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Flood Risk Assessment

Site: Copp Lane, Great Eccleston
Client: Baxter Homes

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ABBREVIATIONS

Term	Meaning / Definition
AEP	Annual Exceedance Probability
BGL	Below Ground Level
BGS	British Geological Society
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
CoP	Code of Practice
EA	Environment Agency
EFO	Extreme Flood Outline (Boundary of floodplain associated with a flood event with a probability of occurrence of 0.1%, 1 in 1000 years)
FDA	Flood Defence Agency (e.g. Environment Agency)
FERS	Flood Event Recording System
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FW	Foul Water
GPZ	Groundwater Protection Zone
LDD	Local Development Document
LDF	Local Development Framework
LHA	Local Highway Authority
LPA	Local Planning Authority
m AOD	Metres above Ordnance Datum
MAF	Mean Annual Flood
NGR	National Grid Reference
OS	Ordnance Survey
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
SFRA	Strategic Flood Risk Assessment
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SW	Surface Water
WFD	Water Framework Directive

1.0 INTRODUCTION

1.1. Baxter Homes are proposing a new residential development on land off Copp Lane, Great Eccleston. Total area of the site is approximately 5.10ha. (Ref. Figure 1.4).

1.2. The Local Planning Authority has requested that a Flood Risk Assessment (FRA) is undertaken to assess the risk of flooding to the site.

1.3. ELLUC Projects Limited has been commissioned by Baxter Homes to prepare a formal Flood Risk Assessment to accompany the planning application.

2.0 PLANNING POLICY

NATIONAL PLANNING POLICY

2.1. The National Planning Policy Framework (NPPF)[1] clearly identifies flood risk as a specific material consideration in the Planning Process and in the allocation and release of sites for development or re-development.

2.2. NPPF builds on its predecessor (PPS 25) and seeks to further strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. NPPF retains key elements of PPS 25 continuing to encourage Local Planning Authorities to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. NPPF expects Local Authorities to adopt a risk-based approach at all levels of Planning, through the application of the Sequential Test detailed in Table 1 and 2, of the Technical Guidance to NPPF document, a copy of which is attached in Appendix A.

2.3. The aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

2.4. The Water Resources Act 1991 [Section 105] also requires the Environment Agency to exercise a general supervision over all flood defence matters, including flood plains and washlands which accommodate waters during periods of flood. In discharging their functions, the Agency from time to time carries out comprehensive surveys and flood studies, largely of 'main rivers' within its jurisdiction.

2.5. A Section 105 Study involves the Agency topographically surveying the subject watercourse (or parts of it) and obtaining details of the flow mechanics within the watercourse. This data then enables them to generate a comprehensive hydraulic computer model for the watercourse. From this hydraulic model, the EA are able to define the approximate extent of fluvial floodplain associated with the 1 in 100-year (1% annual probability) flooding event or the extent of tidal floodplain associated with the 1 in 200-year (0.5% annual probability) flooding event.

2.6. The extents of the modelled floodplain are then provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood-susceptible areas. If development is proposed in a flood-susceptible area, or in an area where there is a history of flooding, the EA, as a statutory consultee in the Planning Process, will generally recommend that the risk of flooding be formally assessed, in accordance with NPPF, and that a Flood Risk Assessment

[1] National Planning Policy Framework

report be produced to support the Planning Application. The broader modelled flood extents are also indicated on the EA's Flood Zone Maps, available through their website[2].

2.7. **Local Planning Policy**

Catchment Flood Management Plan (CFMP)

2.8. The site is located within the Wyre catchment area. The Environment Agency has produced the 'Wyre' Catchment Flood Management Plan'[3]. A copy of the CFMP is available from the EA on request.

2.9. CFMP's are not specifically required by the Water Framework Directive [4] and are prepared voluntarily by the EA (under Government sponsorship). A CFMP is a high-level strategic plan for an area which aims to develop policies to manage flood risk over the next 50 to 100 years. These policies take into account the likely impacts of climate change and the effects of land-use and land management, and identify a range of benefits which contribute towards sustainable development. The CFMP's policies establish whether action should be taken to increase, decrease or maintain the current level of flood risk.

Strategic Flood Risk Assessment (SFRA)

2.10. Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy for the Authority area. The LDD's undergo a Sustainability Appraisal which assists Planning Authorities in ensuring their policies fulfill the principles of sustainability. Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRAs should be used in the review or production of LDD's.

2.11. To assist Local Planning Authorities in their strategic land-use planning, SFRA's should present sufficient information to enable Local Authorities to apply the Sequential Test to their proposed development sites: *"Decision-makers should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas."* [5]

2.12. Lancashire County Council has published a Strategic Flood Risk Assessment[6].

2.13. The SFRA along with the EA flood risk maps indicate that the proposed development sites lie within **Flood Zone 1**. The EA highlight that a Flood Zone 1 is an area of fluvial risk of flooding above the 1 in 1000 year event.

2.14. The SFRA has been developed with the assistance of the Environment Agency and key landowners to provide a robust assessment of current and future levels of flood risk, ensuring that future development takes full account of flood risk and sustainability at the outset.

[2] www.environment-agency.gov.uk

[4] www.defra.gov.uk/environment/water/wfd/index.htm
[5] NPPF
[6] Level 1 Strategic Flood Risk Assessment, Bury Council, March 2011.

2.15. A copy of the SFRA is available from Lancashire County Council

Further Guidance

CIRIA Guidance

2.16. CIRIA publication 'C624 Development and Flood Risk – Guidance for the Construction Industry'[7], define three levels of FRA which can be undertaken:

Table 2.1 Levels / Scopes of Flood Risk Assessment

FRA Level	Description / Scope
Level 1	**Screening Study** to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This should be based on readily available existing information, including the SFRA, Environment Agency Flood Map and Standing Advice. The Screening Study will ascertain whether a FRA is required.
Level 2	**Scoping Study** to be undertaken if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding or that the site may increase flood risk due to increased run-off. This Study should confirm the sources of flooding which may affect the site and should include the following: • an appraisal of the availability and adequacy of existing information; • a qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere; • an appraisal of the scope of possible measures to reduce the flood risk to acceptable levels. The Scoping Study may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.
Level 3	**Detailed Study** to be undertaken if the Level 2 FRA concludes that further quantitative analysis is required to assess flood risk issues related to the development site. The Study should include: • quantitative appraisal of the potential flood risk to the development; • Quantitative appraisal of the potential impact of development site on flood risk elsewhere; • quantitative demonstration of the effectiveness of any proposed mitigation measures.

2.17. It is considered that a Level 2 Scoping Study is appropriate at this stage and to minimise pre-commencement conditions this report has therefore been based on the requirements of a Level 2 Study.

[7] CIRIA publication 'C624 Development and Flood Risk – Guidance for the Construction Industry', 2004

3.0 REQUIREMENTS OF A FLOOD RISK ASSESSMENT

3.1. The EA's Flood Zone Maps, available on the EA's website, indicate that the majority of the site is within a Flood Zone 1. Flood Zone 1 is an area of high risk of flooding, with a risk of flooding lower than 1 in 1000 year event. Current EA guidance indicates that all proposed developments in this zone should be accompanied by an FRA for a development site with an area of over 1 hectare, or the Local Authority have requested one, as in this situation. An FRA should contain:

- Information about the surface water disposal measures already in place and their state of maintenance;
- An assessment of the volume of surface water run-off likely to be generated from the proposed development;
- Information on how that surface water run-off will be disposed of (from the new development);
- Estimates of how climate change could affect the probability and intensity of flooding events in the future;
- Information about any other potential sources of flooding to the site - streams, ditches, sewers, groundwater, overland surface water flow or any combination of these.

3.2. As set out in NPPF flood risk assessments should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

3.3. The detail and complexity of a Flood Risk Assessment should reflect the level of risk to the proposed development and should:

- be proportionate to the risk and appropriate to the scale, nature and location of the development;
- consider the risk of flooding arising from the development in addition to the risk of flooding to the development;
- take the impacts of climate change into account;
- be undertaken by competent people, as early as possible in the particular planning process, to avoid misplaced effort and raising landowner expectations where land is unsuitable for development;
- consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
- consider the vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification (including arrangements for safe access;

- consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems;
- be supported by appropriate data and information, including historical information on previous events.

4.0 SEQUENTIAL TEST

4.1. The sequential test is to ensure that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The aim is to steer new developments to Flood Zone 1 (areas with a low probability of river or sea flooding).

4.2. The proposed development is set within Flood Zone 1.

4.3. The proposed residential development will be categorised as 'Less vulnerable' as classed within NPPF.

Table 4.5 Flood Risk Vulnerability Classification Chart (NPPF)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

4.4. Based upon the Flood risk Vulnerability classification the development site is classed as appropriate and therefore the sequential test is past.

5.0 SITE CONTEXT

SITE LOCATION

5.1. The site is located off Copp Lane, Great Eccleston. The residential site is approximately 5.10ha and has grid reference E342388, N439853 Ref. Figures 5.1 and Figure 5.2.

Figure 5.1 Site Location Plan

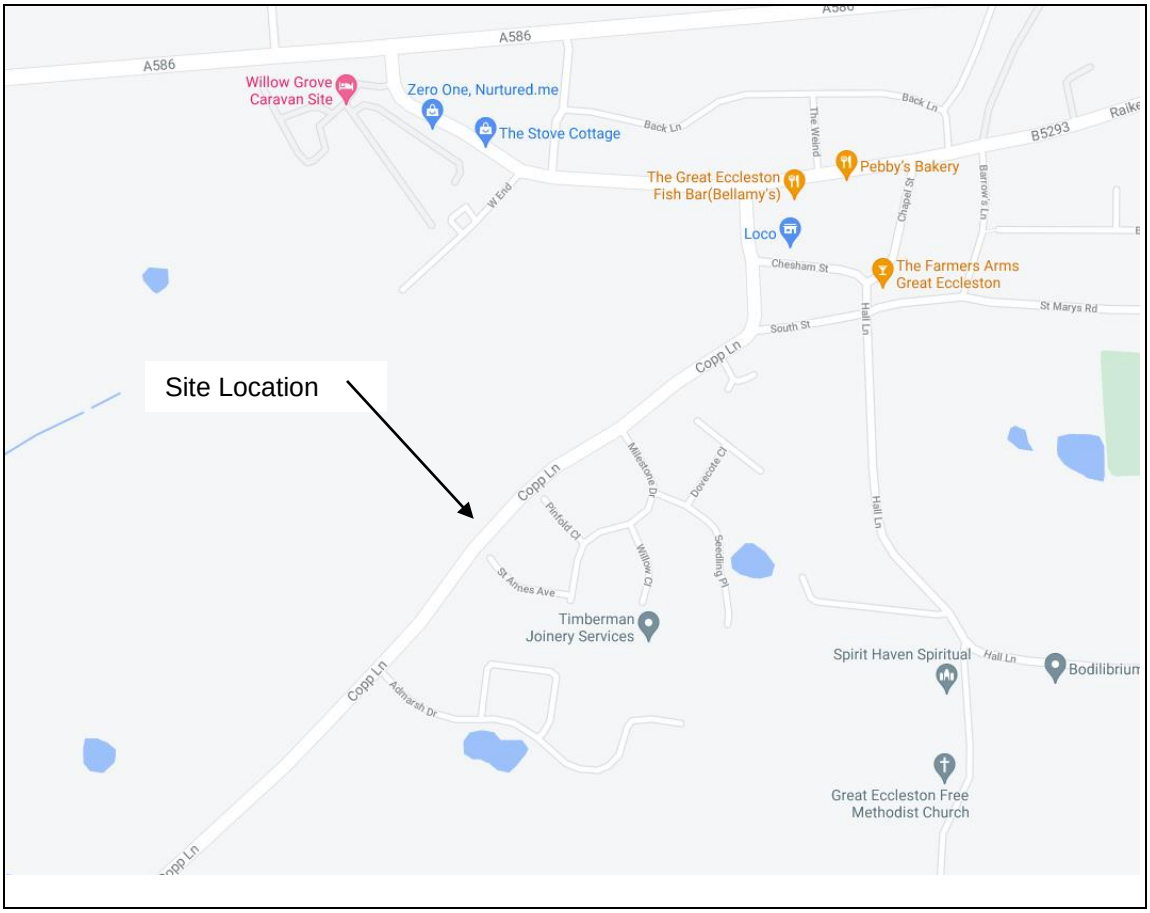


Figure 5.2: Aerial Image

EXISTING SITE CHARACTERISATION / LAND-USE

5.2. The site and surrounding boundary conditions are shown on the Aerial Image in Figure 5.2.

5.3. The site is a greenfield.

5.4. The majority of the site is made up of an existing field.

5.5. The north of the site is bound by an existing field.

5.6. To the west the site is bound by existing field.

5.7. The south of the site is bound by Copp Lane and an existing residential development.

5.8. To the east the site is bound by Copp Lane and an existing residential development.

EXISTING SITE TOPOGRAPHY

5.9. The site's general falls from the southern boundary to the northern boundary (from 15.99m AOD, Copp Lane to 12.72m AOD, Existing field)

EXISTING WATERCOURSES / WATER BODIES /DRAINAGE INFRASTRUCTURE

5.10. There is a watercourse running along the north west boundary of the site.

EXISTING GROUND CONDITIONS

5.11. According to the British Geological Society website 1:50,000 maps, the bedrock of the site is composed of Triassic Rocks – Mudstone, Siltstone and Sandstone. The superficial deposits are Till - Diamiction.

5.12. The site is not within a Groundwater Source Protection Zone.

6.0 PROPOSED DEVELOPMENT

PROPOSED LAYOUT

6.1. The proposed site layout is indicatively shown in Figure 6.1 and the full version is in Appendix C

6.2. The proposed development is for residential dwellings.

PROPOSED LEVELS

6.3. The proposed ground levels where the houses will be set as close as possible to the existing ground levels.

Figure 6.1 Proposed Layout

7.0 PROPOSED DRAINAGE

SURFACE WATER DRAINAGE OPTIONS

7.1. The BGS maps indicate that the geology of the site consists of Pennie Middle coal Measures Formation. It is anticipated that soakaways will not be feasible on the site.

7.2. The site will drain via two surface water network systems in which will both leave the site by discharge into the watercourse running to the western boundary of the site.

7.3. To ensure that post-development run-off volumes and peak flow rates discharging from the site do not exceed current levels, it may be necessary to employ SuDS (Sustainable Drainage Systems) methods and source control techniques, including flow control devices to restrict flows and to store attenuated water on site. The provision of such techniques will ensure that the maximum discharge from the site does not exceed the agreed rates with the statutory bodies. In addition, where practicable, opportunities for reducing flood risk through the management of surface water run-off from the site should be included.

7.4. Storage of attenuated flows within the site could be provided in a number of ways:

- underground – over-sized pipes / tanks or proprietary storage systems such as 'Stormcell';
- above ground – storage / balancing pond, designated surface areas (low risk areas such as car parks, open space);
- combination of underground and above ground.

7.5. Proposed SW drainage systems are generally designed in accordance with 'Sewers for Adoption'[8], which requires that any surface water drainage system, which is proposed to be Adopted after construction, should not surcharge during the 1 in 5-year storm event, and should not produce any surface flooding during a 1 in 30-year storm event (i.e. all run-off contained wholly within the sewerage system during the 1 in 30-year event).

7.6. It is generally accepted that a degree of surface flooding can be permitted during extreme storm events, subject to specific surface areas being designated as flood-susceptible and subject to flooding of these areas posing little or no risk to human life and/or damage to property. Examples of surface areas which might be permitted to flood during extreme events are:

- Agricultural land;
- Recreational land (playing fields etc.);
- Landscaped areas;
- Car parks;
- Other non-inhabited, designated areas.

[8]Sewers for Adoption' 7th Edition, published by WRc Plc., March 2006

7.7. In all cases where surface flooding might be permitted or designed in to a scheme, due diligence needs to be given to NPPF and the need to make potential users of such areas aware of their functionality and purpose, and the requirement to maintain safe access and egress at all times.

7.8. The Building Regulations Approved Document H (2002) outlines a hierarchy of potential methods of disposing of surface water from a site:

- A soakaway; or where that is not practicable
- A watercourse or river; or where that is not practicable,
- A sewer.

7.9. The viability of this hierarchy has been assessed below:

SOAKAWAY

7.10. According to the BGS survey the ground Triassic Rocks Formation. However recent ground investigations consist of clay ground. Therefore, soakaways are not feasible at this site.

WATERCOURSES / WATER BODIES

7.11. There is a watercourse running to the North west boundary of the site.

SEWERS

7.12. The foul water will drain to the existing foul sewer belong to the adjacent site along the North East boundary.

7.13. Below is a chart based on table 1.1 typical SuDS components within CIRIA Guidance 697 SuDS manual. This discusses the viable SuDS components and whether they are useable for this site.

Component	Description	Is it viable
Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat runoff from adjacent impermeable areas.	Infiltration is not likely to be successful therefore this type of SuDS system should not be viable on the site.
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow)	Infiltration is not likely to be successful therefore this type of SuDS system should not be viable on the site.
Infiltration Basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value	Infiltration is not likely to be successful therefore this type of SuDS system should not be viable on the site.
Wet Ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment. They provide temporary storage for additional storm runoff above the permanent water level. Wet ponds may provide amenity and wildlife benefits	The site does have sufficient space for wet ponds. Therefore wet ponds will be viable.
Extended detention basins	Extended detention basins are normally dry, though they may have small permanent pools at the inlet and outlet. They are designed to detain a certain volume of runoff as well as providing water quality treatment.	Extended detention basins would be suitable as there is enough available space on site. Therefore this type of SuDS would be viable and likely situated on site.
Constructed Wetland	Constructed wetlands are ponds with shallow areas and wetland vegetation to improve pollutant removal and enhance wildlife habitat	Constructed wetland would not be possible Therefore this type of SuDS is not suitable.
Filter drains and perforated pipes	Filter drains are trenches that are filled with permeable material. Surface water from the edge of paved areas flows into	Infiltration is not likely to be successful therefore this type of SuDS system should not be viable on the site.

	the trenches, is filtered and conveyed to other parts of the site. A slotted or perforated pipe may be built into the base of the trench to collect and convey the water.	
Infiltration devices	Infiltration devices temporarily store runoff from a development and allow it to percolate into the ground.	Infiltration is not likely to be successful however this type of SuDS system however not be feasible on the site.
Pervious surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water	Infiltration is not likely to be successful However this type of SuDS system should not be feasible on the site.
Green Roofs	Green roofs are system which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation.	Infiltration is not likely to be successful due to the ground being permeable however the site may be highly contaminated therefore this type of SuDS system should be not viable.
Oversized Pipes	Oversized pipes are pipes below ground that hold surface water	These should be viable and will be used within the site.

SURFACE WATER DRAINAGE STRATEGY

7.16 The surface water will discharge to: -The exiting watercourse running to the North west boundary of the site.

7.17 The site will discharge at 31l/s, this is in accordance with the agreed discharge rate with united utilities

7.18 The proposed surface water network has been designed using Microdrainage flow simulation software to ensure the following:

- No surcharging of drainage network for Design Storm of 1 in 2 years.
- No flooding for design flood frequency of 1 in 30 years.
- 1:100 year + 40% model should be duly reviewed and flood routing plans prepared as part of the detailed site designs.
- Maintenance of the drainage will be undertaken by Baxter Homes until adopted and/or transferred to a management company.

8.0 FLOOD HAZARDS & SOURCES OF FLOODING

POTENTIAL FLOOD HAZARDS

8.1 Prior to undertaking an FRA, the different types of flooding mechanisms which may affect the site need to be identified and then assessed to determine whether the development site is located within an area which is at risk of flooding from one or more of the applicable mechanisms.

8.2 CIRIA Report C624 [9], Table A2.1, lists a number of key factors that should be considered during a Level 1 FRA. This table can be used to summarise the findings of a Level 1 FRA study and to identify those flood hazards which may be applicable to the site in question. The boxes shaded grey indicate those sources of flooding which are unlikely to be identified for each question. If sufficient information is not available to identify the specific source of flooding, then all possible sources should be ticked. If a tick is placed below any flood hazard then a Level 2 FRA will be required to assess flood risk issues relating to that hazard in more detail.

8.3 Table 8.1 below identifies the flood hazards applicable to this site.

[9]CIRIA publication 'C624 Development and Flood Risk – Guidance for the Construction Industry'

Table 8.1 Flood Hazard Identification

Question	Flood Hazard						
	Fluvial	Sea	Estuaries	Groundwater	Overland flow	Artificial drainage systems	Infrastructure failure
Is the development site next to the sea or any watercourse shown on Ordnance Survey maps?	✓	✓	×				
Is the development site, or part of the development site, identified as being at risk of flooding within available documentation?	×	×	×	×	×	×	×
If a strategic flood risk assessment is available, is the development site, or part of the development site, identified as being at risk of flooding?	×	×	×	×	×	×	×
If a flood zone map is available, is the development site, or part of the development site, within a High Risk zone?	×	×	×				
If a flood zone map is available, is the development site, or part of the development site, within a Low to Medium Risk zone?	×	×	×				
If a flood zone map is not available, is the development site, or part of the development site, situated on alluvium based on consideration of geological maps of the area?	×	×	×				
If there is an existing property on, or next to the site at the same level, is the property within a flood warning area?	×	×	×	×			
Are the LPA / FDA aware of any existing, historical or potential flooding problems that may affect the site?	×	×	×	×	×	×	×
Do the physical characteristics of the site suggest that it may be prone to flooding?	×	×	×	×	×	×	×
If a flood zone map is not available, is the development site, or part of the development site below 10m AOD AND does the FDA consider the development to be at risk of tidal flooding?		×	×				
Is the development located within a natural or artificial hollow, or at the base of a valley or at the bottom of a hill slope?				×	×		
Does examination of historical maps indicate any likelihood of flood risk at the site?	×	×	×	×	×		
Do the names of surrounding roads, areas or houses suggest the possibility of seasonal or historical flooding?	×	×	×	×	×		
Is the site likely to involve excavation / construction below existing ground levels (excluding foundations)?	×	×	×	×	×		
Is the land use upslope of the site such that the generation of overland flow may be encouraged, and can water from this area flow onto the site?					×		
Are there any artificial drainage systems on or next to the site, at the same level, or upslope of, the site?						×	×
Is the development site protected by an existing flood defence?	×	×	×			×	×
Is the development site protected by a flood control structure (e.g. flap valve, sluice gate, tidal barrier etc)	×	×	×			×	×
Is the development site located upstream of a culvert which may be prone to blockage?	×		×	×	×	×	×
Are water levels in a watercourse located in or next to a development site controlled by a pumping station?	×	×	×	×	×	×	×
Is the development site next to or downstream / down slope of a canal?						×	×
Is the development site downstream/ down slope of a reservoir or other significant water body?						×	×
FURTHER COMMENT ON FLOOD RISK WITHIN THIS FRA?	✓	✓	×	×	×	×	×

SOURCES OF FLOODING

8.4 It is considered that there are two potential sources of flooding to the site:

- Low risk of surface water flooding to the site from the adjacent watercourse.

8.5 The risk of flooding from these various sources is assessed in the following sections of this report.

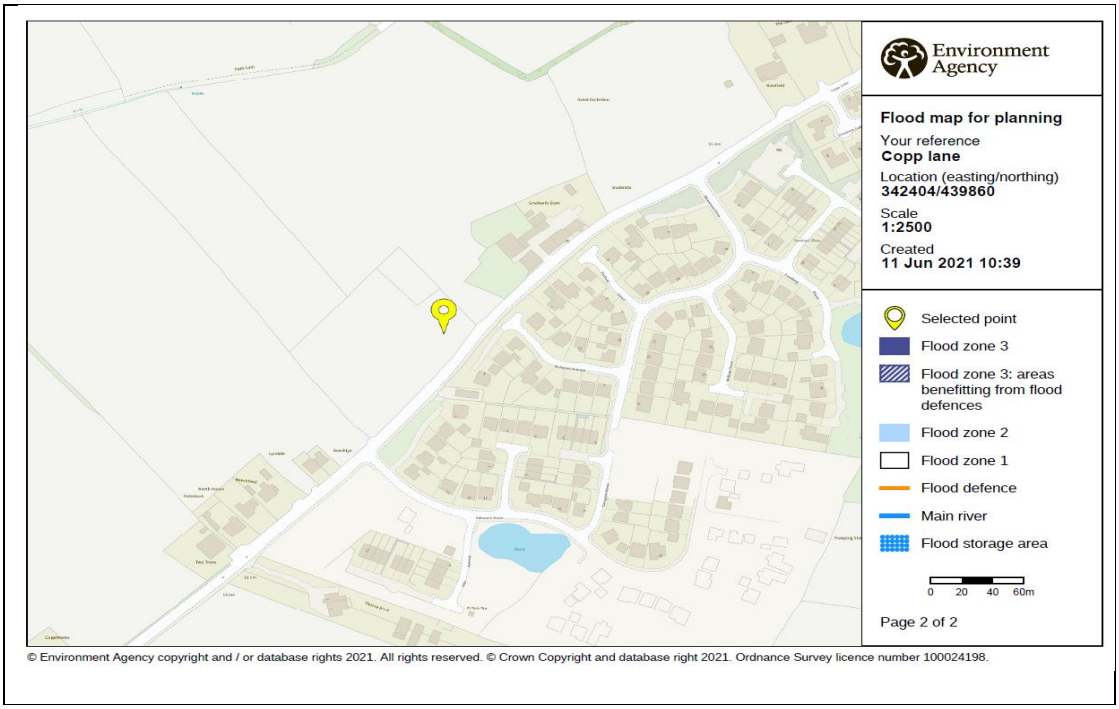
9.0 FLOOD RISK ASSESSMENT

FLUVIAL FLOODING

9.1 The site is within an area of Flood Zone 1. Flood Zone 1 is an area at low risk of flooding.

9.2 The Flood Zone Maps, which are available on the Environment Agency's website (ref. Section 2 of this Assessment), shows the site to be within Flood Zone 1. (see figure 9.2).

Figure 9.2 EA Flood Zone Map (not to scale)



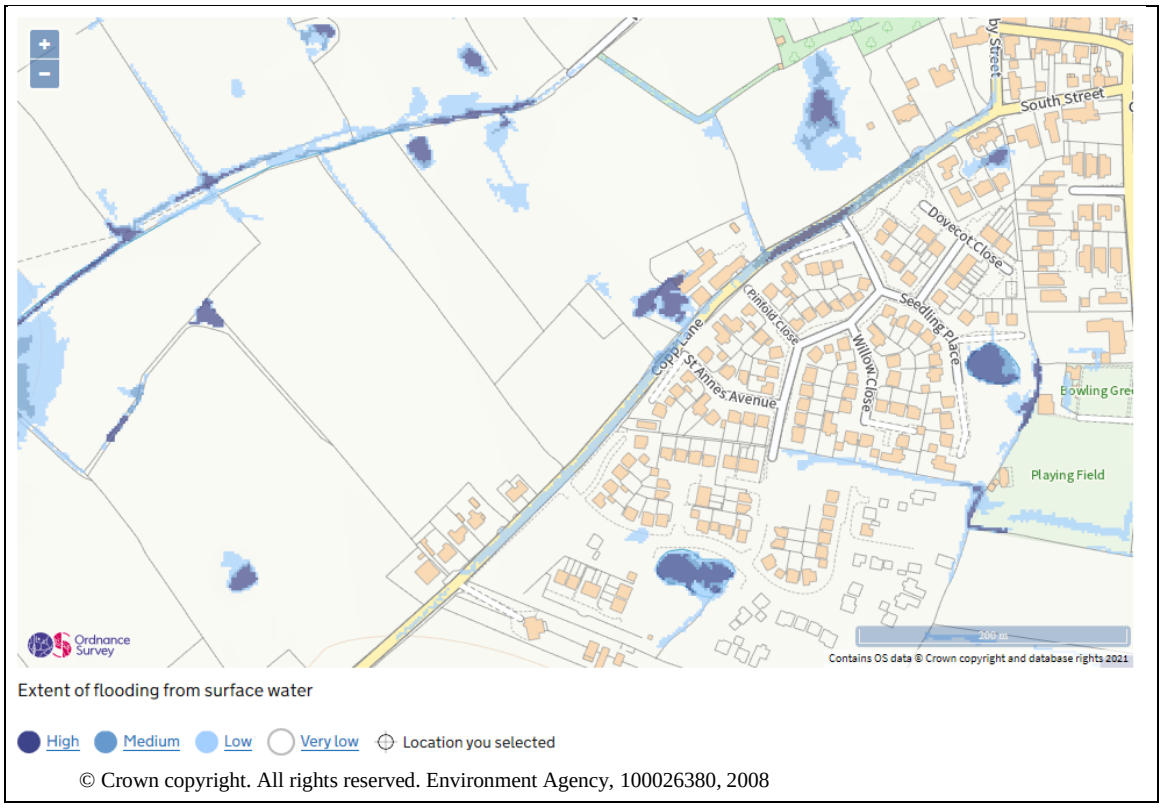
9.3 Based on currently available information, the risk of fluvial flooding at the site from adjacent watercourses, drains and other waterbodies is currently considered to be low.

SURFACE WATER FLOODING

9.4 The EA surface water map indicates that the site is at risk of surface water flooding.

9.5 Figure 9.13 shows areas of the site which are at different levels of risk of surface water flooding.

Figure 9.13 EA Surface Water Map (not to scale)



9.6 It is assumed that there are no springs underneath the site.

9.7 The majority of the site is at a low to very low risk of surface water flooding. The levels are to be raised which will mitigate the risk of surface water flooding.

9.8 A new drainage system will be included which will attenuate drainage up to and including the 1 in 100 year event plus climate change.

9.9 Based on currently available information, the risk of surface water flooding to the proposed development is Low.

SURCHARGING OF ARTIFICIAL DRAINAGE

9.10 There are no UU surface water sewers crossing the site to our knowledge. So, the site is at low risk from flooding from artificial drainage.

INFRASTRUCTURE FAILURE

9.11 The central CIRIA Report C624 defines 'infrastructure failure' as the structural, hydraulic, geotechnical, mechanical or operational failure of infrastructure which normally retains, transmits or controls the flow of water. This risk of flooding is usually associated with three main categories of infrastructure:

- failure of infrastructure designed to store or carry water (e.g. dam break, canal leak, water mains burst);
- failure of infrastructure designed to protect an area from flooding (e.g. flood defence breach, flap valve failure, penstock failure, pumping station failure);
- blockage of a pipe, bridge or culvert.

9.12 There are no additional dams, canals located upstream / upslope of the site.

9.13 Failure of any water mains could result in leakage and consequently over-land flows within the site. There is therefore a risk of over-land flows being generated because of an infrastructure failure in any water mains, however, such failures occur very infrequently and there is little that can be done to anticipate them.

9.14 Water main failures are usually notified to the asset owner within a short period of time of the failure occurring and remedial Work is usually implemented soon thereafter to prevent subsequent property damage and inconvenience. Any failure of a water main is therefore likely to continue for a relatively short period of time.

9.15 Based on the above information, the risk of flooding as a result of infrastructure failure is considered to be low and on this basis any further assessment of flooding from infrastructure failure is not considered necessary.

9.16

GROUNDWATER FLOODING

9.17 There is only a minimal risk of groundwater flooding in the full planning area due to the development sites gradients

9.18 The ground levels will be raised by a minimum of 150mm to take into account groundwater flooding and minimise the risk of groundwater flooding.

10.0 RESIDUAL RISKS & IMPACTS

RESIDUAL RISKS

10.1 Table 10.1 outlines the initial qualitative assessment of risk posed by each potential source of flooding, the mechanisms for flooding and the likely consequences. The table also includes a review of possible mitigation measures and what effect, if any, the mitigation measures are likely to have on the residual risk posed by each potential flood source.

10.2 Categories of risk have been qualitatively defined as:

- 'High' Risk: Flooding is likely to result in significant damage to property and pose a significant risk to life;
- 'Medium' Risk: Flooding is likely to result in possible minor damage to property but flood progress would allow adequate time for residents to be warned and safely evacuated to higher ground or appropriate places of safety;
- 'Low' Risk: Flooding is unlikely to result in any damage to property damage and pose little or no risk to life.

Table 10.1 Qualitative Assessment of Residual Flood Risks

Source	Flood Mechanism & Consequences	Initial Assessment of Risk	Recommended Mitigation Measures	Residual Risk
Fluvial flooding	The site is within Flood Zone 1. An area at low risk of flooding	**Low**	• No fluvial mitigation required.	**Low**
Surface Water Flooding	The EA surface water flood map indicates that the site is mostly at low risk of surface water flooding.	**Low**	• The installation of an effective drainage strategy will help mitigate to risk of surface water flooding on the site.	**Low**
Surcharging of artificial drainage systems	Drainage systems operating above design capacity, resulting in: • surcharging of manholes / drainage systems; • over-land flow through development; • ponding in low-lying areas of site; • no over-land flow route for flood waters accumulating in low-lying areas.	**Low**	• Appropriate design of SW drainage system to provide sufficient attenuation. • There are no records of sewer flooding on the site.	**Low**
Infrastructure failure	Water main burst or pumping station failure, resulting in: • Possible over-land flows through / adjacent to the site and possible inundation of property; • Possible pooling in low-lying areas.	**Low**	. • None required	**Low**

Groundwater	There is no known record of groundwater	**Low**	• The levels in on the site will be raised to minimise the risk of flooding. •	**Low**

10.3 The mitigation measures proposed in this report will generally reduce the risk of flooding from each potential source.

IMPACT OF DISPLACED WATER

10.4 The proposed site is not within an area of fluvial flooding. This suggests there will be minimal risk of displacing water.

IMPACT ON COASTAL OR FLUVIAL MORPHOLOGY

10.5 The proposed development will not directly impact on coastal morphology.

11.0 CLIMATE CHANGE

11.1 Below are the recommended rainfall intensity increases from the Flood Risk Assessment climate change allowances

Table 11.1 Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

11.2 For practical reasons, it is difficult to define the lifetime of a development as each development has different characteristics. However, residential development is considered to have a minimum lifetime horizon of 100 years, unless there is specific justification for considering a shorter period (e.g. development controlled by a time-limited Planning Condition). This development lifetime is approximately 100-year design life.

11.3 Therefore, over the next 100 years, the recommendations contained in table 2 Flood Risk assessments: climate change allowance document in terms of increased rainfall, would equate to an increase of between 20% and 40% in peak rainfall intensity.

11.4 A rainfall intensity of 40% has been used for designing this development. The preliminary design of the proposed SW drainage system has taken account of this increase in peak rainfall intensity over the lifetime of the proposed development and has demonstrated that surface water run-off can be managed in a sustainable manner on the site, including the effects of climate change. It is therefore considered that the proposed development has taken account of climate change effects.

12.0 CONCLUSIONS & RECOMMENDATIONS

12.1 Baxter Homes are proposing a new residential development at the land of Copp Lane, Great Eccleston. Total area of the site is approximately 5.10ha

12.2 The Local Planning Authority has requested that the risk of flooding be formally assessed through a Flood Risk Assessment.

12.3 The development site is greenfield site and currently consists of scrubland

12.4 The site lies within Flood Zone 1.

12.5 The site is overall at a low risk from surface water flooding.

12.6 The installation of an effective drainage strategy will mitigate the risk of surface water and groundwater flooding concerns on the site.

12.7 The discharge will be set at 31 l/s to be agreed with the LLFA. – Please note the discharge rate is based upon 6.4ha (High Street site drains into the Copp lane site 1.3ha + 5.1ha = 6.4ha.)

12.8 Based on the information provided to ELLUC Projects Ltd to accompany this Flood Risk Assessment, redevelopment of the site would be considered sustainable in terms of Flood Risk

APPENDIX A:

Introduction

1. This document provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the National Planning Policy Framework on development in areas at risk of flooding and in relation to mineral extraction. This guidance retains key elements of Planning Policy Statement 25 and of the existing minerals policy statements and minerals planning guidance notes which are considered necessary and helpful in relation to these policy areas. The retention of this guidance is an interim measure pending a wider review of guidance to support planning policy.

Flood risk

2. As set out in the National Planning Policy Framework, 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. For these purposes:

   - "areas at risk of flooding" means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency;

   - "flood risk" means risk from all sources of flooding - 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.

The Sequential and Exception Tests

3. As set out in the National Planning Policy Framework, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The flood zones (see table 1) are the starting point for this sequential approach. Zones 2 and 3 are shown on the flood map[1] with Flood Zone 1 being all the land falling outside Zones 2 and 3. These flood zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences.

4. Strategic Flood Risk Assessments (see paragraphs 7-8) refine information on the probability of flooding, taking other sources of flooding and the impacts of climate change (see paragraphs 11-15) into account. They provide the basis for applying the Sequential Test, on the basis of the flood zones in table 1. Where table 1

[1] To access the flood map, see the Environment Agency's website at: http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx

indicates the need to apply the Exception Test (as set out in the National Planning Policy Framework), the scope of a Strategic Flood Risk Assessment will be widened to consider the impact of the flood risk management infrastructure on the frequency, impact, speed of onset, depth and velocity of flooding within the flood zones considering a range of flood risk management maintenance scenarios. Where a Strategic Flood Risk Assessment is not available, the Sequential Test will be based on the Environment Agency flood zones.

5. The overall aim should be to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, local planning authorities allocating land in local plans or determining planning applications for development at any particular location should take into account the flood risk vulnerability of land uses (see table 2) and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required (see table 3). Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Table 1: Flood zones

(Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 1 - low probability

Definition
This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Appropriate uses
All uses of land are appropriate in this zone.

Flood risk assessment requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention.

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems[2].

[2] Sustainable drainage systems cover the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible.

Zone 2 - medium probability

Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses
Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Zone 3a - high probability

Definition
This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Appropriate uses
The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone.

The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;

- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b - the functional floodplain

Definition
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. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in table 2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land with a lower probability of flooding.

Table 2: Flood risk vulnerability classification

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use[3]. • Installations requiring hazardous substances consent[4]. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure")[5].
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste[6]. • Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7]
Less vulnerable • Police, ambulance and fire stations which are *not* required to be operational during flooding. • Buildings used for shops, financial, professional and other services,

[3] For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.
[4] See Circular 04/00: *Planning controls for hazardous substances* (paragraph 18) at: www.communities.gov.uk/publications/planningandbuilding/circularplanningcontrols
[5] In considering any development proposal for such an installation, local planning authorities should have regard to planning policy on pollution in the National Planning Policy Framework.
[6] For definition, see *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* at www.communities.gov.uk/publications/planningandbuilding/planningsustainable
[7] See footnote 3.

restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do *not* need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan.*

Notes to table 2:

a. This classification is based partly on Department for Environment, Food and Rural Affairs and Environment Agency research on *Flood Risks to People* (*FD2321/TR2*)[8] and also on the need of some uses to keep functioning during flooding.

b. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

c. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

[8] See website for further details.
www.defra.gov.uk/science/Project_Data/DocumentLibrary/FD2320_3364_TRP.pdf

APPENDIX B:

Title : C:\USERS\GJBRO\ONEDRIVE\DESKTOP\LSS FILES\COPPS LANE\COPPS LANE
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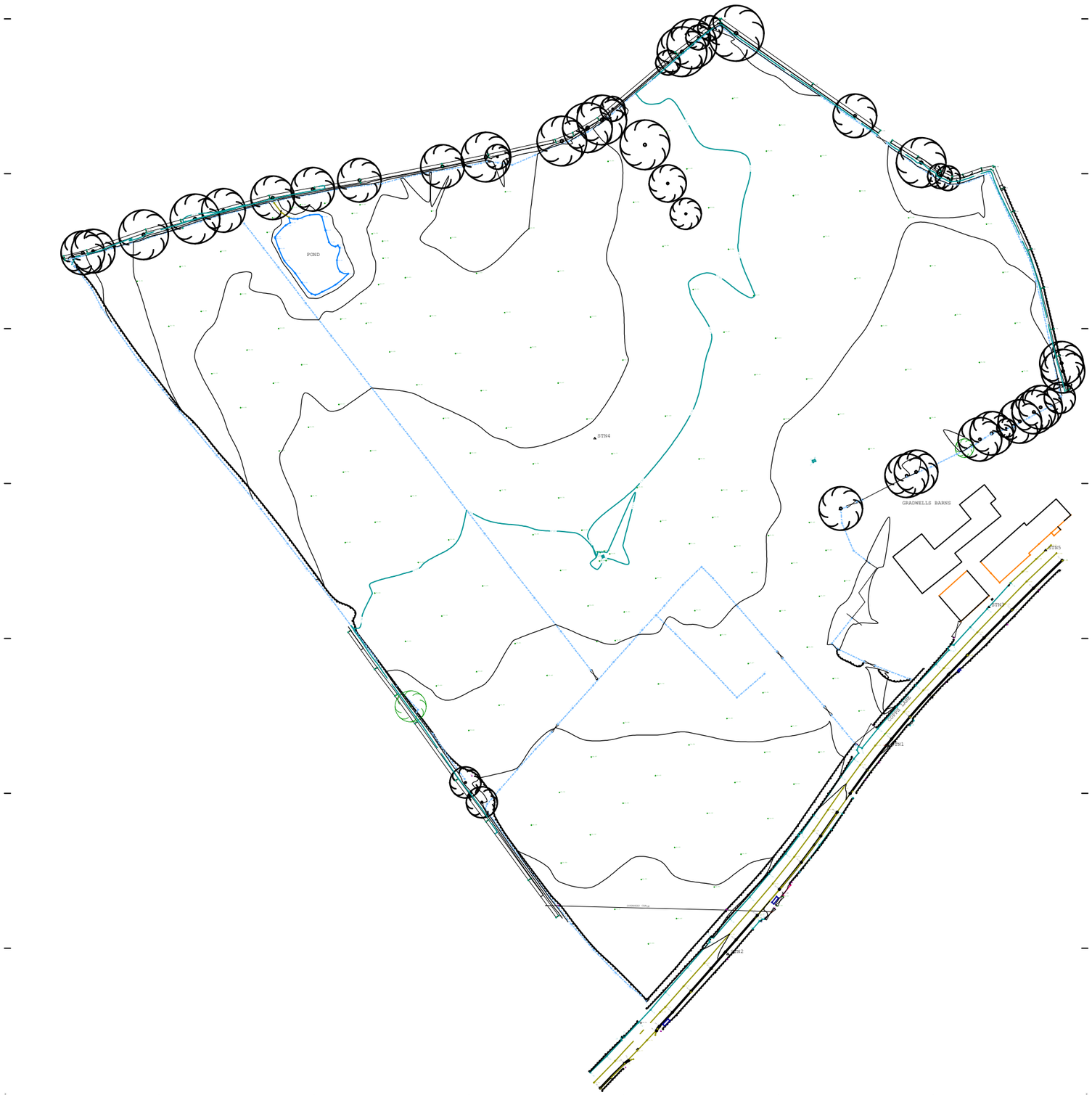
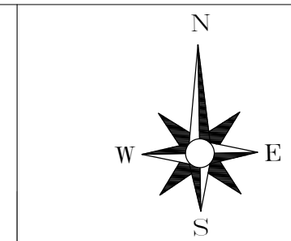
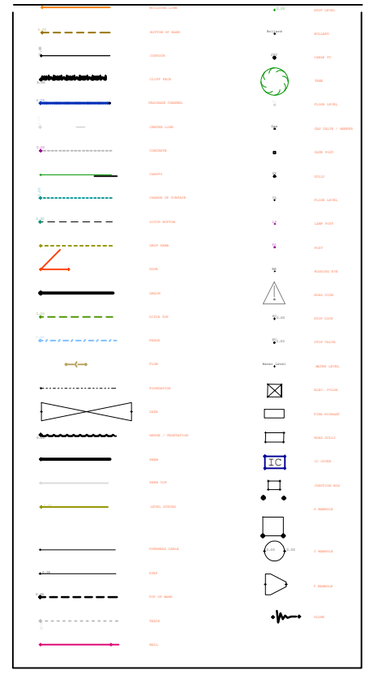
Comment : created using LSS v10.01.01
Comment : created on 2020.02.28 22:41
Comment : units of survey are metres

Station	Easting	Northing	Level
STN1	342435.568	439865.142	16.005
STN2	342383.687	439798.085	16.651
STN3	342467.951	439910.085	15.763
STN4	342340.710	439964.578	14.659
STN5	342486.261	439928.451	15.843







NOTES

THIS SURVEY HAS BEEN ORIENTATED TO THE ORDNANCE SURVEY (O.S) NATIONAL GRID (OSGB36) VIR A GLOBAL POSITION SYSTEM (GPS) AND THE O.S ACTIVE NETWORK (SMARTNET)

A TRUE OSGB3[illegible]ORDINATE HAS BEEN ESTABLISHED AROUND STN 1 AND STN 2 THE SURVEY HAS BEEN CORRELATED TO THESE 2 POINTS TO CREATE A TRUE O.S. BEARING FOR ANGLE ORIENTATION

ONLY DRAINAGE VISIBLE AT TIME OF SURVEY HAS BEEN ADDED

ALL DIMENSIONS SHOULD BE CHECKED ON SITE

SURVEY UNITS ARE IN METERS

SURVEY GRID = 50 METERS

Rev	Description	Date

PROPOSED DEVELOPMENT AT
COPPS LANE GREAT ECCLESTON

BAXTER HOMES

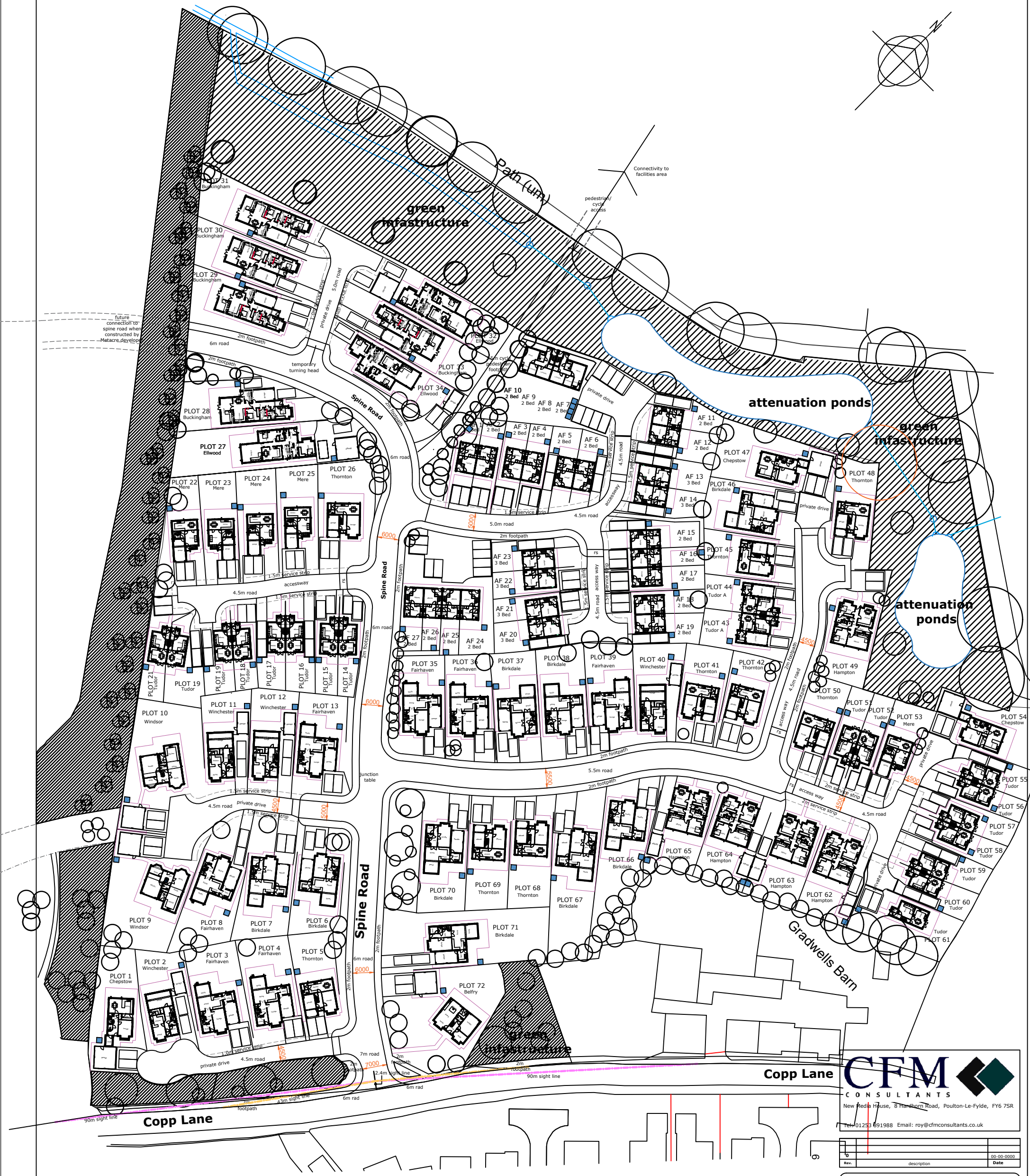
TOPOGRAPHICAL SURVEY

280220/TOP	Drawn	G J Brookes
	Date	FEB 2020
	Scale	1:500@A1

G J Brookes Limited
LAND SURVEYORS & SITE ENGINEERS
14 Joyce Avenue
Blackpool
Lancashire
FY4 4HL
TEL: 01253 766135
MOBILE: 07973 266034
E-MAIL: gjbrookesltd@hotmail.com

0m 10m 20m
SCALE BAR

APPENDIX C:



CFM CONSULTANTS
New Media House, 8 Hardhorn Road, Poulton-Le-Fylde, FY6 7SR
Tel: 01253 891988 Email: roy@cfmconsultants.co.uk

Rev.	description	Date
0		00-00-0000

BAXTER HOMES LTD

Proposed Housing Development
Copp Lane
Great Ecclestone

drawing: Proposed Site Plan			
job no. 4667		drawn. RJB	
scale 1:500		checked. RJB	
date 27-04-2021		issue Planning	
Drawing Size	A1	Drawing No BH/04667/005	Rev -

APPENDIX D

KEY

- Proposed Surface Water Sewer
- Proposed Foul Water Sewer
- Proposed Rising Main

INCOMING SURFACE WATER FROM HIGH STREET DEVELOPMENT

FOUL WATER OUTFALL INTO HIGH STREET DEVELOPMENT

HYDROBRAKE MANHOLE DISCHARGE RATE AT 6 L/S

HYDROBRAKE MANHOLE DISCHARGE RATE AT 31 L/S

OUTFALL INTO EXISTING DITCH

NEW DITCH

PROPOSED FOUL WATER PUMPING STATION

15m PUMPING STATION EXCLUSION ZONE

POND 1

POND 2

POND 3

RISING MAIN

Path (um)

Spire Road

Copp Lane

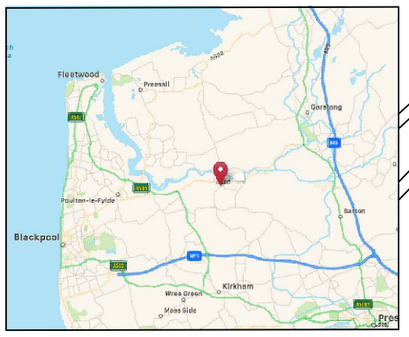
Gradwells Barn

GRADWELLS BARNS

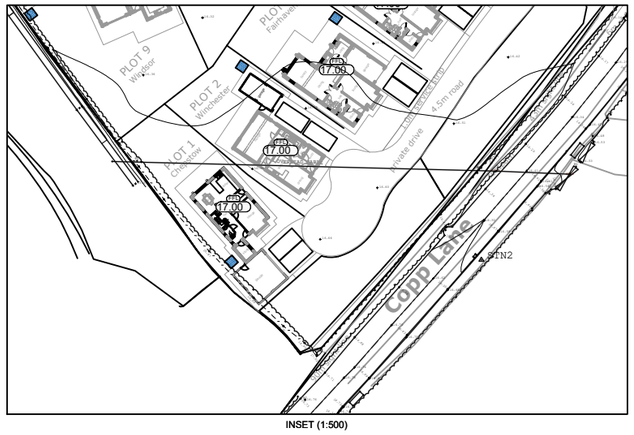
green infastructure

SCALE 1:500

LOCATION PLAN
NTS



INSET (1:500)



FOR CONTINUATION, SEE INSET ON LEFT

THIS DRAWING IS FOR PLANNING AND SHOULD NOT BE USED FOR DESIGN.

NOTES:

1. ALL ADOPTABLE DRAINAGE WORKS HAVE BEEN DESIGNED AND ARE TO BE CONSTRUCTED IN ACCORDANCE WITH "SEWERS FOR ADOPTION 6TH EDITION" AND UU SUPPLEMENT GUIDELINES AND STANDARD DETAILS

2. ALL CLAY PIPE WORK SHALL BE EXTRA STRENGTH CLAYWARE TO B.S EN 295:1991 PART 1

3. ALL PRECAST CONCRETE PIPEWORK SHALL BE TO THE CLASS STATED ON THE DRAWINGS IN ACCORDANCE WITH B.S EN 1916:2002. ALSO, ALL MANHOLES AND CHAMBERS SHALL BE TO B.S EN 1917:2002

4. THE CONTRACTOR MAY ELECT TO USE REINFORCED PVC PIPES AS COVERED BY B.S 4660:2000 & B.S EN 1401-1. STRUCTURED WALL UPVC PIPES TO COMPLY WITH WIS 4-35-01 UPTO AND INCLUDING 300MM. (BY PRIOR AGREEMENT WITH ADOPTING AUTHORITY) MAX. PIPE LENGTH TO BE 3.0M

5. ALL LEVELS RELATE TO EARTHWORK FORMATION LEVELS.

6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS

7. PLOT DRAINAGE CONNECTIONS TO SEWERS MUST BE 150MM DIAMETER AND UNLESS OTHERWISE STATED LAID TO THE INVERT SHOWN.

8. LEVELS GIVEN ON DRAGOUT CHAMBERS ARE INCOMING PIPE LEVELS

9. PLOT DRAINAGE RUNS TO BE KEPT WITHIN THE CURTILAGE OF THE PLOT THEY SERVE WHEREVER POSSIBLE.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ANY EXISTING INVERT LEVELS AND EXISTING SITE LEVELS (EXISTING BOUNDARY LEVELS) INDICATED ON DRAWINGS ARE CORRECT BEFORE WORKS COMMENCE.

11. ALL CONNECTIONS TO ADOPTABLE SEWERS SHALL BE MANUFACTURED JUNCTION PIPES. SADDLE CONNECTIONS WILL NOT BE PERMITTED, UNLESS SPECIFIED.

12. ALL SEWERS FOR ADOPTION WITH GREATER THAN 1.20M COVER IN ROADS OR 0.9M COVER IN FIELDS SHALL HAVE CLASS S GRANULAR BED AND SURROUND.

13. ANY SEWER FOR ADOPTION WITH LESS THAN 1.2M COVER IN ROADS OR 0.9M COVER IN FIELDS SHALL HAVE A MINIMUM OF 150MM ST4 CONCRETE SURROUND. FLEXIBILITY SHALL BE MAINTAINED BY THE PROVISION OF FLEXCELL OR SIMILAR APPROVED JOINT FILLER BREAKS IN THE CONCRETE SURROUND AT EACH PIPE JOINT

14. IT IS THE RESPONSIBILITY FOR THE CONTRACTOR TO CHECK ALL ONSITE EXISTING GROUND LEVELS PRIOR TO COMMENCING AND IF THERE ARE ANY DISCREPANCIES THE CONTRACTOR MUST REPORT TO THE ENGINEER IMMEDIATELY

15. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE DRAINAGE AUTHORITY OF THE COMMENCEMENT OF ANY DRAINAGE WORKS AND TO COMPLETE ANY REQUIRED SEWER CONNECTION FORMS INCLUSIVE OF PAYING ANY REQUIRED FEES. THE CONTRACTOR MUST ALLOW FOR THE SUPERVISION OF THE SEWER CONSTRUCTION WORKS BY THE LOCAL AUTHORITY AND NOTIFY THE SUPERVISING OFFICER, GIVING NOTICE WHICH IN ACCORDANCE WORTH THE L.A REQUIREMENTS.

16. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY FOR ANY REQUIRED ROAD OPENING PERMITS WITH THE LOCAL AUTHORITY INCLUDING THE PAYMENT OF ANY FEES

17. BEFORE COMMENCING ANY WORKS ON SITE, THE CONTRACTOR MUST CONTACT THE RELEVANT STATUTORY UNDERTAKER AND BE IN POSSESSION OF THE LATEST AVAILABLE DRAWINGS FROM THE STATUTORY UNDERTAKERS WHICH SHOWS DETAILS OF THEIR SERVICES/APPARATUS.
THE CONTRACTOR MUST CONFIRM EXACT LOCATION AND DEPTH OF ANY SERVICES/APPARATUS BY THE USE OF ELECTRO-LOCATION OR SIMILAR DEVICES AND BY HAND DUG TRIAL HOLES.
MECHANICAL EXCAVATOR, POWER TOOLS ETC. MUST NOT BE USED TO LOCATE EXISTING SERVICES/APPARATUS.

Rev:	Description:	Date:	By:	Chkd:
B	REVISED TO SUIT NEW LAYOUT AND DRAINAGE STRATEGY	14.06.21	LGM	LM
A	LAYOUT & DRAINAGE STRATEGY REVISED	21.10.20	CDW	ARA

Status: CONCEPT

Client: BAXTER HOMES

Project: COPP LANE
GREAT ECCLESTON

Drg Title: CONCEPT DRAINAGE LAYOUT

ELLUC Projects

ELLUC PROJECTS
UNIT 7
REGENTS COURT
FARMOOR LANE, REDDITCH
WEST MIDLANDS
B98 0SD

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info@ellucprojects.co.uk
www.ellucprojects.co.uk

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A1	SEP 2020	EK	ARA

Drg No: ELL-20058-B-BH-900

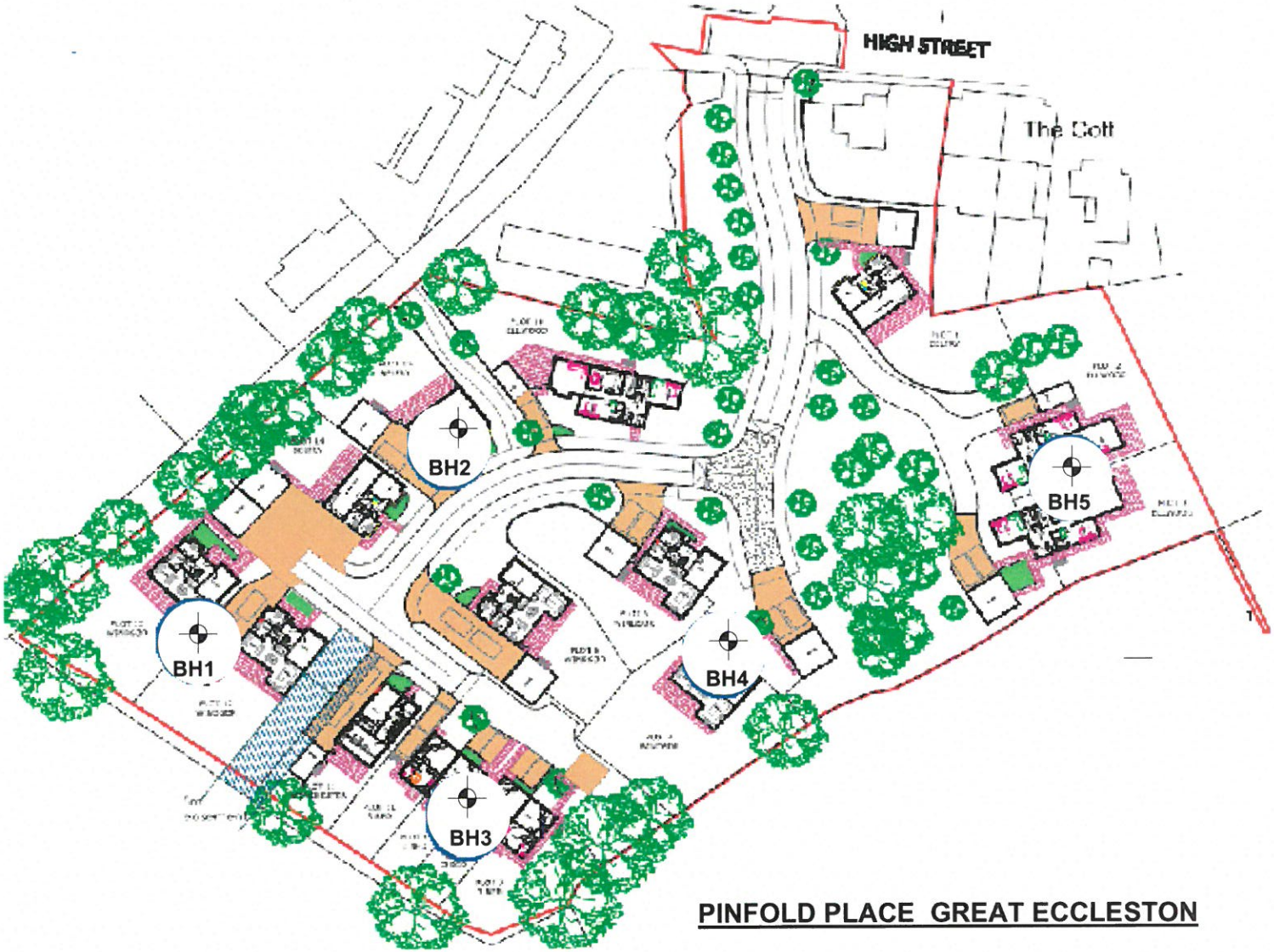
Rev: B

APPENDIX E

MINI· SOIL· SURVEYS

MINI SOIL SURVEYS (NORTHERN) LTD.
12 Beech Walk, Leigh, Lancs. WN7 3LH

Tel: (01942) 269769
mssnorth@btinternet.com



PINFOLD PLACE GREAT ECCLESTON

MINI ▪ SOIL ▪ SURVEYS

MINI SOIL SURVEYS NORTHERN LTD.
12 Beech Walk Leigh Lancs. WN7 3LH

01942 269769
mssnorth@btinternet.com

Site:- PINFOLD PLACE GT. ECCLESTON

Job No. NTH 2868 Date:- 10/5/21 **BH No.1**

Description	Depth	Leg	Test/ Depth	Value
Turf over dark brown sandy clay and topsoil with some mixed gravel.				
Firm brown occasionally mottled grey sandy CLAY with some mixed gravel.	0.40			
			0.6	DS
			1.1	SV Cu = 55kN/m2
			1.2	SPT N = 12
			1.7	SV Cu = 60kN/m2
Very stiff brown sandy CLAY with some mixed gravel and thinly bedded	1.80			
medium spaced bands of fine to medium sand.			1.9	DS
			2.3	SV Cu = 140+kN/m2
			2.4	SPT N = 42
	3.50			
SPT @ 1.2m 2/3/3,3,2,4 @ 2.4m 9/9/11,10,11,10				

Water encoutered at 0.3m. (Perched surface water) Borehole dry beyond 0.4m

Key: SPT (standard penetration test). SV (shear vane). DS (disturbed sample). U38 (38mm undisturbed sample).

MINI ▪ SOIL ▪ SURVEYS

MINI SOIL SURVEYS NORTHERN LTD.
12 Beech Walk Leigh Lancs. WN7 3LH

01942 269769
mssnorth@btinternet.com

Site:- PINFOLD PLACE GT. ECCLESTON

Job No. NTH 2868 Date:- 10/5/21 **BH No.2**

Description	Depth	Leg	Test/ Depth	Value
Vegetation over dark brown/brown sandy clayey topsoil with some mixed gravel and some fine roots.				
Firm light brown/grey mottled sandy CLAY with mixed gravel and some rounded cobbles.	0.45		0.6 DS	
			1.1 SV	Cu = 62*kN/m2
			1.2 SPT	N = 6
			1.7 SV	Cu = 68kN/m2
Very stiff brown sandy CLAY with mixed gravel.	1.80		1.9 DS	
			2.3 SV	Cu = 140+kN/m2
			2.4 SPT	N = 42
* SV at1.1m suspect affected by gravel/cobble	3.50			

SPT @ 1.2m 2/1/2,1,1,2 @ 2.4m 9/10/10,10,11,11
Borehole dry.

Key: SPT (standard penetration test). SV (shear vane). DS (disturbed sample). U38 (38mm undisturbed sample).

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Site:- PINFOLD PLACE GT. ECCLESTON

Job No. NTH 2868 Date:- 10/5/21 **BH No.3**

Description	Depth	Leg	Test/ Depth	Value
Dark brown turning brown/grey sandy clay and topsoil with some mixed gravel.				
Firm occasionally firm/stiff brown/grey mottled sandy CLAY with some mixed gravel.	0.50		0.6 DS 1.1 SV 1.2 SPT	Cu = 52kN/m2 N = 9 1.7 SV Cu = 61kN/m2
Very stiff brown sandy CLAY with some mixed gravel.	1.90		2.0 DS 2.3 SV 2.4 SPT	Cu = 140+kN/m2 N = 41
	3.50			

SPT @ 1.2m 2/2/2,2,2,3 @ 2.4m 8/10/9,11,10,11
Borehole dry.

Key: SPT (standard penetration test). SV (shear vane). DS (disturbed sample). U38 (38mm undisturbed sample).

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Site:- PINFOLD PLACE GT. ECCLESTON

Job No. NTH 2868 Date:- 10/5/21 **BH No.4**

Description	Depth	Leg	Test/ Depth	Value
Vegetation over dark brown/brown sandy clayey topsoil with some mixed gravel, cobbles and brick fragments. MADE GROUND.				
Firm becoming stiff light brown/grey sandy very gravelly CLAY with frequent bands of wet fine to medium sand and rounded gravel below 1.6m.	0.40		1.0 DS 1.1 SV 1.2 SPT 1.8 SPT	Cu = 98*kN/m2 N = 9 N = 17
Very stiff brown sandy CLAY with mixed gravel.	2.40		2.4 SPT 2.9 SV	N = 29 Cu = 140+kN/m2
* SV at 1.1m suspect affected by gravel.	3.50			

SPT @ 1.2m 2/3/2,2,2,3 @ 1.8m 3/4/3,4,4,6 @ 2.4m 4/3/6,6,8,9
Water encountered at 1.6m. Standing on completion at 1.4m.

Key: SPT (standard penetration test). SV (shear vane). DS (disturbed sample). U38 (38mm undisturbed sample).

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Site:- PINFOLD PLACE GT. ECCLESTON

Job No. NTH 2868 Date:- 10/5/21 **BH No.5**

Description	Depth	Leg	Test/ Depth	Value
Turf over dark brown sandy clay and topsoil with mixed gravel and roots. MADE GROUND.				
Firm brown/grey sandy clay with some mixed gravel and brick fragments. MADE GROUND.	0.35			
Firm becoming firm/stiff brown occasionally mottled grey sandy CLAY with some mixed gravel.	0.90		0.9 DS 1.1 SV 1.2 SPT	Cu = 69kN/m2 N = 12
Medium dense brown fine to medium SAND.	1.70		1.8 SPT	N = 20
Very stiff brown sandy CLAY with some mixed gravel.	2.10		2.2 DS 2.3 SV 2.4 SPT	Cu = 140+kN/m2 N = 42
	3.50			

SPT @ 1.2m 3/3/2,3,3,4 @ 1.8m 5/5/4,5,5,6 @ 2.4m 10/10/11,10,11,10
Water encountered and standing on completion at 0.6m. (Suspect perched surface water)

Key: SPT (standard penetration test). SV (shear vane). DS (disturbed sample). U38 (38mm undisturbed sample).

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TEST REPORT

CONSTRUCTION TESTING

Determination of Liquid and Plastic Limits

Client: Mini Soil Survey (Northern) Ltd
Client Address: 12 Beech Walk, Leigh, Lancs, WN7 3LH

Site: Pinfold Place GT. Eccleston
Supplier/Source*: Client/Site Won
Test Method: 1 Point

Report No: TD21-M-07-G-01
Date Reported: 19/05/2021
Sampled By: Client
Date Sampled*: 12/05/2021
Date Received: 12/05/2021
Date Tested: 17/05/2021

Site Reference*	Lab Reference	Sample Location*	Sample Description	Sample Type	Sample Prep.	% Ret. 425µm sieve	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %
BH1 1.8 - 2.8m	Lab 21/1154	BH1 1.8 - 2.8m	Orange Sandy Clay	B	N	8.2	15	23	12	11

Sample Type: **D** = Disturbed, **B** = Bulk, **U** = Undisturbed *Sample Prep:* **N** = tested in natural condition, **A** = air dried before test, **W** = subject to wet sieving before test *Result:* **NP** = Non-plastic

Testing was carried out in accordance with BS 1377-2:1990 Methods 3.0, 4.4 & 5.3

Where sampling was not carried out by TD Construction Testing Ltd, the results relate to the sample as received.

Results relate only to the sample tested.

* Information supplied by client.

Comments/Deviations:

Signed:	[ ] T.Robinson (Technical Manager/Director)
	[ ] D. Ames (Laboratory Manager/Director)
	[X] J. Hopkinson (Laboratory Section Manager)

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TEST REPORT

CONSTRUCTION TESTING

Determination of Liquid and Plastic Limits

Client: Mini Soil Survey (Northern) Ltd
Client Address: 12 Beech Walk, Leigh, Lancs, WN7 3LH

Site: Pinfold Place GT. Eccleston
Supplier/Source*: Client/Site Won
Test Method: 1 Point

Report No: TD21-M-07-G-02
Date Reported: 19/05/2021
Sampled By: Client
Date Sampled*: 12/05/2021
Date Received: 12/05/2021
Date Tested: 17/05/2021

Site Reference*	Lab Reference	Sample Location*	Sample Description	Sample Type	Sample Prep.	% Ret. 425µm sieve	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %
BH4 1.0 - 2.0m	Lab 21/1155	BH4 1.0 - 2.0m	Light Brown Sandy Clay with Occasional Gravel	B	N	11.0	17	30	14	16

Sample Type: **D** = Disturbed, **B** = Bulk, **U** = Undisturbed *Sample Prep:* **N** = tested in natural condition, **A** = air dried before test, **W** = subject to wet sieving before test *Result:* **NP** = Non-plastic

Testing was carried out in accordance with BS 1377-2:1990 Methods 3.0, 4.4 & 5.3

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TEST REPORT

CONSTRUCTION TESTING

Determination of Liquid and Plastic Limits

Client: Mini Soil Survey (Northern) Ltd
Client Address: 12 Beech Walk, Leigh, Lancs, WN7 3LH

Site: Pinfold Place GT. Eccleston
Supplier/Source*: Client/Site Won
Test Method: 1 Point

Report No: TD21-M-07-G-03
Date Reported: 19/05/2021
Sampled By: Client
Date Sampled*: 12/05/2021
Date Received: 12/05/2021
Date Tested: 17/05/2021

Site Reference*	Lab Reference	Sample Location*	Sample Description	Sample Type	Sample Prep.	% Ret. 425µm sieve	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %
BH5 0.9 - 1.7m	Lab 21/1156	BH5 0.9 - 1.7m	Brown Sandy Clay with Fine Gravel	B	N	12.1	23	27	15	12

Sample Type: **D** = Disturbed, **B** = Bulk, **U** = Undisturbed *Sample Prep:* **N** = tested in natural condition, **A** = air dried before test, **W** = subject to wet sieving before test *Result:* **NP** = Non-plastic

Testing was carried out in accordance with BS 1377-2:1990 Methods 3.0, 4.4 & 5.3

Where sampling was not carried out by TD Construction Testing Ltd, the results relate to the sample as received.

This report shall not be reproduced except in full without approval of the laboratory.

Results relate only to the sample tested.

* Information supplied by client.

Comments/Deviations:

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