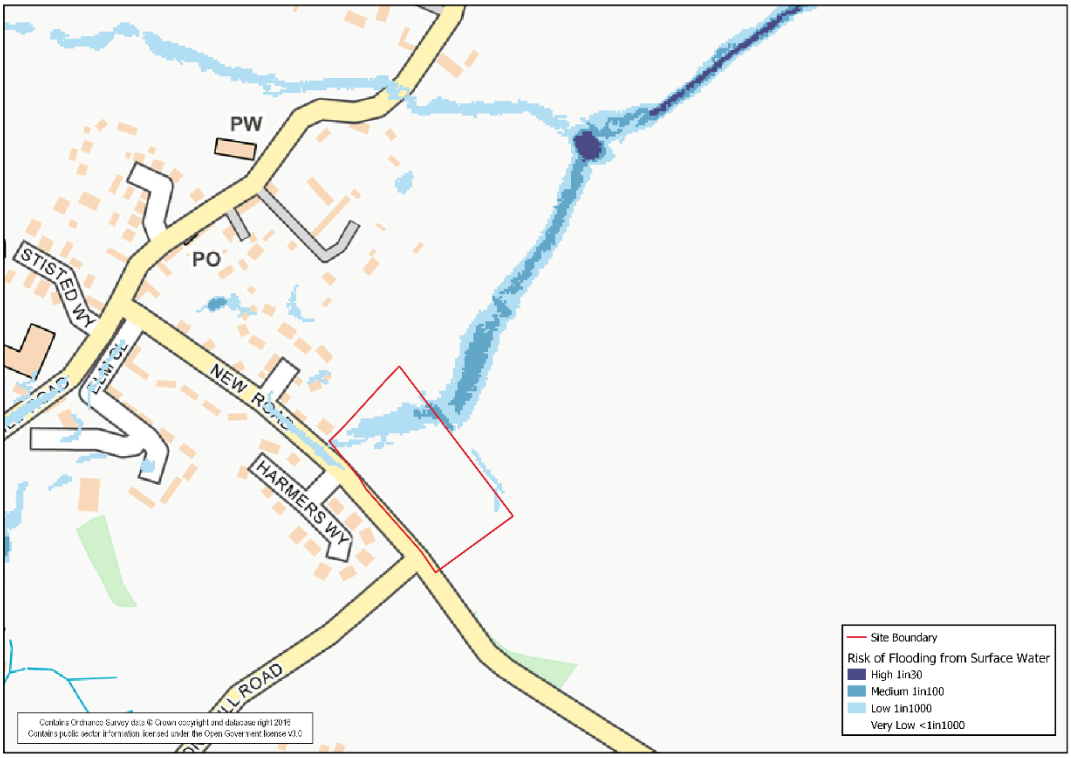


Figure 3.2 – Flood Risk from Surface Water

3.1.10 The areas of "low" and "medium" flood risk may be attributed to a possible surface water flow path or localised depressions

3.1.11 The surface water flood map is included within **Appendix C**.

3.1.12 Further information on the Flood Risk Maps for Surface Water can be found in *Risk of flooding from surface water - Understanding and using the map* document hosted on the GOV.UK website[2].

[2] https://www.gov.uk/government/publications/flood-risk-maps-for-surface-water-how-to-use-the-map

Flood Risk from Reservoirs Mapping

3.1.13 The '*Flood Risk from Reservoirs Mapping'* is hosted on the flood warning information service website[1] and present extents, depths and velocities of flooding for simulated, hypothetical '*credible worst case'* dam breaches for reservoirs with a capacity of 25,000m^3 or greater. These reservoirs fall under the *Reservoir Act 1975*.

3.1.14 The mapping indicates that the site is not at risk of flooding from reservoirs.

3.2 Groundwater Flooding

3.2.1 The desk study found that groundwater levels are indicated to be over 5m below ground level, and therefore groundwater flooding is not considered to be a risk on the site. However, this will be confirmed during later stages of work as part of a detailed ground investigation.

3.3 Sewer Flooding

3.3.1 Consultation with Southern Water confirmed that there are no records of sewer flooding within the site boundary. However, there is record that over the last 10 years there has been one flooding incident nearby. This was an external flooding event and was caused by a blockage in the sewer network.

3.3.2 Correspondence with Southern Water has been included in **Appendix D**.

3.4 Flooding from Artificial Sources

3.4.1 No artificial sources of flooding, such as canals, lakes and ponds, have been identified within the vicinity of the site and therefore flood risk from these sources can be considered negligible for the site.

3.5 Historic Flooding

3.5.1 The pre-application advice received from KCC indicated a number of small-scale flooding incidents within the highways surrounding the site, however it also states that once the drains were cleansed the problem was solved.

3.5.2 A copy of the pre-application consultation has been included within **Appendix D**.

3.6 Impact of Climate Change

3.6.1 In considering flood risk to the site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.

3.6.2 In February 2016 the EA released new guidance on the application of climate change allowances in flood risk assessments [3]. This guidance provides contingency allowances for potential increases in peak river flow, and for potential increases in rainfall intensity.

3.6.3 Based on the sites location and topography it is unlikely that climate change will have an impact on the risk of fluvial flooding.

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

3.6.4 Increased in rainfall intensities has been considered in the development of the surface water drainage strategy as detailed in **Table 3.1** and is discussed in **Section 6.**

Applies Across All of England	Total Potential Change Anticipated for the '2080s' (2010 to 2115)
Upper end	***40%***
Central	***20%***

Table 3.1: Climate Change Allowances for Peak Rainfall Intensity

4 Proposed Development and Sequential Test

4.1 Development Proposals

4.1.1 The application submitted is for:

'construction of up to 15 residential properties at Allotment Field, Egerton'.

4.1.2 The site Illustrative Masterplan is provided within **Appendix E**.

4.2 Development Vulnerability

4.2.1 PPG 'Flood Risk and Coastal Change' Table 2 (*Paragraph 066 Reference ID: 7-067-20140306)* confirms the *'Flood risk vulnerability classification'* of a site, depending upon the proposed usage. This classification is subsequently applied to PPG Table 3 (Paragraph: 067 Reference ID: 7-067-20140306) to determine whether:

- The proposed development is suitable for the flood zone in which it is located, and;
- Whether an Exception Test is required for the proposed development.

4.2.2 The proposed development comprises the following uses and vulnerability classes:

- **More vulnerable:** Residential and educational uses;
- **Water-compatible development:** Amenity open space.

4.2.3 The site lies entirely within Flood Zone 1 and therefore all forms of development are compatible, as indicated in Table 3 of the online PPG (Paragraph: 067 Reference ID: 7-067-20140306).

4.3 The Sequential and Exception Test

4.3.1 The NPPF requires local Planning Authorities to apply the Sequential Test to steer new development towards areas of lowest flood risk. As all development will be situated in Flood Zone 1, the proposals are in accordance with the Sequential Test.

4.3.2 Table 3 sets out flood risk vulnerability and Flood Zone compatibility, including thresholds invoking the Exception Test. As all development will be located in Flood Zone 1 there is no requirement to apply the Exception Test.

5 Flood Mitigation Strategy

5.1 Sequential Approach

5.1.1 The NPPF encourages the application of the 'sequential approach' in the master-planning process for new development, i.e. locating the more sensitive/vulnerable elements of new development in the areas which lie at lowest probability of flooding and, conversely, reserve the areas of the site at greatest risk of flooding for the least vulnerable elements of the development (or, preferably, leave such areas undeveloped or as soft landscaping).

5.1.2 As the site lies entirely in Flood Zone 1, the sequential approach is inherent within the masterplanning of the site.

5.2 Building Design

Ground Floor Levels

5.2.1 Standard requirements for ground floor levels of new development are set out in BS8533:2011 'Assessing and Managing Flood Risk in New Development – Code of Practice'. This recommends floor levels are set a minimum of 300mm above the modelled 1 in 100 annual probability plus allowance for climate change flood level.

5.2.2 It is also recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from dwellings in such a scenario.

5.3 Safe Access

5.3.1 It is necessary to consider and incorporate safe access arrangements as part of the mitigation, to ensure the users/occupants of the development are safe in times of flooding.

5.3.2 As the entire site lies within Flood Zone 1, it is considered that access in egress to the site will be safe.

6 Proposed Surface Water Drainage Strategy

6.1 Overview

6.1.1 A key requirement for the proposed development is to seek that flood risk downstream is not increased. The potential is associated with additional runoff generated by the introduction of roofs and hard-paved surfaces as part of the development. These surfaces replace natural ground where water can percolate into soil pores and to a greater or lesser extent infiltrate into the underlying rock. Additionally, natural ground is more uneven, promoting localised ponding while vegetation intercepts rainfall by collecting water. Lastly, natural ground is generally more resistant flow, reducing the velocity of overland flow and the time that it takes to leave the site.

6.1.2 The replacement of natural surfaces has two principal effects on the land's response to rainfall:

- An increase in the rate of runoff;
- An increase in the volume of runoff.

Both of these impacts have the potential to increase the flood risk downstream. The rate of runoff is normally of principal concern as it can impact on the peak flow rate in the receiving watercourse or drainage network.

6.1.3 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface water runoff from development sites and recommended that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development.

6.2 Outfall Parameters and Destination

6.2.1 The key design criteria for the surface water drainage system are detailed in the following documents:

- NPPF 'Planning Practice Guidance';
- DEFRA 'Non-Statutory Technical Standards for Sustainable Drainage Systems';
- 'The SuDS Manual' CIRIA C753;
- Ashford Stage 1 Surface Water Management Plan (SWMP), prepared by JBA consulting dated October 2013; and
- Kent Local Flood Risk Management Strategy 2017-2023.

6.2.2 Based on KCC's 'SuDS Policy 1', consistent with the PPG and Building Regulations Part H, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practical:

i. Into the ground (infiltration);

ii. To a surface water body;

iii. To a surface water sewer, highway drain or another drainage system;

iv. To a combined sewer.

6.2.3 The hierarchy is considered in order below.

Discharge into the Ground (Infiltration)

6.2.4 Based on the Building Regulations Part H hierarchy, the preferred method for disposal of surface water from the new development is via infiltration drainage.

6.2.5 The geological information available indicates that infiltration is likely to be feasible on site. Therefore, use of infiltration techniques to manage surface water discharge have been included within the outline drainage strategy.

6.2.6 In line with KCC's Drainage and Planning Policy submission requirements, it is recommended that the infiltration potential on site is confirmed by targeted in-situ soakage testing in accordance with BRE Soakaway Design (DG 365) to support a future reserved matters planning application.

6.3 Surface Water Outfall

Infiltration Rates

6.3.1 The infiltration coefficient has been calculated using Table 25.1 "Typical Infiltration Coefficients Based on Soil texture" of the SuDS Manual C753. The underlying geology can be described as "Slightly silty slightly clayey SAND" which the table states typically have coefficients of between 1x 10^{-5} and 5 x 10^{-5}. In the interest in producing a worst-case-scenario drainage strategy, the lesser of these coefficients has been used within the MicroDrainage Calculations (**Appendix F**).

6.4 Sustainable Drainage Techniques

6.4.1 The proposed surface water drainage strategy is shown on Stantec Drawing 001 in **Appendix F** and shows the following SuDS features:

- Lined permeable pavements for capture and treatment of surface water runoff;
- Swales for conveying surface water runoff;
- Infiltration basins;
- Lined wetland features upstream of infiltration basins to provide nutrient treatment. (for further information see Nutrient Impact Assessment and Mitigation Strategy report in **Appendix G**).

6.4.2 The drainage strategy has been split into 2 different sub-catchments which are shown on Stantec Drawing 001 in **Appendix F**. The drainage strategy for each sub-catchment has been outlined below.

Catchment 1

6.4.3 Catchment 1 includes the southern portion of the site and includes a large area of permeable pavement to which a number of properties drain into before entering the pipe network. The pipe network laid within the highway will convey the runoff towards a wetland located within the greenspace adjacent to the southwestern boundary of the site. The runoff will be stored in the wetland for treatment prior to being conveyed into the infiltration basin where it will be allowed to freely infiltrate through the base.

6.4.4 The network for Catchment 1 has been modelled in MicroDrainage, the outputs are included in Appendix F.

Catchment 2

6.4.5 Catchment 2 includes the dwellings and highways in the northern part of the site. This catchment includes some areas of permeable pavement which will act to capture the runoff from the surrounding impermeable areas, as well as providing a “slow the flow” benefit to the wider network. The runoff will be conveyed from the permeable pavement and other impermeable surfaces within a pipe network in the highway, towards a wetland which is located in the greenspace adjacent to the northern boundary of the site. The runoff will be stored within the wetland for treatment prior to being conveyed into the infiltration basin where it will be allowed to freely infiltrate through the base.

6.4.6 The network for Catchment 2 has been modelled in MicroDrainage, the outputs are included in **Appendix F**.

Modelling Assumptions

6.4.7 The network models for both Catchment 1 and 2 have not included the swales as a means of conveying the surface water, and instead assumed an entirely pipe based network. This has been done to provide a “worst case scenario” in terms of the sizing of the soakaway manholes. However, the inclusion of these features in the strategy at detailed design will enhance the scheme by both slowing the flow of surface water across the site, as well as providing an extra level of treatment.

6.4.8 It should be noted, if at a later stage these features are included, it is recommended that they are lined to prevent infiltration at those locations. The reason for this is that all surface water runoff should pass through the onsite wetlands before discharging in order for the site to maintain a nutrient neutral status.

6.4.9 Furthermore, the MicroDrainage Network modelling has been undertaken based on existing ground levels in the absence of any proposed ground modelling work. The surface water drainage strategy will require refinement based on the updated levels when the proposed ground levels are available at a later stage.

6.5 Pollution Control

6.5.1 Pollution control measures will be included to minimise the risk of contamination or pollution entering the receiving water bodies from surface water runoff from the development.

6.5.2 The drainage system will therefore be designed to comply with the requirements of the SuDS treatment train as laid out by CIRIA 753 ‘The SuDS Manual’.

6.5.3 The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source).
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels.
- The sensitivity of the receiving environment.

6.5.4 The recommended approach for water quality risk management is given in Table 26.1 of the SuDs Manual. The ‘Simple Index’ approach will be used as a design method for this site.

Hazard classification for different land uses are provided in Table 26.2, which are considered below in **Table 6.1**.

6.5.5 To deliver adequate treatment, the selected SuDs components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following will have to be achieved for the surface water running off the site.

Total SuDS mitigation index >=pollution hazard index

6.5.6 Table 26.2 of the SuDS Manual provides hazard classification and pollution hazard indices of potential different land uses, which for this development are tabulated in **Table 6.1**.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4

Table 6.1: Hazard classification and pollution hazard indices

6.5.7 On the basis that the surface water drainage infrastructure is expected to comprise of a network of permeable paving, swales and wetlands amongst other features, the SuDS mitigation index for these principal SuDS components expected to be constructed on site are as provided from Table 26.3 of the SuDS manual and are tabulated in **Table 6.2**.

Mitigation indices			
Type of SuDS component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Wetland	0.8	0.8	0.8
Swale	0.5	0.6	0.6
Permeable Paving	0.7	0.6	0.7

Table 6.2: SuDS mitigation indices

6.5.8 In summary, the SuDS component mitigation indices of these principal features are greater than pollution hazard indices for residential areas and the required level of treatment is provided by the proposals before surface water is discharged from the site. It should be noted that internal link roads may require secondary SuDs features to achieve pollution control

levels and the inclusion of these additional features will be determined at the detailed design stage.

6.6 Operation and Maintenance

6.6.1 To ensure the ongoing performance of the SuDS scheme, the proposed drainage will require regular maintenance over its lifetime. Typically, the maintenance of a SuDS network involves removing litter/debris in the system and general landscaping/grass cutting.

6.6.2 Final designs of the attenuation areas, outfalls, inlets and strategic drainage network must be designed with a regard for future maintenance. All areas should be easily accessible and safe for operatives without compromising the overall attenuation and landscape requirements.

6.6.3 Potential options for a SuDS adopting maintenance party include: an independent management company, South East Water or Kent County Council.

6.6.4 Recommended permeable paving operation and maintenance requirements are shown in **Table 6.3** below.

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

	Monitor inspection chambers	Annually

Table 6.3: Recommended Permeable Paving Maintenance Schedule

7 Residual Risk

7.1.1 Two residual risks have been identified, namely, potential blockage of drainage infrastructure; and the occurrence of (rare) storm events which exceed the design conditions.

7.1.2 The risk associated with a potential blockage for the main drainage system onsite is considered to be small. Routine inspection and maintenance procedures as described in **Section 9** of this report will minimise the risk of the accumulation of detritus and debris as well as ensuring that the drainage systems continue to operate efficiently. However, the residual risk of these events needs to be managed. The principles of dealing with these is set out below.

7.1.3 In the event of a rare storm (beyond the design condition), the capacity of the drainage network could be temporarily exceeded, and drainage inlets could be bypassed creating overland flow. To minimise and manage the impact of these events at source the SuDS features for the scheme will be designed with controlled overflows such as spillways and weirs.

7.1.4 The detailed masterplan will consider the overland flow paths required to manage these events and the flows from the overflow of SUDS features. Where possible, the masterplan will be designed to utilise natural and naturalised blue/green corridors to divert the flows from critical infrastructure and the development to further mitigate the impact.

7.1.5 In certain circumstances it may be necessary to utilise road corridors to deliver this function. This, however, should not be considered the preferred option and should still facilitate safe access and egress as well as taking reasonable steps to protect property.

7.1.6 All buildings would be provided with internal threshold levels raised above surrounding ground levels and designated flow paths created around the buildings to the lower lying levels. Localised grading may be required to achieve level access criteria. Exceedance flows would then naturally be directed around the buildings to lower ground. The masterplan has been developed with this in mind and maintains where possible the natural flow paths existing on the site.

7.1.7 An overland flow assessment would be carried out at the detailed design stage so that any hotspots can be identified and designed out.

7.1.8 During normal operation open SuDS features pose a potential risk to the general public from drowning. The detailed design will consider this and implement adequate protection for the public and enable safe means of egress from open features, while not compromising the proposed amenity uses.

8 Conclusion

8.1 Planning Application

8.1.1 This FRA has been prepared to support a full planning application for the development of up to 15 residential properties at Allotment Field, Egerton.

8.2 Flood Risk

8.2.1 The Flood Map for Planning provided by the EA demonstrates that the site lies entirely within Flood Zone 1. Therefore, the requirement of the Sequential and Exception Tests are met.

8.3 Surface Water Drainage

8.3.1 Based on the underlying geology of the site, infiltration potential is likely to be good. Therefore, the drainage strategy has been developed based on this as the method of surface water discharge. This would be confirmed at a later stage by targeted in-situ soakage testing in accordance with BRE Soakaway Design (DG 365).

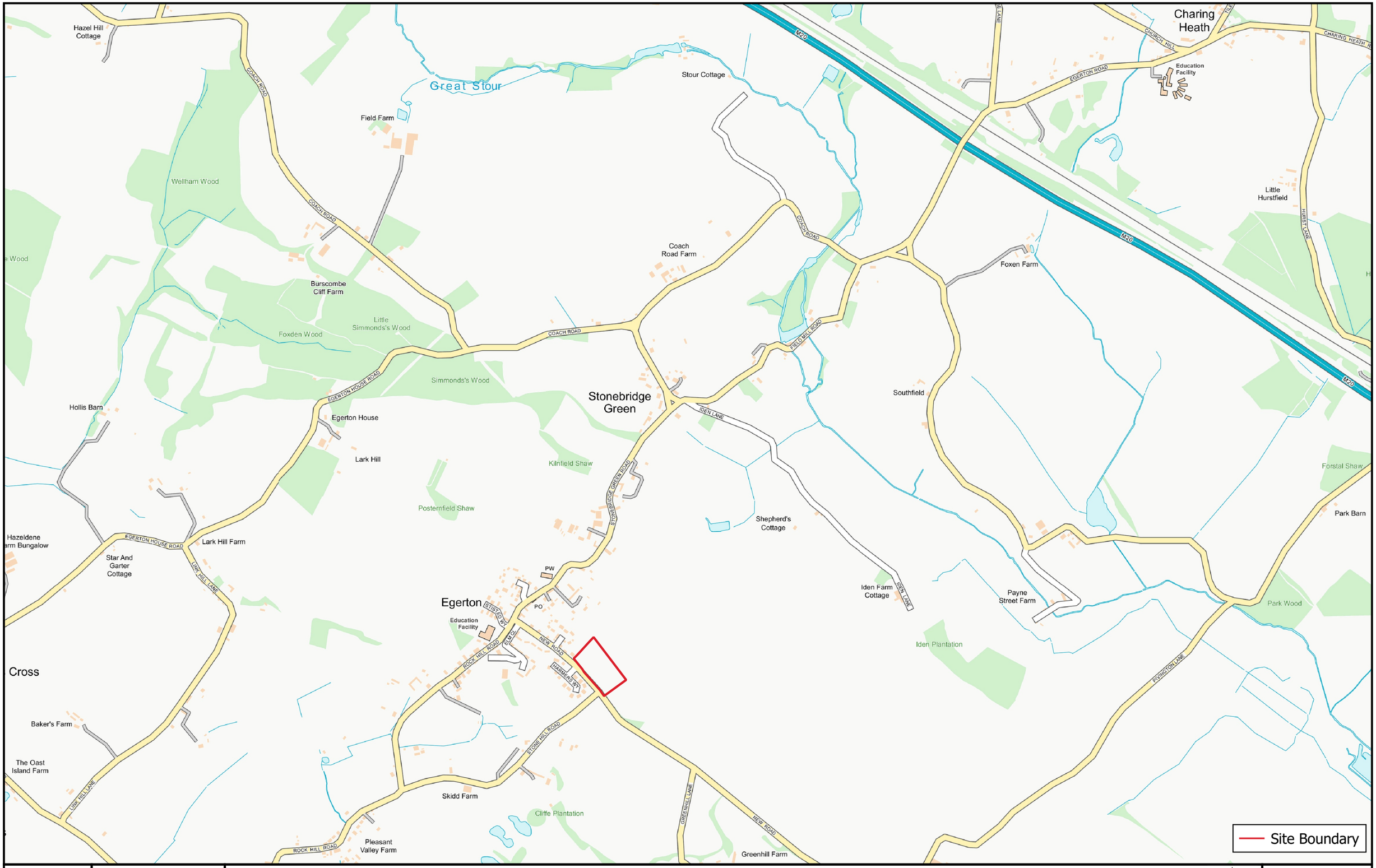
8.3.2 The surface water drainage strategy has been developed based on splitting the site into two catchments. Each with its own infiltration basin and treatment wetland. Each network also includes a range of SuDS features including swales and permeable pavements.

8.4 Policy

8.4.1 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

Appendix A Site Location

Figure 1 – Site Location Plan



Stantec

www.stantec.com/uk

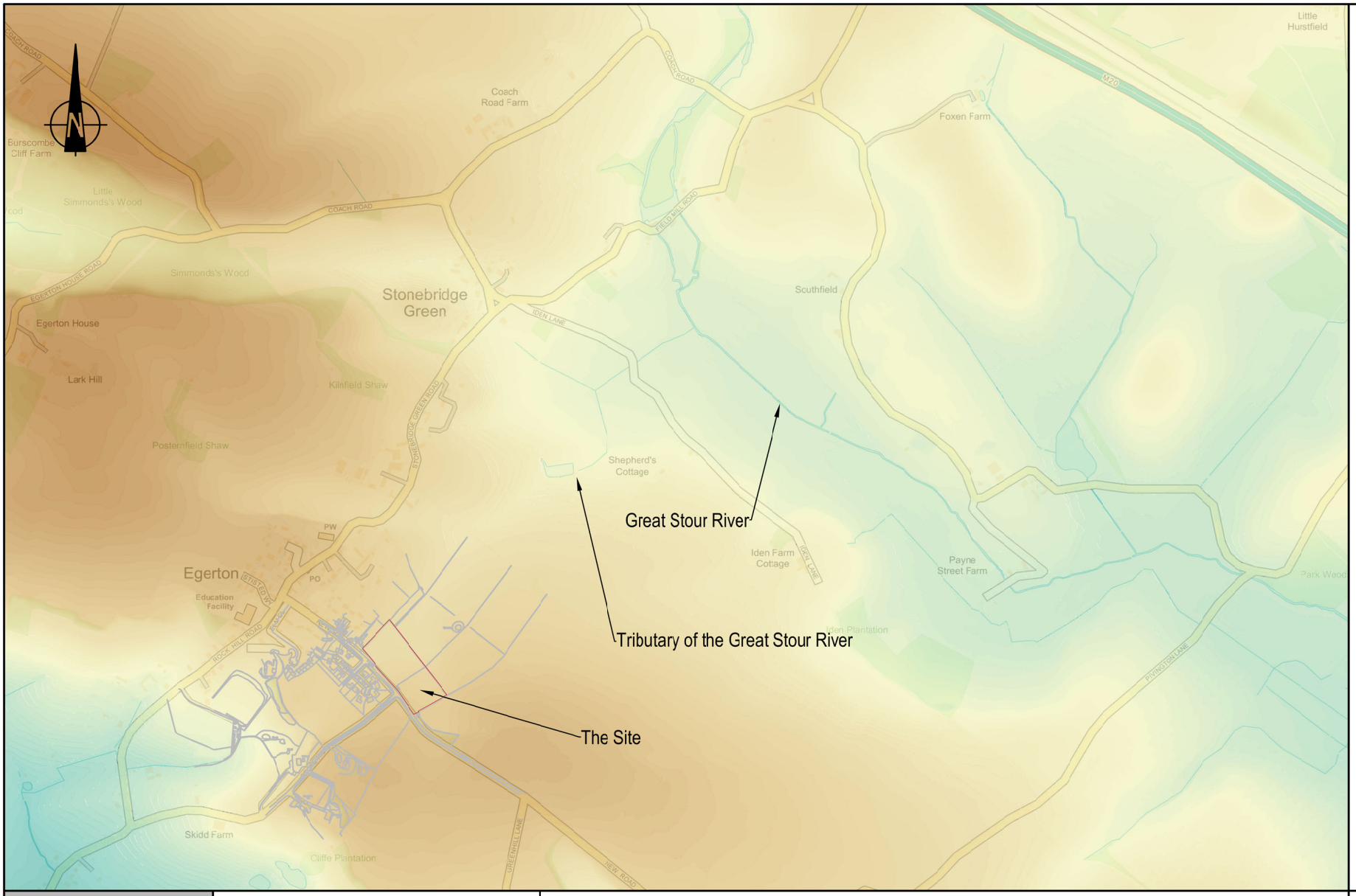
TAUNTON
Tel: 01823 218940

Client:
Jarvis Strategic Land Ltd

Land East of New Road, Egerton
Site Location

First Date of Issue: 08/12/2020
Scale: NTS
Drawn By: KT Checked By: GN
Drawing Number:
Figure 1

Stantec Office Drive: \\pba.intlash\Projects\48386 - JSL - Allotment Field Egerton\BRIEF 0002 - Flood Risk and Drainage\QGIS



EA LiDAR Heat Plan

Key:

High

Low

Notes:

1. Data shown provided by Environment Agency 'Open Data' datasets, available from https://environment.data.gov.uk/. Contains Environment Agency information © Environment Agency and database right.

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TAUNTON
Tel: 01823 218 940

Client
Jarvis Strategic Land Ltd

Land East of New Road, Egerton

Key Features Plan

Date	08.12.20
A4 Scale	1:125,000
Drawn by	GN
Checked by	ET

Figure Number
Figure 2

Appendix B Topographical Survey

Topographical Survey

LEGEND

SERVICES

AV	AIR VENT
CAJB	CABLE JUNCTION BOX
CATV	CABLE TELEVISION COVER
CD	CABLE DUCT
CIP	CABLE INSPECTION POINT
EIC	ELECTRIC INSPECTION COVER
EJB	ELECTRIC JUNCTION BOX
EP	ELECTRICITY POLE
ER	EARTHING ROD
FH	FIRE HYDRANT
GIC	GAS INSPECTION COVER
GJB	GAS JUNCTION BOX
GV	GAS VENT
MK(E)	SERVICE MARKER (ELECTRIC)
MK(G)	SERVICE MARKER (GAS)
MK(W)	SERVICE MARKER (WATER)
SCO	STOP COCK
SCO(G)	STOP COCK (GAS)
SCO(W)	STOP COCK (W)
SPP	SUPPORT FOR TELEPHONE POLE
SVG	STOP VALVE GAS
TIC	TELEPHONE INSPECTION COVER
TJB	TELEPHONE JUNCTION BOX
TP	TELEPHONE POLE
WIC	WATER INSPECTION COVER
WJB	WATER JUNCTION BOX
WM	WATER METER

LEVELS

DPC	DAMP PROOF COURSE
THL	THRESHOLD LEVEL
T.O.C	TOP OF CHIMNEY
T.O.W	TOP OF WALL
WL	WATER LEVEL

INTERNAL

CLG	CEILING LEVEL
DHL	DOOR HEAD LEVEL
FL	FLOOR LEVEL
SCLG	SUSPENDED CEILING LEVEL
US	UNDERSIDE
USB	UNDERSIDE OF BEAM
WCL	WINDOW CILL LEVEL
WHL	WINDOW HEAD LEVEL

DRAINAGE

BD	BACK DROP
BL	BASE/BED LEVEL
CL	COVER LEVEL
CP	CATCH PIT
DC	DRAINAGE CHANNEL
DP	DOWN PIPE
G	GULLY
IC	INSPECTION COVER
IL	INVERT LEVEL
MH(C)	MANHOLE (COMBINED)
MH(T)	MANHOLE (TOUL)
MH(S)	MANHOLE (SURFACE WATER)
RE	RODDING EYE
RWP	RAIN WATER PIPE
SEG	SIDE ENTRY GULLY
SVP	SOIL VENT PIPE
UM	UNKNOWN METAL LID
VP	VENT PIPE
WO	WASH OUT

FEATURES

B	BOLLARD
BH	BORE HOLE
BP	BRICK PILLAR
BS	BUS STOP
CPS	CONCRETE PAVING SLABS
FB	FLOWER BED
LB	LITTER BIN
LC	LIGHTING COLUMN
P	POST
PB	POST BOX
RNP	ROAD NAME PLATE
RS	ROAD SIGN
SW	SOLDIER WALL
SP	SIGN POST
SU	STEP(S) UP
TCB	TELEPHONE CALL BOX
TH	TRIAL HOLE
TS	TREE STUMP

CONTROL

OSBM	ORDNANCE SURVEY BENCH MARK
STN	SURVEY STATION
TBM	TEMPORARY BENCH MARK

TREE (girth/spread/height/species/no. of boles)

DIRECTION OF LEAN

CHANGE IN FENCE TYPE

GATE — GATES

FENCE

BUILDING

OVER HEAD BUILDING LINE

FACE OF WALL

BACK OF RETAINING WALL

LINE

CHANGE OF SURFACE

EDGE OF UNDERGROWTH

BANKING

TOP OF BANK

BOTTOM OF BANK

KERB

DROP KERB

VERGE

CONTOUR WITH VALUE

OVER HEAD WIRE

HEDGE/TREE LINE

FOR FUTURE SURVEY WORK OR SETTING OUT, J C WHITE GEOMATICS LIMITED QUOTED SURVEY CONTROL COORDINATES & LEVELS MUST BE USED. UNDER NO CIRCUMSTANCES SHOULD ANY OTHER SURVEYED POINTS ON THE DRAWING BE USED OTHER THAN AS A GROSS ERROR CHECK.

TREE GIRTHS AND SPREADS ARE QUOTED AS A MEAN SIZE, AND SHOWN TO SCALE.

WHILST EVERY EFFORT IS MADE TO IDENTIFY TREE SPECIES AND GAUGE HEIGHTS, NO RESPONSIBILITY CAN BE TAKEN FOR THE ACCURACY OF THIS INFORMATION.

WHILST EVERY EFFORT IS MADE TO ENSURE THAT PIPE DIAMETERS, INVERT LEVELS AND DRAINAGE TYPES ARE CORRECT, THE ACCURACY OF THIS INFORMATION CANNOT BE GUARANTEED, AND IT IS STRONGLY RECOMMENDED THAT EXISTING SERVICES ARE CONFIRMED PRIOR TO THE COMMENCEMENT OF ANY DETAILED DESIGN AND CONSTRUCTION WORKS.

LEVELS AT KERB LINES ARE CHANNEL LEVELS.

ALL COORDINATES AND LEVELS ARE BASED ON A LOCAL GRID CENTRED ON AN OS ACTIVE RINEX DERIVED COORDINATE AND DATUM FOR STN. 3. ALL COORDINATES HAVE BEEN COMPUTED USING A SCALE FACTOR OF 1.000000.

DUE TO THE UNMAINTAINED NATURE OF THE SITE, IT CANNOT BE GUARANTEED THAT ALL FEATURES HAVE BEEN SURVEYED.

CONTOUR INTERVAL 0.5 METRES.

N

CONTROL SCHEDULE

STATION	EASTING	NORTHING	HEIGHT	DESCRIPTION
1	590926.522	147251.054	93.126	Peg
2	590972.509	147208.080	96.469	Nail
3	591000.849	147232.940	95.316	Peg
4	590893.898	147281.938	92.204	Nail

Sheet Layout

1

2

J. C. WHITE
Geomatics Limited
Shrine Barn, Shrine Farm, Sandling Road, Postling, Hythe, Kent, CT21 4HE
Tel : 01303 261212 Fax : 01303 264040
Email : survey@jcwhite.co.uk Web site : www.jcwhite.co.uk

- GPS Surveys
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- Measured Building Surveys
- Laser Scanning
- Setting Out
- Boundary Disputes
- Engineering Surveys
- Deformation & Settlement Surveys
- Scan to BIM Modelling

CLIENT

Jarvis Strategic Land Ltd

JOB TITLE

Land NE of New Road, Egerton, TN17 9DN.

DRAWING TITLE

Topographical Survey

JOB No. *19/00/215*	DATE *June 2020*
SURVEYED BY *J.Turnbull*	DRAWN BY *J.Turnbull*
SCALE *1:200*	DWG. No. *1 of 2* REV. No.

CAD PLOT DATE	ORIGINAL SHEET SIZE	CADFILE NAME
01.07.2020	*A0*	*1900215 - Egerton.dwg*