Gladman Developments Ltd.

Fryatts Way, Bexhill

Flood Risk Assessment & Outline Surface Water Drainage Strategy

881964-R2(02)-FRA

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RSK GENERAL NOTES

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Title: Flood Risk Assessment & Outline Surface Water Drainage Strategy
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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

CONTENTS

APPENDICES

1 INTRODUCTION

RSK Land and Development Engineering Ltd (RSK) was commissioned to carry out a Flood Risk Assessment (FRA) for Gladman Developments Ltd. (the 'client'). The assessment is in support of the outline planning submission for the land off Fryatts Way, Bexhill (the site').

The assessment has been prepared in accordance with the National Planning Policy Framework (NPPF)[1] and its accompanying Planning Practice Guidance[2], the Interim Code of Practice for Sustainable Drainage[3], BS 8533-2011 Assessing and Managing Flood Risk in Development Code of Practice[4] and the Non-statutory technical standards for sustainable drainage systems[5], with site-specific advice from the Environment Agency, the Lead Local Flood Authority (LLFA), the Local Planning Authority (LPA), the architect and the client.

The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

The key definitions within the PPG are:

- "Flood risk" is a combination of the probability and the potential consequences of flooding from all sources – including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.
- "Areas at risk of flooding" means areas at risk from all sources of flooding. For fluvial (river) and sea flooding, this is principally land within Flood Zones 2 and 3. It can also include an area within Flood Zone 1 which the Environment Agency has notified the local planning authority as having critical drainage problems.

For this site, the key aspects that require the assessment are:

- The Environment Agency's indicative Flood Zone map shows that the site is located mainly within Flood Zone 1 with some Flood Zone 2 and 3 associated with the Picknell Green Stream (Main River) along the western boundary (**Figure 1.1**), and;
- The application site area is 11.29Ha therefore surface water drainage must be considered, and sustainable drainage systems (SuDS) should be considered, where possible.

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

[1] Communities and Local Government, 'National Planning Policy Framework', 2019

[2] Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', May 2014 http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

[3] DEFRA, 'Interim Code of Practice for Sustainable Drainage Systems' National SUDS Working Group, July 2004

[4] BSI, 'BS 8533-2011 Assessing and managing flood risk in development Code of practice', 2011

[5] DEFRA, 'Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems', May 2015

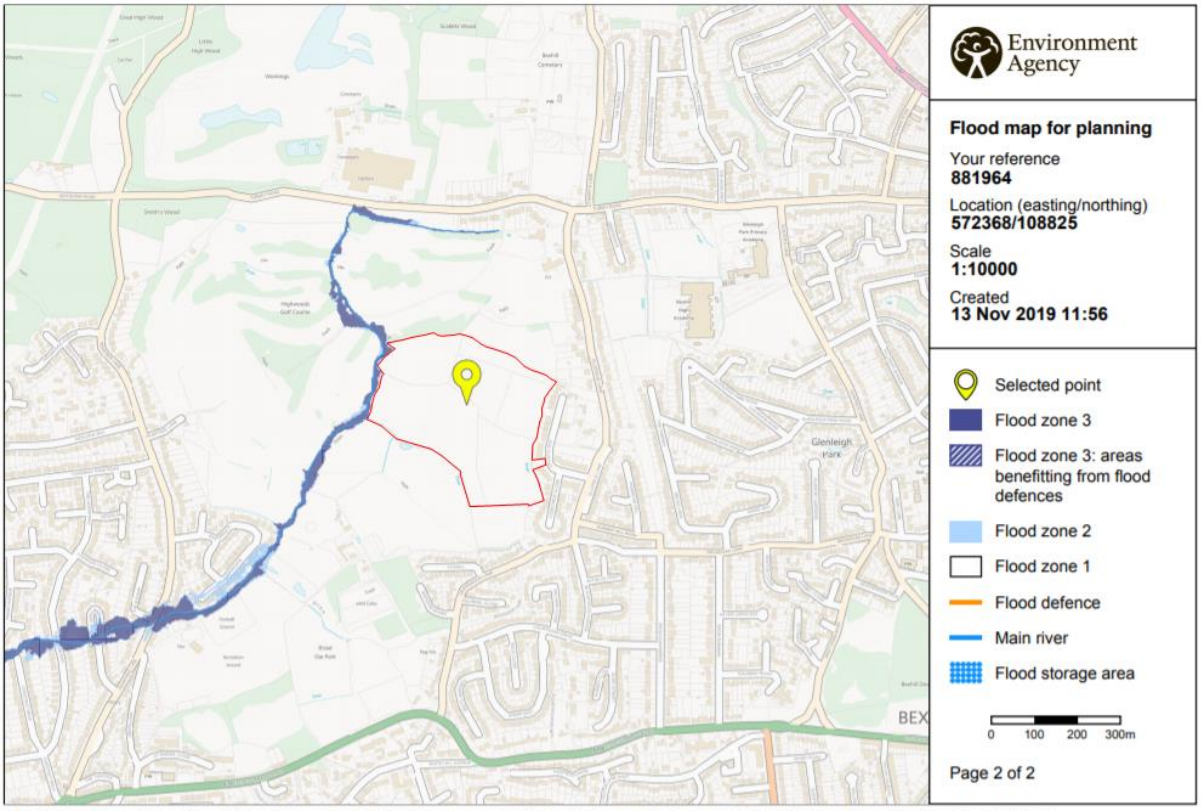

Figure 1.1: Environment Agency Flood Zone Map

2 CONTEXT AND SCOPE OF WORK

A key element of project development is to prepare a Flood Risk Assessment to establish the flood risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the risk to a more acceptable level.

The scope of work relating to a Flood Risk Assessment is based on the guidance provided in Section 14 of the NPPF and its accompanying Planning Practice Guidance.

A site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. The scope of this assessment therefore comprises the following elements:

- To review development framework plans, planning information and other studies to determine existing site conditions;
- To obtain information on the hydrology and hydrological regime in and around the site;
- To obtain the views of the Lead Local Flood Authority in terms of flood risk and drainage;
- To obtain the views of the Environment Agency including scope, location and impacts;
- To determine the extent of new flooding provision and the influence on the site;
- To assess the impact on the site from climate change effects and anticipated increases in rainfall over a 100 year period for residential uses;
- To review site surface water drainage based on the proposed layout and, if necessary, to determine the extent of infrastructure required; and
- To prepare a report including calculations and summaries of the source information and elements reviewed.

Reliance has been placed on factual and anecdotal data obtained from the sources identified. RSK cannot be held responsible for the scope of work, or any omissions, misrepresentation, errors or inaccuracies with the supplied information. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

3 SITE DESCRIPTION

3.1 Location

Site Name: Land off Fryatt's Way, Bexhill

Site National Grid Reference: 572375 E, 108825 N

The site is located to the west of Bexhill, 2.5km from the south Sussex coastline. Access to the site is gained from Fryatt's Way along the eastern boundary of the site.

The site comprises of three main fields separated by hedgerows and drainage features. The total application site area is 11.29Ha.

Table 3.1, below, provides a description of the immediate surroundings of the site. A summary of site features can be found in the Photographic Location Plan in **Appendix B**.

Table 3.1: Site setting

Direction	Characteristic
North	The northern boundary is set against adjacent fields. Hedgerows and a tree line define the northern boundary and separate the site from the neighbouring fields.
East	The eastern boundary of the site is formed by the rear gardens of the dwellings off Fryatt's Way
South	The southern boundary is formed by a hedgerows and a tree line separating the site from the neighbouring land (Broad Oak Park)
West	The western boundary is formed by Picknell Green Stream with a Golf course on the opposite bank of the watercourse.

Figure 3.1 shows a Site Location Map.

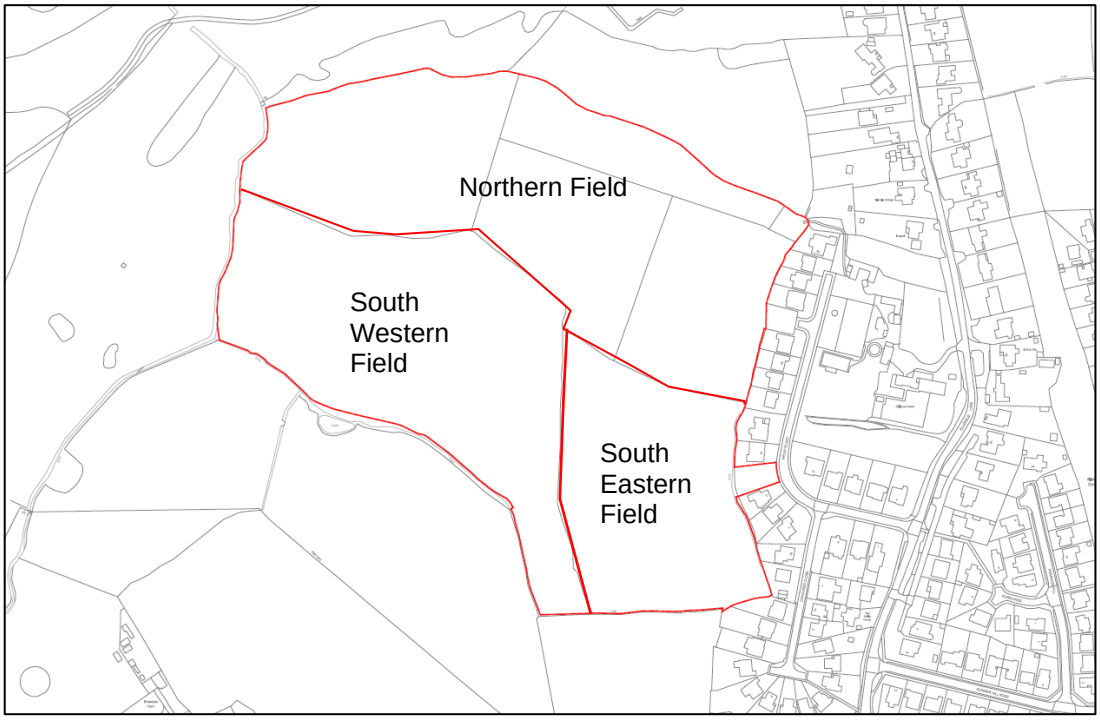

Figure 3.1: Site location plan

3.2 Land use and topography

A topographic survey has been provided for the site by Gladman Developments Ltd (shown in **Appendix C**). The site comprises of three main fields. For the purpose of this report the fields will be referenced as the northern field, the south western field and the south eastern field (**Figure 3.1**).

The areas of highest ground level elevation on the site are found at the eastern boundary of the site with ground levels of approximately 36.8m AOD (above ordnance data). The land falls in a westerly/south westerly direction towards the western boundary. The lowest point across the site is located at the south westerly corner of the site, with a ground level of approximately 13.2m AOD.

The approximate land use of the site is as follows:

Table 3.2: Existing site land uses

Land use	Area (Ha)	Percentage
Impermeable	0.0	0
Permeable	11.29	100
Total	11.29	100

As the site in undeveloped and has no existing impermeable area the site is considered Greenfield.

3.3 Geology and Hydrogeology

Based on published geological records for the area (British Geological Survey online mapping), the site exhibits the following geology:

The underlying geology on the site can be described as the following:

- Superficial Geology – none recorded
- Bedrock Geology: Tunbridge Wells Sand Formation - Siltstone, Mudstone and Sandstone. Sedimentary Bedrock formed approximately 134 to 139 million years ago in the Cretaceous Period. Local environment previously dominated by swamps, estuaries and deltas.

There are several historical borehole logs located within a 500m radius of the site, these typically confer the presence of sand-based geology with ground water levels determined by localised pumping in some locations. Where pumping has not been recorded the ground water levels are in excess of 6m bgl (20 feet).

The site is not located within a Groundwater Source Protection Zone or a drinking water sensitive area.

3.4 On-Site Observations

A site walkover survey was undertaken on the 13th November 2019. Relevant photos taken whilst on site and are enclosed with this report (**Appendix B**) and are referenced and contextualised below.

The Environment Agency Main River was observed flowing north to south along the western boundary of the site. The channel appeared to vary in characteristics over short distances from steep and narrow (**Photograph 19**) to wider with gently sloping sides (**Photograph 20**). Three field ditches were present across the site, one on the southern site boundary, another on the northern site boundary and one through the centre of the site. All appeared to flow in a westerly direction, finally discharging into the Main River.

The southern ditch was observed to flow along the southern border of the site (**Photograph 8**). The head of the ditch was located on the site boundary in the south east and was dry. Approximately 100m downstream from the head of the ditch water was

present and began to flow in a westerly direction. In the central portion of the southern boundary a 300mm diameter pipe was present (**Photographs 10a & 10b**) and was conveying flow from the southern ditch to a ponded area in the south of the site (**Photographs 12 &13a**). A 450mm diameter pipe was present conveying flow from the ponded area back to the southern watercourse to the west of the pond (**Photographs 13c & 14a**). This network of pipes redirected flow around a section of the southern watercourse that followed the site boundary to the corner. Where the southern ditch continued around the corner of the site, water was present but was not flowing in either direction (**Photograph 11**). The land owner explained the water in the drain in the south west corner of the field often did not flow effectively and led to the field flooding and therefore the pipe was put in to attempt to convey flow more efficiently.

The central field drain was located along the boundary between the two most western fields (**Photograph 23a**). The field drain was culverted in two places for lengths of approximately 3m (300mm dia pipe) and 10m (450mm dia pipe) (**Photograph 23b, 23c, 26 and 28**). Water was present in the drain, with the volume increasing further downstream. The ground to the north of this drain was very boggy with standing water present (**Photograph 24a**). Additionally, standing water was present towards the western boundary of the same parcel.

The northern field drain was located along the northern boundary of the site (**Photograph 20**). Shallow running water was present flowing from east to west, discharging into the Main River. The upstream extent of the field drain could not be located as the neighbouring field was not accessible.

The topography of the site was variable with a general fall in elevation to the west and south of the site. Localised low points were present across the western and southern portions of the site including the pond feature. Additionally, there is a high point at the eastern side of the site near the residential border. The surrounding fields and residential properties were observed to be at higher elevations to the site. The field bordering the northern boundary appeared, from a distance, to be at a higher elevation to the site, although this could not be confirmed as it was not accessible.

An unlabelled manhole was present at the site entrance via Fryatts Way (**Photograph 4a and 4b**). It was not lifted and its use is unknown.

The fields in the south of the site appeared to be less maintained with longer grass and brambles bordering the site (**Photograph 5c**). Large trees were present along all borders of the site and along the field boundaries cutting through the site. All ordinary watercourses had leaves and other vegetation debris present in them, likely to be from the surrounding trees and brambles due to the time of year.

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4 DEVELOPMENT PROPOSALS

The proposed development is for a residential end use. The current proposed development framework shows that approximately 6.90Ha of the 11.29Ha site will be developed. This area will contain a variety of dwellings, driveways, gardens, access highways, areas of public open space and areas of soft landscaping. Of this development area an impermeable area of 55% has been assumed. Therefore, the approximate land uses of the proposed site are summarised in **Table 4.1** below.

Table 4.1: Proposed site land uses

Land use	Area (Ha)	Percentage of Developable Area (%)	Percentage of Total Site (%)
Impermeable	3.78	55	33.5
Permeable	3.12	45	27.7
Total Developable Area	6.90	100	61.2
Remaining Greenfield Area	4.39	N/A	38.8
Total Site Area	11.29	N/A	100.0

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5 LEGISLATION AND POLICY CONTEXT

5.1 National policy

Table 5.1: National legislation and policy context

Legislation	Key provisions
National Planning Policy Framework (2019)	The aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.
Planning Practice Guidance (2014)	The NPPF is supported by an online Planning Practice Guidance, which provide additional guidance on flood risk.
Flood and Water Management Act 2010	The Flood and Water Management Act (FWMA) aims to implement the findings of the 2007 Pitt Review and co-ordinate control of drainage and flood issues. There are a number of increased responsibilities within the Act that affect adoption of SuDS features and the role of the Environment Agency to expand on the mapping data they provide. The implementation of SuDS features has many beneficial impacts on the treatment of surface water during remediation works.
Water Resources Act 1991	Section 24 – The Environment Agency is empowered under this Act to maintain and improve the quality of 'controlled' waters Section 85 – It is an offence to cause or knowingly permit pollution of controlled waters Section 88 – Discharge consents are required for discharges to controlled waters
Water Framework Directive (2000)	The Water Framework Directive (WFD) requires all inland and coastal waters to reach 'good' chemical and biological status by 2015. Flood risk management is unlikely to have a significant impact on chemical water quality except where maintenance works disturb sediment (such as de-silting) or where pollutants are mobilised from contaminated land by floodwaters. The main impact of the WFD on flood risk management, both now and in the future, relates to the ecological quality of water bodies. Channel works, such as straightening and deepening, or flood risk management schemes that modify geomorphological processes can change river morphology. The WFD aims to protect conservation sites identified by the EC Habitats Directive and Birds Directive that have water-related features, by designating them as 'protected sites'.

5.2 Local policy

Local policies ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and making development safe without increasing flood risk elsewhere and where possible, reducing flood risk. The latest Rother District Core Strategy was adopted in September 2014. The policies relating to drainage, flood risk and sustainability have been considered in **Table 5.2**.

Table 5.2: Local policy context

LDF document	Key provisions and policies
Rother District Local Plan Core Strategy September 2014	Policy EN6: Flood Risk Management An effective and integrated approach to flood risk management in Rother district will be achieved by working with the relevant agencies and strategic partners to ensure that: (i) The levels of flood risk protection for Rother's coast, and coastal settlements, set out the South Foreland to Beachy Head Shoreline Management Plan are delivered through appropriate schemes and maintenance regimes; (ii) Protect communities wherever practicable from flooding to a level consistent with predicted sea level rise, increased river flows arising from climate change and in accordance with the Folkestone to Cliff End Flood and Erosion Management Strategy; (iii) Fluvial flood risk is minimised by implementing the policies of the Rother and Romney Catchment Flood Management Plan, Cuckmere and Sussex Havens Catchment Flood Management Plan; (iv) Proposed flood protection measures should have full regard to sensitive areas designated with specific nature conservation and biodiversity interests such as RAMSAR, SAC, SPC, LNR or SSSI. Policy EN7: Flood Risk and Development Flood risk will be taken into account at all stages in the planning process to avoid inappropriate development in areas at current or future risk from flooding, and to direct development away from areas of highest risk. Development will be permitted providing the following criteria are met: (i) Where development is proposed in an area identified as at flood risk, the applicant will be required to submit a site-specific Flood Risk Assessment which demonstrates that the development will be safe, will not increase flood risk elsewhere, and, where possible, will reduce flooding; (ii) When development is, exceptionally, acceptable in flood risk areas, consideration is paid to the layout and form of development to minimise flood risk; (iii) Drainage systems and sustainable drainage systems for all new development are in accordance with the Flood and Water Management Act 2010; (iv) Where it is appropriate, contributions will be sought for improvements to infrastructure to mitigate against flood risk.

6 SOURCES OF INFORMATION

6.1 Environment Agency consultation

6.1.1 Flood zone maps

The Environment Agency Flood Zone mapping study for England is available on their website at https://flood-map-for-planning.service.gov.uk/

The current displayed map is reproduced as **Figure 1.1** and shows the site is located mainly within an area designated by the Environment Agency as Flood Zone 1. This means the risk from flooding from rivers and the sea is very unlikely or, less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. An area of Flood Zone 2 and 3 is located along the western boundary of the site associated with the Picknell Green Stream (Main River) which flows along this boundary. A further minor watercourse is located along the eastern and southern boundary and a land drain through the centre of the site discharging into Picknell Green Stream, due to the limited catchment associated with this watercourse any flood risk will be limited in nature.

6.1.2 Site specific consultation

The Environment Agency was formally consulted as part of this assessment. The response from this request is included as **Appendix D**. The Environment Agency confirmed that the National Flood Risk Assessment (carried out in 2018), which takes account of the location, type and condition of flood defences, classified the flood risk for this site, predominantly as **Very Low** - less than 0.1% (1 in 1,000) in any given year. Note: The western extent of the site is located within Flood Zone 3.

6.2 East Sussex County Council

The Flood Risk Management department at East Sussex County Council provided a response to the pre-development enquiry sent by RSK. This request is included in **Appendix E**, and provides the following information:

- The site is mainly within Flood Zone 1;
- There are a number of flow paths that run along a large proportion of the site boundary. Some of these could be associated with water courses. Surface water flood risk should be considered when designing the site layout as to not increase this risk both on and off the site;
- Mapping from the British Geological Survey shows that there is negligible risk of Groundwater flooding to the site;
- A number of flooding incidence have been recorded in the vicinity of the site;
- The surface water management strategy should include information on how the potential impacts of local flood risk sources on the proposed drainage arrangements have been considered and mitigated where necessary.

6.3 Internal Drainage Board

The site is not within an IDB managed area; however, the Picknell Green Stream drains towards the Pevensey Cuckmere WLMP's administrate area.

6.4 Canal & River Trust

There are no known Canal & River Trust maintained assets within the study area.

6.5 Relevant studies

Table 6.1: Relevant studies

Study	Comments
Rother District Council Strategic Flood Risk Assessment – Level 1 August 2008	The objective of the Level 1 SFRA is to collate and review available information on flood risk for the study area. Information has been sought from a variety of stakeholders including the Environment Agency, Southern Water, County Highways, Internal Drainage Board together with from within the Council (Drainage Engineer, Building Control Officer, Planning Department and the Emergency Planning Officer. The major additional strategic allocation in Rother District is likely to be at North Bexhill. Allocations are likely to abut the Flood Risk Zones 2 and 3 at Pevensey Marshes and the valleys of the Picknill Green Stream and Egerton Park Stream. It is therefore likely that some roads and other infrastructure will need to be situated in those areas. In addition, it is anticipated that some 'greenways' including pedestrian and cycle paths will also be situated in these areas. It is anticipated that a Level 2 SFRA will not be required for Bexhill as it proposed that the strategic growth area (and any other proposed development) will avoid flood Zones 2 and 3.
Bexhill Stage 1 Surface Water Management Plan June 2016	A Surface Water Management Plan (SWMP) is a study to understand the flood risk that arises from local flood risk, which is defined by the Flood and Water Management Act 2010 as flooding from surface runoff, groundwater, and ordinary watercourses. SWMPs are led by a partnership of flood risk management authorities who have responsibilities for aspects of local flooding, including the County Council, District Council, Sewerage Undertaker, Internal Drainage Boards and other relevant authorities. The purpose of a SWMP is to identify what the local flood risk issues are, the potential options to manage the flood risk or the damage caused and who should take these options forward. This is presented in an action plan which lists the partners who are responsible for taking the various actions forward. The action plan, which will be reviewed periodically, should be agreed by all project partners to manage the flood risk identified. Bexhill has been identified as an area potentially at risk of local flooding in the East Sussex Local Flood Risk Management Strategy (LFRMS). Therefore, this SWMP was commissioned by East Sussex

Study	Comments
	County Council (ESCC) to investigate the local flood risks across the urban centre of Bexhill as part of its remit for strategic oversight of local flood risk management in East Sussex, under the Flood and Water Management Act 2010. It builds on an initial assessment completed by Atkins in 2013. One of the purposes of a SWMP is to identify what the local flood risk issues are, and to summarise the flood history and predicted flood risk to the area. The report comments that a common source of flooding is attributed to drainage ditches. This is particularly problematic in the upper reaches of the Picknell Green Stream.

6.6 Drainage

6.6.1 Public sewer

Southern Water Sewer Records (available in **Appendix F**) show there are no public sewers within the site boundary. Details of nearby sewers are as follows:

- A foul water system (150mm Dia.) is present in Fryatt's Way directly adjacent to the site with a separate surface water system serving Summer Hill Road.
- A manhole has been identified on site near to the access point of Fryatt's Way, it is understood that this is a surface water drain from Fryatt's Way.

6.6.2 Private/land drainage

No details of the site's existing on-site drainage were provided; however, a number of culverted crossings have been identified on the site survey. In addition, a number of outfalls into the drainage ditches were located during the site walkover, these are likely to be land drainage outfalls. It is assumed that these only serve the site with no inflow from the upstream catchments.

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7 SOURCES OF FLOOD RISK

7.1 Criteria

In accordance with the NPPF and advice from the Environment Agency, a prediction of the flood sources and levels is required along with the effects of climate change from the present for the design life of the development (in this case assumed to be 100 years). To consider these effects of climate change a 40% climate change factor has been used within the calculations.

The flood risk elements that need to be considered for any site are defined in BS 8533 as the "Forms of Flooding" and are listed as:

- Flooding from Rivers (fluvial flood risk);
- Flooding from the Sea (tidal flood risk);
- Flooding from the Land;
- Flooding from Groundwater;
- Flooding from Sewers (sewer and drain exceedance, pumping station failure etc), and;
- Flooding from Reservoirs, Canals and other Artificial Structures.

The following section reviews each of these in respect of the subject site.

7.2 Flooding from rivers (fluvial flood risk)

7.2.1 Flooding from Main River

The latest Environment Agency published flood zone map shows that the site lies mainly within Flood Zone 1 with some flood zone 2 and 3 along the western boundary of the site associated with the Picknell Green Stream.

The proposed development area is all situated on land outside of the Flood Zone 2 and 3 (approx. 500mm above the peak flood outline). This means that the risk to the developable area of the site is considered as 'Low Probability'; the land is assessed as having a less than 0.1% (1 in 1000) annual probability of river or sea flooding. The latest 'Risk of Flooding from Rivers and Sea' flood map (**Figure 7.1**) confirms that the site is considered to at '**very low'** risk of fluvial flooding.

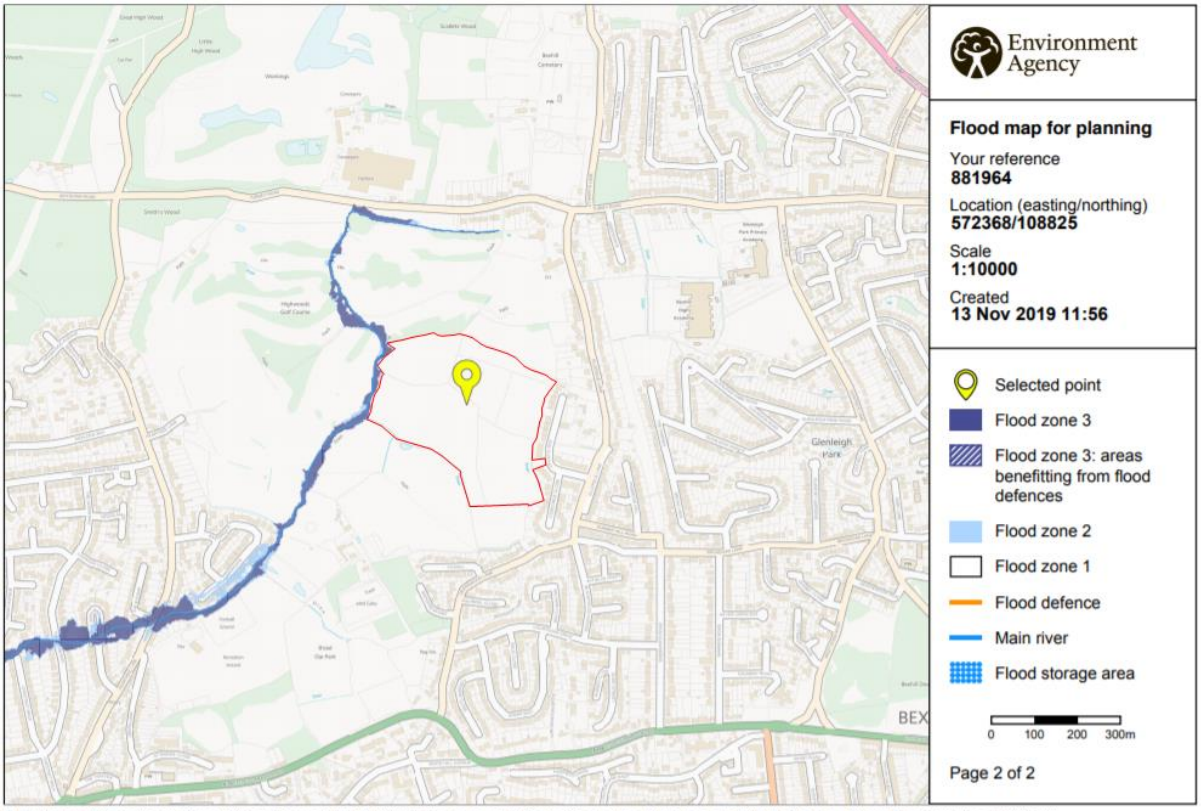

Figure 7.1: Environment Agency fluvial flood risk map (accessed November 2019)

7.2.2 Climate change

Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks; however, as the site is set above areas at risk from flooding then at present climate change is not considered to increase risk to the site.

7.3 Flooding from the sea (tidal flood risk)

The site is not considered to be at risk from tidal flooding due to its inland location.

7.4 Flooding from the land (overland pluvial flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff will occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

The Environment Agency's surface water flood map (**Figure 7.2**) shows that the risk posed to the majority of the site from pluvial flooding is considered as **very low;** however,

there is a n area which is classified as **low-high** surface water flood risk. The main features shown by the flood map are:

- There are areas of low risk surface water flooding where there are existing watercourses are present on the site;
- An area of pluvial flood risk has been identified crossing the south eastern sections of the site. this appears to be a flow path originating on Fryatts Way and flowing onto the site, this could be due to the fact the minor watercourse has not been modelled. Depending on ground levels, this flow path could be intercepted by a new swale with the flows diverted into the ditch along the southern boundary of the site, thus reducing the impact on potentially developable area.

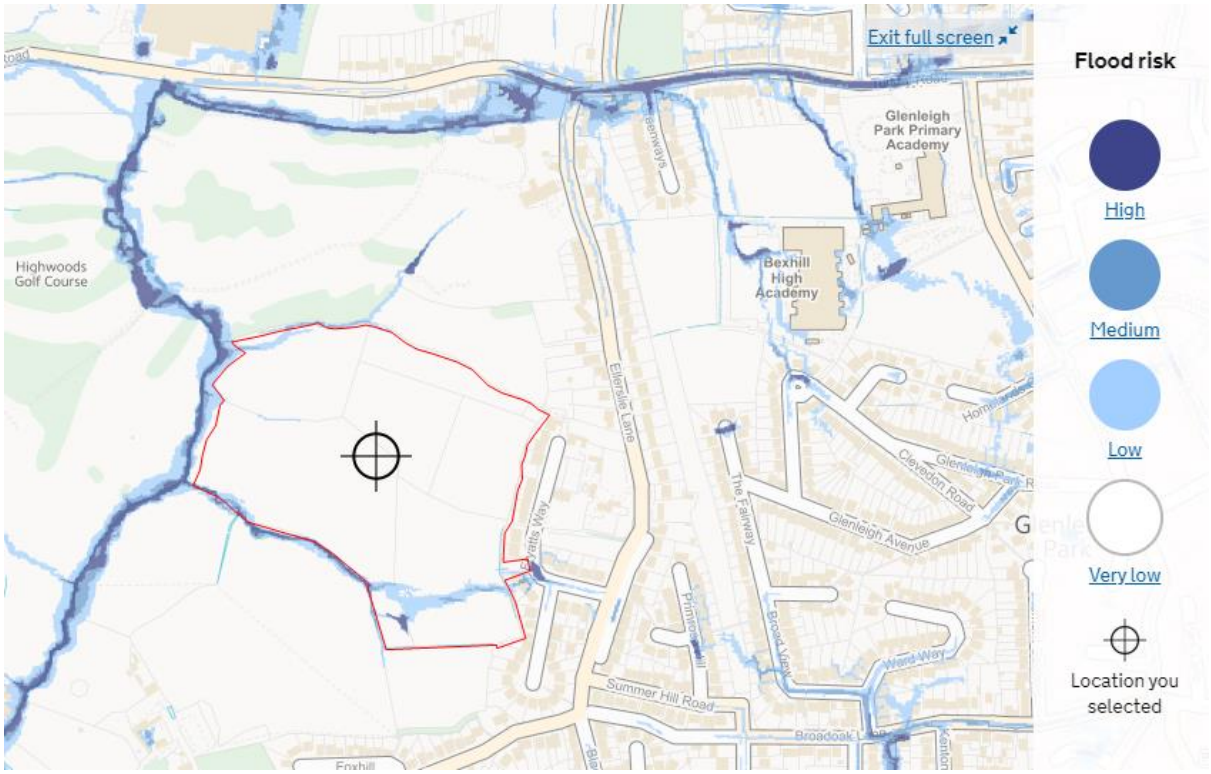

Figure 7.2: Environment Agency surface water flood risk map (accessed December 2019)

Existing and post-development surface water flood risk is assessed further within **Section 9** as part of the indicative surface water management strategy for the proposed development.

According to the latest Environment Agency flood maps, an area on Fryatt's Way located adjacent to the proposed access to the site is at potential risk. During the low risk scenario (between 1% and 0.1% AEP), the estimated depth is between 300 and 900mm at its worst **(Figure 7.3**). Based on the local topography in this area it is likely to be less than 900mm as water would follow the ground level and flow rather than pond to this depth. The peak flow depth is likely to be similar to the kerb height before water flows through the front gardens and in westerly direction. A standard passenger vehicle can pass though flood water of 300mm in depth, with emergency vehicles this can be up to 600mm, as such vehicular access and egress should be possible in events up to the 0.1% AEP event.

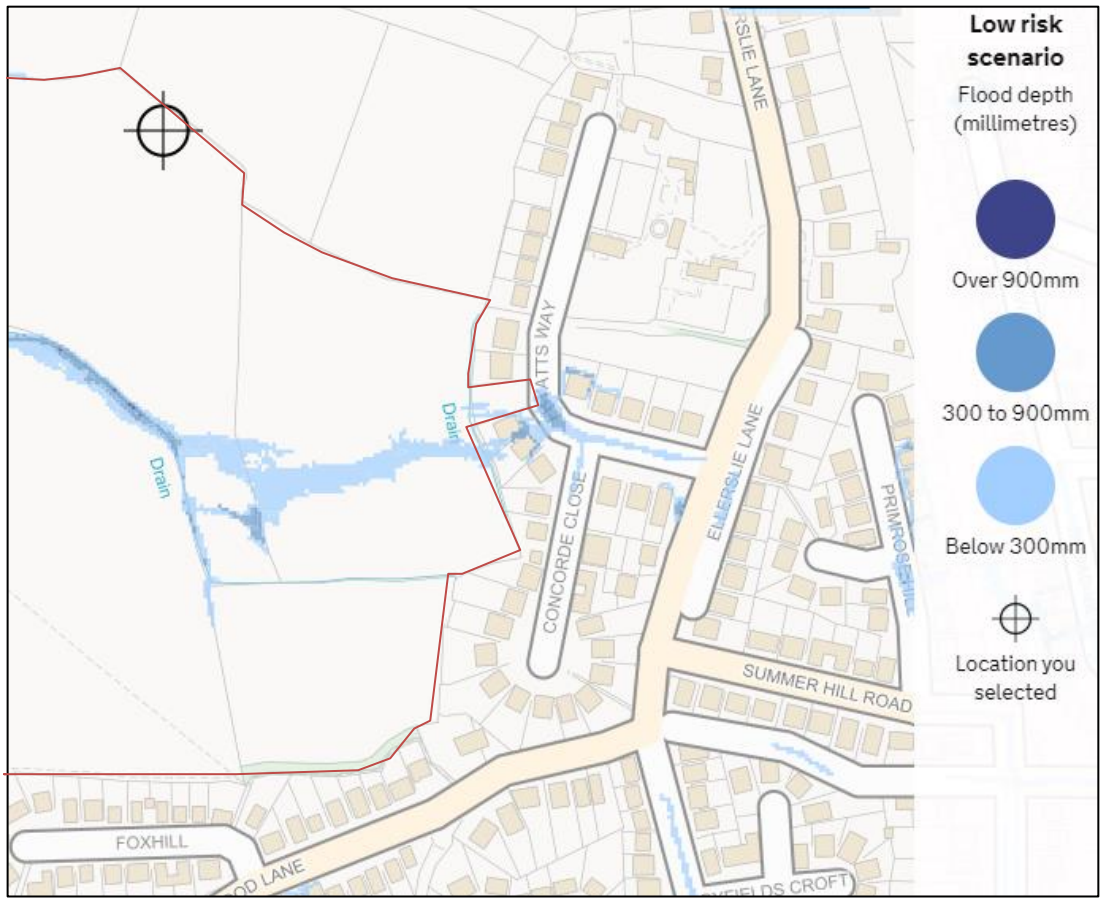

Figure 7.3: Environment Agency surface water flood depth map – Low risk scenario (accessed December 2019)

7.4.1 Climate change

Surface water flooding is likely to increase as a result of climate change in a similar ratio to fluvial flooding. Increased intensity and frequency of precipitation is likely to lead to reduced infiltration and increased overland flow, this can impact on the development area if the surface water risk is not addressed.

7.5 Flooding from Groundwater

Groundwater flooding tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

There are historical borehole records within the vicinity of the site noting that ground water could be influenced by pumping. It is not known if this pumping continues to this day and therefore if this still influences groundwater levels. Groundwater has not been recorded close to the surface and the surface water drainage network on site is likely to keep groundwater levels low. Given the potential permeable geology groundwater levels could be reactive to rainfall events (if there is a perched aquifer) and therefore levels should be monitored on site. According to the Bexhill Stage 1 SWMP (June 2016) Bexhill is at very limited risk of groundwater flooding. This is due to the bedrock geology having low potential for storing water. The pre-development enquiry response from East Sussex County Council has highlighted that groundwater maybe shallower along the western boundary of the site. Given the potential permeable geology across the site groundwater levels could be reactive to rainfall events (if there is a perched aquifer) and therefore levels should be monitored on site.

7.5.1 Climate change

Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. If winter rainfall becomes more frequent and heavier, groundwater levels may increase. Higher winter recharge may however be balanced by lower recharge during the predicted hotter and drier summers. This is less likely to cause a significant change to flood risk than from other sources, since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk is likely to be low.

7.6 Flooding from sewers

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. A sewer flood is often caused by surface water drains discharging into the combined sewer systems; sewer capacity is exceeded in large rainfall events causing the backing up of floodwaters within properties or discharging through manholes.

Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption[6]. One of the design parameters is that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30 year rainfall event. By definition a 1 in 100 year event would exceed the capacity of the sewer network as well as any proposed drainage.

Southern Water is responsible for the public sewer networks in this area. The historic town centre is served by a combined network, whereas the newer developments to the west and east of the town have largely separate sewerage systems, with a foul network to convey industrial and household waste water, and a surface water sewer system to convey pluvial runoff. According to the SWMP (**Figure 7.4**) for the area there have been a number of recorded incidences of sewer flooding, it is not known if these impacted on the site, however sewer flooding typically causes very localised issues.

[6] WRC, 'Sewers for Adoption' 7th Edition, 2012

New sewers constructed as part of the development will be construction in line with best practice to reduce the risk of sewer flooding on site.

7.6.1 Climate change

The impact of climate change is likely to be negative regarding flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of sewer flooding in general but is not significant in terms of the proposed development.

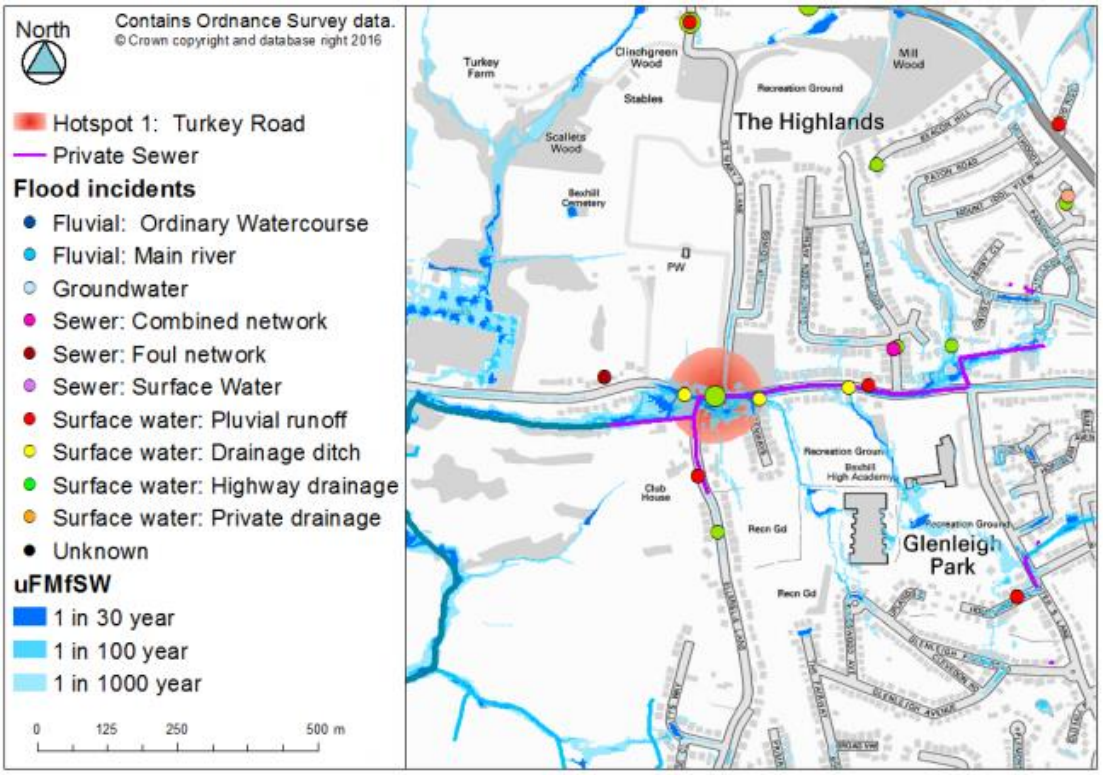

Figure 7.4: SWMP historic flooding incidence mapping

7.7 Other sources of flooding

7.7.1 Reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs, canals and artificial structures.

The Environment Agency reservoir flood map (**Figure 7.5**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The flood map shows the site is not located within an area at risk from reservoir flooding.

7.7.2 Climate change

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow, but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this site.

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Figure 7.5: Reservoir Flood Map (accessed December 2019)

7.7.3 Canals

There are no Canal & River Trust owned canals or assets within the study area or within close proximity.

7.7.4 Blockages of artificial drainage systems

There is a possibility that flooding may result due to culverts and/or sewers being blocked by debris or structural failure. This can cause water to backup and result in localised flooding, as well as placing areas with lower ground levels at risk.

There are a number of culverted crossings within the site which can be considered a risk. Should these become blocked and flooding occur, the flows will follow the topography and re-enter the channels downstream. The development of the site should allow for a suitable management strategy of any areas which could potentially become blocked. Despite this, overland flow paths around the culverts will be considered in the post development situation to ensure flows are encouraged to re-enter the channel.

7.7.5 Historic flooding

East Sussex LLFA have provided a map illustrating previous flooding incidence that have occurred in the vicinity of the site. According to this map (**Figure 7.6 and Appendix E)** one flooding event has been shown to be recorded on the site however no information has been provided on this and it does not appear to be associated with any known infrastructure or within an area of preserved risk. A small ditch is located along the northern boundary, should this have become blocked, water would have following the topography and flowed in a westerly direction towards the watercourse. All other reported incidents are located upstream of the site and the proposed development will not impact on these locations.

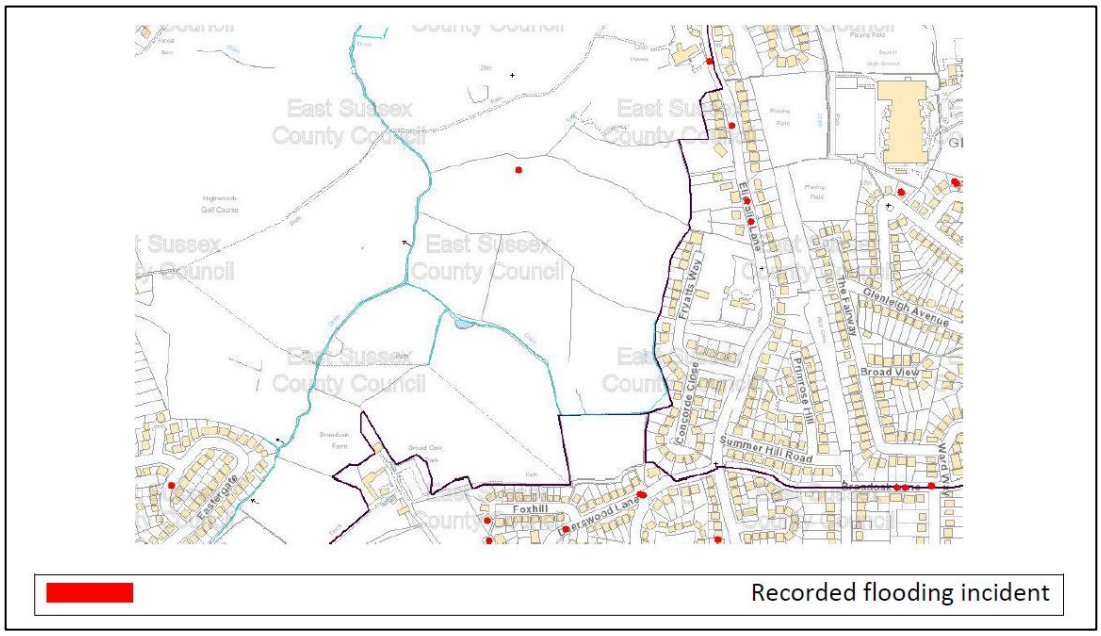


Figure 7.6: LLFA Recorded Flood Incidents

7.8 Flood risk resulting from the development

In theory any development can increase flood risk downstream, if it is not designed properly. This potential is much increased where the site is on greenfield land, as development tends to increase impermeable surfaces, resulting in increased runoff from the site.

The proposed development will use the latest best practice guidance to ensure that flood risk is not increased as a result of the development. This will require the provision of a suitable surface water management plan to ensure that the surface water generated from the site does not increase the risk of flooding to the proposed properties or off-site.

The Pevensey Levels SAC/RAMSAR site is located to the south west of the site, whilst the surface water flows from the site do not directly flow into the Levels, the receiving watercourse forms part of the contributing catchment. Due to the designation of the Levels, the proposed offsite discharge rates and water quality will need to ensure that there is no detriment. This is considered further in Section 9 of this report.

8 PLANNING CONTEXT

8.1 Application of planning policy

Section 14 of the NPPF includes measures specifically dealing with development planning and flood risk using a sequential characterisation of risk based on planning zones and the Environment Agency Flood Map. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

8.2 Land use vulnerability

Planning Practice Guidance includes a list of appropriate land uses in each flood zone dependent on vulnerability to flooding. In applying the Sequential Test, reference is made to **Table 8.1** below, reproduced from **Table 3** of Planning Practice Guidance. With reference to **Table 2** of the Planning Practice Guidance, the proposed development, based on its residential end use, is classed as 'More Vulnerable'. This classification of development is appropriate for areas within Flood Zone 1. The proposed layout for the site shows all the developable area to be located within Flood Zone 1. There are isolated areas of Flood Zone 2 and 3 along the western boundary of the site and these areas will be left as open space to ensure the existing hydraulic regime of the watercourse is not impacted.

Table 8.1: Flood risk vulnerability and flood zone 'compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	**Appropriate**	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

8.3 Sequential Test

The Sequential Test is required to assess flood risk and the Planning Practice Guidance recommends that the test be applied at all stages of the planning process to direct new development to areas with the lowest probability of flooding (Flood Zone 1).

According to the NPPF, if there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development (see Planning Practice Guidance Table 2) can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

The development proposal is for a 'More Vulnerable' residential use to be developed on the site. With reference to **Table 8.1** above, this development would be appropriate for areas within Flood Zone 1, subject to the implementation of an appropriate surface water drainage strategy.

The proposed areas of development have been guided away from the areas of Flood Zone 2 and 3 and therefore, the Sequential Test has been passed as the development has been situated within the lowest possible designated risk area available and therefore does not require the Exception Test to be satisfied.

9 SURFACE WATER DRAINAGE ASSESSMENT

9.1 Scope

As development is greater than 1Ha in size, the Environment Agency and the LLFA requires such development to focus on the management of surface water run-off. This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the framework development plan.

The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by regional and local policy (see Section 6.7). In accordance with local and national guidance, the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to Greenfield rates (Preferred Standard).

In addition, Building Regulations Part H[7] requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

9.2 Pre-development situation

The existing site area is 11.29Ha and is considered as Greenfield. The site drains naturally by allowing surface water to follow the topographic falls of the site towards the western boundary.

In order to estimate the existing Greenfield Runoff Rate for the developable area (6.90Ha), the pro-rata IoH 124 (ICP SuDS) method[8] of calculation has been used. These calculations are contained in **Appendix G**. Greenfield Runoff Rates for this area are shown in **Table 9.1**.

[7] HM Government (2010 with 2013 amendments), 'The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)'

[8] Institute of Hydrology (IoH), 'Flood Estimation for small catchments - Report 124', 1994

Table 9.1: ICP SuDS surface water runoff (for developable area only 6.90Ha)

Return period	Peak flow (l/s) Total Site Area
QBar	35.21
1 in 30 year	80.99
1 in 100 year	112.33

9.3 Post-development situation

The proposed development is for a residential end use. As explained within Section 4 of this assessment it is proposed that 55% of the developable area will be assumed to be impermeable, which will result in an increase in surface water across the site. It will therefore be necessary to manage surface water on-site in order to limit the discharge of surface water off-site to an agreed rate (as above), to provide sufficient on-site attenuation up to the 1 in 100 year climate change rainfall event and to provide improvements to water quality through appropriate source treatment.

9.3.1 Off site discharge options

9.3.1.1 Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed site. The effectiveness of infiltration is completely dependent on the physical conditions at the site. Potential obstacles include:

- Local variations in permeability preventing infiltration – The underlying geology of the site is Siltstone, Mudstone and Sandstone and maybe capable of water permeability. Soakaway testing should be undertaken to confirm infiltration rates;
- Shallow groundwater table - For infiltration drainage devices, Building Regulation approved document H2 states that these *"should not be built in ground where the water table reaches the bottom of the device at any time of the year"*. Groundwater levels are not known on the site, should infiltration prove possible ground water levels should also be recorded; and;
- Source Protection Zones - As discussed above, the site is not located within a Groundwater Source Protection Zone.

9.3.1.2 Discharge to watercourse

There is a watercourse forming the western boundary of the site, with a minor channel located on the site which offer a suitable discharge location for surface water flows from the site. This is also the existing receiving watercourse for run off from the site.

9.3.1.3 Discharge to surface water sewer

There are no surface water sewers crossing the site, with the nearest sewers being located in the residential development to the East. Connection to these sewers, whilst possible, would require a pumped solution and significant off site works as the sewer is located to the east of Ellerslie Lane. Due to the location of the watercourse in proximity to the site, this is not considered further a suitable point of connection for surface water.

9.3.2 Limiting discharge for design

In line with ESCC flood policy, the proposed offsite discharge rates will not exceed the predevelopment rates for the corresponding rainfall event. Agreement with the LLFA has been reached to consider the use of a complex control to limit the flows to the QBAR, 30-year and 100-year events (**Appendix E**).

This should be reflected within the detailed design of the site and agreed by the LLFA.

9.3.3 Storage estimates

9.3.3.1 Discharge to onsite watercourse

If discharge via infiltration is deemed unfeasible due to slow infiltration coefficient results then discharge to the watercourse on site should be considered as the next most feasible solution. This should be achievable via a gravitational surface water system with onsite attenuation, but this should be confirmed with a detailed drainage appraisal. Discharge rates should not exceed that of the equivalent rainfall event as per the agreement in principal from the LLFA.

The development has been split into two catchments for the purposes of providing feasible gravitational drainage towards two attenuation basins. The northern basin will operate using a complex control to limit the discharge rates depending on the inflow rainfall event and the southern pond will have a fixed discharge rate to ensure that the total offsite discharge rate does not exceed that of the equivalent greenfield discharge rate for the developable area. Due to the limited space in the northern catchment, the discharge rates from this basin are greater than the greenfield rates, however this is compensated for in the reduction in rates from the southern pond with the total discharge rate from the site being less than the equivalent greenfield rate for the same rainfall event.

To determine the volume of attenuation storage that would be required on the site, the WinDes ' 4-Stage Design Guide' tool has been used. The WinDes '4-Stage Design Guide' tool allows for an attenuation figure to be calculated based upon basin dimensions, rainfall values and permitted discharge rates with a 1:4 slope to the base, in line with CIRIA guidance. These volumes can be later revised at detail design stage by the introduction of specific flow control methods.

To attenuate flows from the northern catchment, the basin will need to provide a minimum volume of **827.7m^3** to attenuate surface water runoff without flooding during a 1 in 100 year event inclusive of 40% climate change. This is based on the discharge being limited via a complex control device to ensure off site flow rates do not exceed the pre-development greenfield rates.

To attenuate flows from the southern catchment, the basin will need to provide a minimum volume of **1195.8m^3** to attenuate surface water runoff without flooding during a 1 in 100 year event inclusive of 40% climate change. This is based on the discharge being limited via a flow control device to ensure off site flow rates do not exceed the pre-development greenfield rates.

Further details on basin sizing and attenuation calculations can be found in **Appendix H**. This has been shown as a split basin within the drainage strategy.

Table 9.2: Pre and post development discharge rates for each return period

Return period	Greenfield run off rate (l/s) Developable Area	Peak flow (l/s) Northern Catchment	Peak flow (l/s) Southern Catchment	Total Post development Peak flow (l/s)
QBar	35.21	22.7	9.9	32.6
1 in 30 year	80.99	36.2	9.9	49.1
1 in 100 year	112.33	59.6	9.9	69.5
1 in 100 year +40% Climate change	112.33 (Q100)	91.5	11.2	102.7

9.3.4 Proposed drainage strategy

The proposed drainage layout drawing is shown in **Appendix I.** The drawing is based on an indicative design which outlines the following detail:

- Discharge of surface water runoff from the site via the onsite watercourse to Picknell Green Stream along the western boundary of the site;
- The proposed runoff from the site is to be restricted to the equivalent greenfield run-off rate to the comparable rainfall event, this will be achieved using a complex control on the northern catchment and a reduced rate for the southern catchment;
- Two attenuation basins will be located on the western edge of the developable area with runoff being conveyed to these basins within surface water pipes, swales and using gravitational falls;
- The attenuation basins for the surface water network is sized to accommodate runoff for the 1 in 100 year storm event plus 40% climate change;
- The surface water sewer pipes should be designed to allow appropriate levels of cover, this will include 1.2m of cover below road surfaces;
- Permeable paving could be incorporated within private roads, shared surfaces and drive ways that are part of the development. These areas of paving can be used to collect and store runoff from the houses and surrounding hardstanding areas before joining the on-site surface water network that flows into the attenuation structure.

The dimensions, volumes and location of the SuDS features will need to be revised as the development framework plan develops and during the detailed planning stage. Indicative dimensions are provided as part of this report to provide an indication of the surface area that would be required for attenuation. Detailed design of individual features is not part of the scope of this report. Preliminary design criteria have been based upon guidance given in the CIRIA publication The SuDS Manual and the information received to date.

9.3.5 Water Quality

Due to the location of the SAC/RAMSAR site downstream of the receiving watercourse, water quality has been considered further in this report.

The SUDS Manual contains guidance on how to assess water quality, stating *"Determining the hazard posed by the land use activities at a site and the extent to which underlying soil layers and/or proposed treatment components reduce the associated risk can be done using a variety of methods that vary in complexity and data requirements."*

In accordance with Table 4.3 of the SuDS Manual, the proposed development for the site can be summarised with the following pollution hazard levels and management requirements for discharge to the receiving surface water:

- Residential roofs – **Very Low** Pollution Hazard – Simple Index Approach; and
- Individual property driveways, roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – **Low** Pollution Hazard – Simple Index Approach.

It is therefore considered appropriate to use the Simple Index Approach for the purpose of this assessment.

Table 26.1 of the SUDS Manual indicates that for the Simple Index Approach:

- Simple pollution hazard indices should be based on land use (e.g., Table 26.2); and
- Risk reduction for Surface Water should be done using Simple SuDS hazard mitigation indices (e.g., Table 26.3)

Extracts of Tables 26.2 and 26.3 are replicated below, highlighting the relevant features applicable to this site:

Table 9.3: Extract of SuDS Manual Table 26.2: Pollution hazard indices for different land use classifications

Land use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	**Very Low**	0.2	0.2	0.05
Individual property driveways, roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices)	**Low**	0.5	0.4	0.4

Table 9.4: Extract of Table 26.3: Indicative SuDS mitigation indices for discharges to surface waters

Land use	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Swale	0.5	0.6	0.6
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6

The SuDS Manual States:

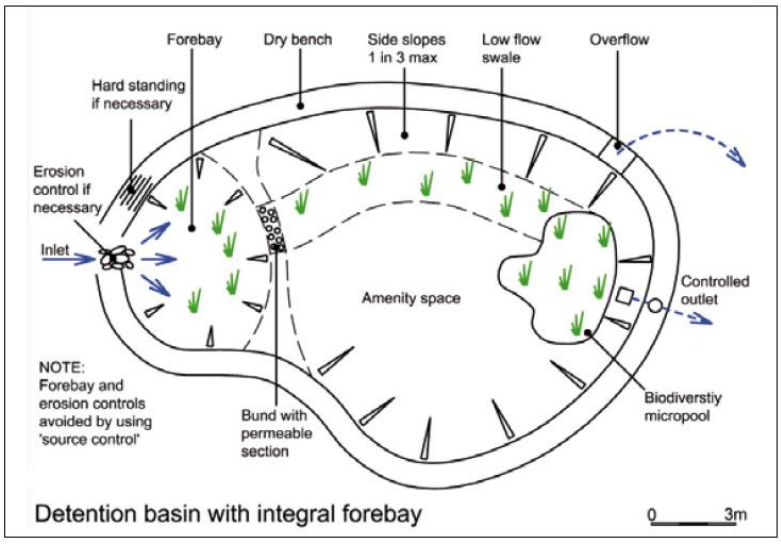
Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

Swales are linear vegetated channels with a flat base that encourage sheet flow of water through grass or other robust vegetation. They collect, convey and sometimes store surface water runoff allowing water to soak into the ground where soil conditions are suitable. Swales usually collect surface water runoff laterally across grass filter strips or over kerb edge inlets that reduce the rate of flow and allow suspended particles to settle in grassed areas. Surface water runoff can flow into swales through a point inlet but then requires erosion control and needs a silt collection arrangement if this has not been removed at source. Shallow under-drained swales are useful in housing to collect surface water runoff at source and are normally dry grass channels that are visually acceptable to residents and can be used for informal play by children. They can be the first treatment stage before conveyance to the next part of the management train.

Permeable paving reduces the volume of suspended sediment and hydrocarbon pollution associated with residential developments, providing effective water quality improvements. Adopted roads will not be constructed using permeable paving due to ownership and future maintenance issues, where responsibility will most likely lie with the highway authority. As the surface area available for permeable paving is currently unknown then the storage volume of permeable paving has not been included in the calculations. The design of permeable pavements comprises a structural element for loading and a hydraulic consideration for water storage. Permeable pavement includes permeable block paving, porous asphalt, gravel surfaces and engineered grass surfaces.

Attenuation basins are vegetated depressions in the ground designed to store surface water runoff on the surface. They can be designed to be dry or to have standing water most of the time. Basins should be designed as landscape features that act as visual enhancement and habitat creation. When dry, they can be used for social space, and habitat creation.



These features in isolation provide water quality treatment prior to discharge, however the outline drainage strategy seeks to utilise a number of these treatment trains, thus

further reducing the likelihood of any pollutants leaving the site. Subject to condition, a detailed drainage design will form part of a full planning application with the details requiring confirmation from the Local Authority prior to commencement on site.

In conclusion, any one SuDS feature (Table 9.2) is shown to be in excess of the requirement for residential roofs, individual property driveways, roofs, residential car parks, low traffic roads and non-residential car parking with infrequent change (Table 9.3). It should be noted that all surface water runoff will pass through a treatment train of at least two features and therefore the water quality requirements are considered to be met.

Due to the potential sensitivity of the groundwater in the area, a further connection to the surface water sewer could be considered for runoff from the road and other potential areas of higher pollution risk.

10 FLOOD MITIGATION MEASURES

10.1 Overview

The site is currently proposed to be a residential development. As a result, this end use is considered to be More Vulnerable. The developable area lies wholly within Flood Zone 1 and, more specifically, the proposed development is situated within the areas to the south east of the site, where these areas are at low risk from all sources of flooding. Provided that the developable area is kept located within Flood Zone 1 and outside of the risk from surface water it is not proposed that additional mitigation measures should be incorporated into the design. There are elements of best practice which should be considered at an early stage as outlined below.

10.2 Overland flood flow

There is an area of potential surface water flood risk to the east of the site, located in close proximity to the access to the site. Whilst this flood risk is noted, it is unlikely to restrict access via motor or emergency vehicle. Should the flow path extend into the site, the flows would be collected in the onsite derange system and managed on site.

10.3 Finished floor levels

As the proposed developable area will not be affected by fluvial flooding there is no need to incorporate any freeboard levels into the finished floor levels of the design. Low lying areas that could lead to ponding of surface flows will be avoided by careful design of finished levels.

As a result, it is recommended that the proposed site levels should be set at or above the existing ground levels in the areas of designated Flood Zone 1.

Where site levels are proposed to be locally elevated, to provide gravitational drainage falls towards the surface water pipe network, the falls should be maintained away from the properties whilst still tying in to the proposed highways.

10.4 Safe access/egress

As the proposed site access lies outside of the 1 in 1000 year climate change flood extent, safe access and egress will be available up to this storm event. For extreme events above this, it is considered appropriate that site users should be able to safely escape to an area away from the watercourse. In addition, the proposed buildings will be set above the existing ground level and will likely contain an internal access to the first floor.

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11 CONCLUSIONS AND RECOMMENDATIONS

This Flood Risk Assessment complies with the NPPF and Planning Practice Guidance and demonstrates that flood risk from all sources has been considered in the proposed development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

This Flood Risk Assessment demonstrates that the requirements of the NPPF and Sequential Test have been met, with the location of the proposed developable area being within Flood Zone 1 meaning that any form of classification of development is considered to be acceptable. Flood Zone 1 is designated by the Environment Agency as land having a chance of flooding of less than 1 in 1,000 (<0.1%) in any year.

This Flood Risk Assessment has concluded that:

- The site is located mainly within an area designated as Flood Zone 1 (limited flood zone along the western boundary away from the developable area). As a result, the risk to the proposed development is considered to be very low from both fluvial and tidal sources;
- Flood risk from surface water is considered very low across the site with some risk to the east on Fryatts Way;
- Flood risk from Groundwater is considered to be low across the proposed area of development. As a result, the risk of Groundwater emergence on-site is considered low;
- The site is not at risk from reservoir flooding;
- There are no Canal & River Trust assets within the study area and therefore the site is not at risk from this source;
- The risk of artificial sources blocking the culvert has been demonstrated to be low;
- As safe pedestrian and vehicular access, to and from the development, will be achievable under all conditions, a formal evacuation plan is not required;
- Surface water generated from the development will be managed on site by the use of swales and attenuation basins (designed to the 100 year plus 40% climate change event);
- Surface water will be discharged into the onsite watercourse at a rate not exceeding the equivalent greenfield runoff rate using a complex control on the northern basin and a fixed control on the southern pond;
- Permeable paving, swales and the basins will offer adequate water quality benefits to reduce the potential for impact on the SAC/RAMSAR site;

Overall, taking into account the above points, the development of the site should not be precluded on flood risk grounds as the development will not be at risk from existing sources of flooding and will not result in an increase in flooding downstream provided sufficient attenuation is provided.

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APPENDIX A
SERVICE CONSTRAINTS

RSK Group service constraints

1. This report and the Drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Gladman Developments Ltd. (the "client") in accordance with the terms of a contract between RSK and the "client. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to

this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B
SITE WALKOVER PHOTO LOG

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
1a	13/11/19

Direction Photo Taken:

N

Description:

The NE entrance to the site. Large established trees observed at the site boundary. Weeds and brambles observed to the E and hedgerow present to the N. Grass observed across the main section of the field.

Photo No.	**Date:**
1b	13/11/19

Direction Photo Taken:

NW

Description:

At the NE entrance to the site. The land sloped downwards towards the W of the site. Large, established trees observed along the N site boundary. Horses observed in the field to the N as seen in photo.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name:
Gladman Developments Ltd.

Site Location:
Fryatts Way, Bexhill

Photo No.	**Date:**
1c	13/11/19

Direction Photo Taken:

W

Description:

At the NE entrance to the site. The land sloped downwards to the W and upwards to the S.

Photo No.	**Date:**
1d	13/11/19

Direction Photo Taken:

S

Description:

At the NE entrance to the site. The land sloped upwards to the S. Large, established trees observed along the E site boundary.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
2a	13/11/19

Direction Photo Taken:

W

Description:

Standing to the E of the site at a localised highpoint. The land fell away to the S, W and N.

Photo No.	**Date:**
2b	13/11/19

Direction Photo Taken:

S

Description:

Standing to the E of the site at a localised highpoint looking across into the SW field. The field boundary to the S, as seen in the picture, appeared to be densely vegetated with hedgerow, trees and weeds.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name:
Gladman Developments Ltd.

Site Location:
Fryatts Way, Bexhill

Photo No.	**Date:**
3	13/11/19

Direction Photo Taken:

NW

Description:

Taken at the field boundary. The land sloped downwards to the W and upwards to the N.

Photo No.	**Date:**
4a	13/11/19

Direction Photo Taken:

N/A

Description:

Manhole cover located in the SE field.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
4b	13/11/19

Direction Photo Taken:

E

Description:

Facing towards the entrance to the site via Fryatts way. The manhole cover was present just inside the entrance.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name:
Gladman Developments Ltd.

Site Location:
Fryatts Way, Bexhill

Photo No.	**Date:**
4c	13/11/19

Direction Photo Taken:

W

Description:

Standing by the manhole cover. The land sloped upwards to the N and downwards to the S and W. Grass was observed to be longer than in the N field.

Photo No.	**Date:**
5a	13/11/19

Direction Photo Taken:

S

Description:

Dense vegetation observed along the E boundary of the site. There was evidence that some effort to clear/maintain this vegetation had been made.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
5b	13/11/19

Direction Photo Taken:

S

Description:

Potential badger set located at the E boundary of the SE field. Further investigation would be needed to confirm this.

Photo No.	**Date:**
5c	13/11/19

Direction Photo Taken:

S

Description:

The picture shows the E boundary of the SE field. There was dense vegetation present and evidence of potential tipping. There was no ditch present as was indicated on the EA flood map.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
6a	13/11/19

Direction Photo Taken:

N

Description:

The picture shows the E boundary of the SE field. There was evidence that some effort to clear/maintain this vegetation had been made.

Photo No.	**Date:**
6b	13/11/19

Direction Photo Taken:

S

Description:

The picture shows the E boundary of the SE field. The vegetation was observed to become denser and less controlled at the S side of the field.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
7	13/11/19

Direction Photo Taken:

N

Description:

View from the SE tip of the site. The land sloped upwards to the N creating an observed low point**.** The grass appeared to be long and unmaintained.

Photo No.	**Date:**
8	13/11/19

Direction Photo Taken:

S

Description:

Observed a shallow ditch along the S boundary of the SE field as marked by the arrow. The water did not appear to be flowing at the upper end of the drain. It was surrounded by dense vegetation and leaves were present in the channel.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name:
Gladman Developments Ltd.

Site Location:
Fryatts Way, Bexhill

Photo No.	**Date:**
9	13/11/19

Direction Photo Taken:

W

Description:

Dense vegetation observed along the S boarder of the site. Ditch observed beneath the vegetation with shallow standing water.

Photo No.	**Date:**
10a	13/11/19

Direction Photo Taken:

N/A

Description:

Blue plastic pipe observed approximately 300mm in diameter. Direction of flow was not certain as standing water was present in the ditch.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
10b	13/11/19

Direction Photo Taken:

N/A

Description:

Blue plastic pipe observed approximately 300mm in diameter. Direction of flow was not certain as standing water is present in the ditch. The pipe is labelled with an arrow and runs into the site in a NW direction.

Photo No.	**Date:**
11	13/11/19

Direction Photo Taken:

N

Description:

The ditch observed in photos 8, 10a and 10b continued after the blue pipe along the S boundary of the site. The water observed was standing.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
12	13/11/19

Direction Photo Taken:

E

Description:

The land sloped upwards towards the E of the site and downwards towards the N. A pond was observed with tall vegetation to the W and this vegetation is pointed out with an arrow.

Photo No.	**Date:**
13a	13/11/19

Direction Photo Taken:

S

Description:

Pond observed in the SW of the site. Taller grasses present in the pond area and it was a localised low point

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
13b	13/11/19

Direction Photo Taken:

S

Description:

A grey plastic pipe, approximately 400-450mm in diameter was observed conveying water from the pond to the ditch located to the SE of the site. Dense weeds surrounding pipe, although the inlet appears clear.

Photo No.	**Date:**
13c	13/11/19

Direction Photo Taken:

SW

Description:

A grey plastic pipe, approximately 400-450mm in diameter was observed conveying water from the pond to the watercourse located to the SE of the site.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
14a	13/11/19

Direction Photo Taken:

W

Description:

A black ridged plastic pipe, approximately 400-450mm in diameter was observed discharging water from the pond to the ditch located to the SW of the site. Water was being discharged into the ditch.

Photo No.	**Date:**
14b	13/11/19

Direction Photo Taken:

NE

Description:

A black ridged plastic pipe, approximately 400-450mm in diameter was observed discharging water from the pond to the watercourse located to the SW of the site.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
14c	13/11/19

Direction Photo Taken:

W

Description:

This photo was taken standing next to the pipe pictured in photos 14a and 14b. The vegetation alongside the watercourse was significantly denser and more overgrown then the rest of the field.

Photo No.	**Date:**
15a	13/11/19

Direction Photo Taken:

SE

Description:

Watercourse located to the SW boundary of the site. Water was observed to be flowing in an E to W direction. The surrounding ground was very wet in this area.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
15b	13/11/19

Direction Photo Taken:

S

Description:

Watercourse located to the SW boundary of the site. Water was observed to be flowing in an E to W direction. As shown in the photo, the land bordering the site fell to the N towards the site.

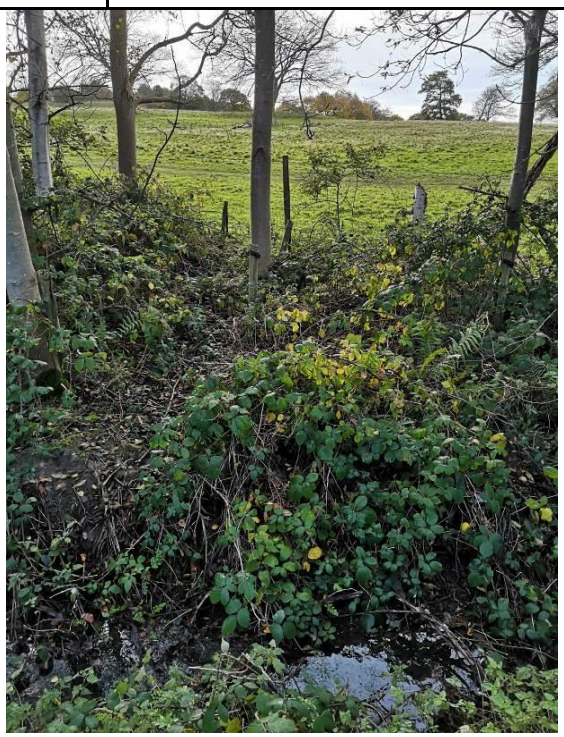

Photo No.	**Date:**
15c	13/11/19

Direction Photo Taken:

W

Description:

The land gently sloped downwards to the S. Vegetation was mainly grasses and the ground is wet, but not saturated.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
16	13/11/19

Direction Photo Taken:

SW

Description:

The channel was observed to change greatly in a short distance. The sides of the channel were very steep and tall with a narrow flow path. Water in the channel appeared to be fast flowing and turbulent.

Photo No.	**Date:**
17	13/11/19

Direction Photo Taken:

SW

Description:

Channel observed to be shallow with heavily vegetated banks. Leaf litter was present in channel.

RSK	Report No:881964	PHOTOGRAPHIC LOG

Client name: Gladman Developments Ltd.	**Site Location:** Fryatts Way, Bexhill

Photo No.	**Date:**
18a	13/11/19

Direction Photo Taken:

E

Description:

The ground was very boggy at this low point of the site. Land sloped upwards to the E.

Photo No.	**Date:**
18b	13/11/19

Direction Photo Taken:

W

Description:

Watercourse present at the W boarder of the site. Dense ferns were observed on both sides of the channel. The water in the channel appeared to be fast flowing in a N to S direction. Land on the opposite bank appeared higher by 0.5m than the site.