

APPENDIX 7

(Flood Risk Assessment - Motion)



Landscape Enhancement,
Land at Knepp Castle, West Sussex

Flood Risk Assessment

for

Matthews (Sussex) Limited.

Document Control Sheet

Flood Risk Assessment
Landscape Enhancement,
Knepp Castle Estate, West Sussex
Matthews (Sussex) Limited.

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
05/02/2019	Draft	VBH	NJ
18/11/2019	Draft	VBH	NJ

Contents

1.0	Introduction	1
2.0	Legislative and Policy Framework	3
3.0	Site Description.....	5
4.0	Proposed Works and Water Resources Impacts.....	7
5.0	Flood Risk Appraisal.....	8
6.0	Flood Risk Mitigation.....	10
7.0	Summary and Conclusions	12

Appendices

A	Site Location Plan
B	Topographical Survey
C	Restoration Proposals
D	Modifications to the currently consented scheme
E	EA Flood Mapping
F	BGS Boreholes and Site Testing
G	Government Long Term Surface Water Flood Maps
H	QBar Calculations
I	MicroDrainage Storage Calculations

1.0 Introduction

- 1.1 Motion consultants has been commissioned by Matthews (Sussex) Ltd to undertake a Flood Risk Assessment (FRA) to support a planning application at Knepp Castle Estate.
- 1.2 In 2018 Motion undertook an FRA to support a planning application for the dredging of the Mill Pond located within the Knepp Castle Estate, along with land reprofiling and landscape enhancement features. This scheme has gained planning permission, however, a number of changes to the final landform are being proposed. currently consented scheme.
- 1.3 In February 2019 Motion undertook a revised FRA which incorporated the changes made to the consented scheme. The scheme has been revised again and this application does not include the proposals for the dredging of Knepp Mill Pond or the creation of the wetland habitat. This is because these previously approved elements are being implemented as approved under the current consent. The application red site boundary has been revised to exclude these elements and the purpose of this report is to provide an updated FRA which incorporates the revised scheme.
- 1.4 The site is referred to as Knepp Castle. Refer to [Appendix A](#) for the site location plan.
- 1.5 A Topographical Survey of the proposed development area was undertaken in July 2017 by Maltby Surveys Ltd and the associated mapping can be seen in [Appendix B](#).
- 1.6 This FRA has been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) with due regard to other relevant flood risk legislation and policy to establish whether the site is at flood risk.

Scope of Flood Risk Assessment (FRA)

- 1.7 The scope of this Report is as follows:
 - (i) Identification of all the potential sources of flooding at the site from all sources (i.e. fluvial, tidal, pluvial, groundwater and surface water);
 - (ii) To show that flood risk can be managed so that the site will not be subject to unacceptable flood risk whilst taking into account the potential allowance for climate change over the lifetime of the development; and
 - (iii) To demonstrate that there will not be increased risk of flooding on or off site owing to the proposed dredging and re-profiling works.

Sources of Information

- 1.8 The following sources of information were utilised in establishing the baseline conditions and preparing this report:
 - ▶ National Planning Policy Framework (Communities and Local Government, March 2012);
 - ▶ Flood and Water Management Act 2010 (DEFRA, 2010);
 - ▶ West Sussex County Council Strategic Flood Risk Assessment (January, 2010);
 - ▶ West Sussex County Council Preliminary Flood Risk Assessment (May, 2011);
 - ▶ Planning Practice Guidance (November 2016);
 - ▶ Environment Agency (EA) website www.environment-agency.gov.uk , EA Product 4 flood data, EA Pre-Development Enquiry – Flood Risk Assessment;
 - ▶ Interim Code of Practice for Sustainable Drainage Systems (DEFRA National SuDS Working Group, 2004);
 - ▶ British Geology Survey website www.bgs.ac.uk; and

- ▶ Proposed New Layout KW/Knepp/100 L (August 2019)
- ▶ Revised Restoration Proposals RCo201/ Fig 01.

1.9 Motion's assessment of potential flood impacts and their significance in this report is based on available baseline information references as listed above, and takes into account the proposed land use, mitigation measures and design features.

2.0 Legislative and Policy Framework

Flood & Water Management Act

- 2.1 The Flood and Water Management Act 2010 (FWMA) received Royal Assent on 8th April 2010. The Act was introduced to enforce some of the key proposals set out within UK Government flood and water strategies along with UK Government's response to the Sir Michael Pitt's Review of the Summer 2007 floods.
- 2.2 All Lead Local Flood Authorities (LLFA's), including West Sussex County Council (WSCC) have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from surface run-off, groundwater and ordinary watercourses (i.e. non main rivers). The Environment Agency (EA) plays a role in managing the watercourses designated as 'main rivers'.

National Planning Policy Framework

- 2.3 The National Planning Policy Framework (NPPF) aims 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 high risk.
- 2.4 All land in England and Wales is classified into three main Flood Zones which refer to the probability of river or sea flooding (ignoring the existence of defences). The three Flood Zones are:
- ▶ Flood Zone 1 (Low Probability) – less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%);
 - ▶ Flood Zone 2 (Medium Probability) – having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year or having between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year (0.5% - 0.1%);
 - ▶ Flood Zone 3a (High Probability) – having a 1 in 100 or greater annual probability of river flooding ($\geq 1\%$) or having a 1 in 200 or greater annual probability of sea flooding ($\geq 0.5\%$); and
 - ▶ Flood Zone 3b (the Functional Floodplain) – having a 1 in 20 or greater annual probability of river flooding. The zone comprises land where water has to flow or be stored in times of flood.
- 2.5 NPPF states that a FRA must be undertaken for all developments greater than 1 hectare, located within the floodplain (Flood Zone 2 or 3) and/or suffers from drainage problems, to highlight and assess the significance of all forms of flooding to the proposed development and to assess any potential the development may have on increasing flooding in other areas.
- 2.6 The site is greater than 1 hectare, but falls entirely within flood zone 1, and therefore requires an FRA.
- 2.7 The Environment Agency Product 4 mapping can be seen in [Appendix E](#).
- 2.8 In February 2016, the Environment Agency updated its climate change allowance variables to better reflect the flooding from overland flow, river basins, fluvial and pluvial flooding. Making use of these allowances within Flood Risk Assessments helps to minimise vulnerability and provide resilience to flooding and coastal change in the future. The climate change allowances are predictions of anticipated change for:
- ▶ Peak river flow by river basin districts;
 - ▶ Peak Rainfall Intensity (previously 30%, currently 40%);
 - ▶ Sea level rise; and
 - ▶ Offshore wind speed and extreme wave height.

- 2.9 These allowances are based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere. There are different allowances for different epochs of time over the next century.

West Sussex County Council Strategic Flood Risk Assessment

- 2.10 NPPF requires the evidence base for the Local Development Framework (LDF) to include a Strategic Flood Risk Assessment (SFRA). West Sussex County Council was appointed to produce a SFRA in accordance with the NPPF. The final report 'Level 2 Strategic Flood Risk Assessment' was published in January 2010, and provides useful points of reference and baseline information for West Grinstead and the wider West Sussex areas.

West Sussex County Council Preliminary Flood Risk Assessment

- 2.11 The LLFA, West Sussex County Council, has a responsibility under the Flood Risk Regulations 2009 to prepare a Preliminary Flood Risk Assessment, which provides a high-level summary of potentially significant local flood risk based on available and readily derivable information. West Sussex County Council PFRA published in May 2011, compiles information on significant local flood risk which is flood risk originating from sources other than main rivers, the sea and large reservoirs and principally meaning flood risk from surface runoff, ground water and ordinary water watercourses.

Lead Local Flood Authority

- 2.12 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. West Sussex County Council are the LLFA for West Grinstead and the wider West Sussex area.
- 2.13 West Sussex County Council were contacted for a detailed information request regarding historic flood events, such as ground water and surface water flooding. The pre-development enquiry response and information will be attached once received and this report updated.

3.0 Site Description

Site Location and Description

- 3.1 The site is accessed through Pound Lane to the west and Castle Lane to the south with the centre of the site located at grid reference TQ 15800 22052.
- 3.2 The site is bound to the North by the A272 West Chiltington Lane, to the east by the A24 Worthing Road, to the south by the western branch of the River Adur and to the west by Pound Lane.
- 3.3 The site is part of the Knepp Castle Estate, and includes the old castle ruins, Knepp Mill Pond as well as several privately-owned businesses and associated land and nature reserve.

Topography

- 3.4 A Topographical Survey was carried out by Maltby Surveys Ltd. The survey can be seen in [Appendix B](#).
- 3.5 The topography of the site is such that it slopes from the highest points at the A272 and A24 junction, southwards towards Castle Lane.
- 3.6 The topographical survey does not identify any drainage ditches in or around the development site.

Geology

- 3.7 BGS online mapping shows the site to be underlain by Cretaceous Weald Clay.
- 3.8 The western parts of the proposed site is shown to be underlain by the thin sandstones which form a subdivision of the Weald Clay. Quaternary Alluvium is shown overlying the Weald Clay to the north of Knepp Mill Pond along the valley of the watercourse upstream of the pond.
- 3.9 The Knepp Castle Fault runs generally west south west to east north east through the northern part of the site. The fault is downthrown to the south east. A second fault running generally west south west to east north east is located approximately 200m south east of the site. The fault is downthrown to the north west.
- 3.10 The BGS map records thin bands of clay ironstone nodules in the lower part of the Weald Clay sequence which would be at depth in the Weald Clay at Knepp Park. Borehole records from the surrounding area have been obtained from the BGS online index, these can be seen in [Appendix F](#) along with onsite testing records.
- 3.11 The thickness of the Weald Clay ranges from approximately 172m to approximately 275m in the vicinity of the site. The boreholes drilled as part of the A24 junction improvement scheme were drilled to the east and north east of the site and terminated at depths between 10mbgl and 15mbgl.
- 3.12 The Weald Clay uncovered in the vicinity of the site comprises generally firm to stiff grey brown sandy clay interbedded with thin bands of mudstone, siltstone or occasional thin bands of clayey, well fissured black shale.

Hydrogeology

- 3.13 It is likely that the Alluvium has a low permeability restricting infiltration and vertical groundwater movement where present. The clay, mudstones and siltstones of the Weald Clay have a low permeability.
- 3.14 The sand, sandstone and limestone of the Weald Clay may be water bearing. It is likely that the sand, sandstone and limestone of the Weald Clay have a moderate to high permeability.
- 3.15 No groundwater was struck in the boreholes drilled in the vicinity of the site. No groundwater was struck in the trial pits excavated in the vicinity of the site in April 2003 with the exception of a trial pit located to the north east of the site adjacent to the A24 where a slight seepage was recorded at 4.00mbgl.

- 3.16 No groundwater was struck in the trial pits excavated at and in the vicinity of the site in June 2007 with the exception of trial pit TP2 located in the south of the site to the east of Knepp Mill Pond where a slow seepage was recorded at 3.2mbgl.
- 3.17 The Alluvium is designated as a Category A Secondary aquifer by the Environment Agency.
- 3.18 The clay, mudstones and siltstones of the Weald Clay are designated unproductive strata and the sands, sandstones and limestones of the Weald Clay are designated Category A Secondary aquifers.
- 3.19 There are no licensed or deregulated groundwater abstractions within 2km of the site. It is understood that the local authority do not hold records of private groundwater abstractions.
- 3.20 The site is not located in the Source Protection Zone of a public water supply facility.

Hydrology

- 3.21 The site is located in the catchment of the River Adur which is between 4m and 4.5m wide in the vicinity of the site and flows generally north west to south east approximately 200m south of the site at the closest point. A site visit was conducted in March 2017 and at the time of the site visits there was little visible flow in the River Adur.
- 3.22 A tributary of the River Adur approximately 3.8m wide flows generally north to south which was dammed to form Knepp Mill Pond. Drainage ditches convey water from the dam at the southern end of Knepp Mill Pond to the River Adur. The flow from Knepp Mill Pond into the drainage ditches is controlled by two sluice gates located at the western and the eastern ends of the dam.
- 3.23 An old pump house is located at the western end of the dam which conveyed water to Knepp Castle in the early 1900s. It is understood that the pump house is now inactive.
- 3.24 With the exception of Knepp Mill Pond there are no surface water bodies in the application site. A small pond is located adjacent to the southern boundary of the proposed Tor feature. A small pond is located adjacent to the west of the proposed central landscaped bund. A number of other small ponds are located in Knepp Park to the west of Knepp Mill Pond.
- 3.25 There is one licensed surface water abstraction and one licensed surface water impoundment within 2km of the site. The licensed surface water abstraction is from Knepp Mill Pond and is used for spray irrigation by Knepp Castle Polo Club. The licensed surface water impoundment is for Hammond Pond which is a tributary of the River Adur located approximately 880m south west of the site. It is understood that the local authority do not hold records of private surface water abstractions.

Existing Drainage Regime

- 3.26 Currently there is no positive surface water drainage on site, but according to the topography it is assumed that surface water generated follows its natural route into the Knepp Pond.
- 3.27 UKSuDS was used to calculate the Greenfield runoff rate for the site. The site has a calculated QBar of 5.59/s/ha. The UKSuDS QBar outputs can be found in [Appendix H](#).

4.0 Proposed Works and Water Resources Impacts

The Previously Consented Scheme

4.1 The main aspects of the previously consented scheme consisted of land reprofiling and landscape enhancement features at Knepp Castle Estate including;

- ▶ The Dredging of Knepp Mill Pond;
- ▶ Excavation of the Proposed Wetland Habitat;
- ▶ Construction of the Landscaped Visual and Acoustic Screening Bunds and Floodgates Farm Landscape Enhancement Features.

Modified Scheme

4.2 The main modifications to the site can be found in [Appendix D](#) and involve:

- ▶ Revised form to the Buck Barn landscape enhancement feature;
- ▶ Revised form to Floodgate Farm landscape enhancement feature;
- ▶ Change to the permanent vehicular access arrangements on the site;
- ▶ The existing light industrial unit to the south would also be provided with a dedicated access route; and
- ▶ Provision of public car park at the southern end of the Floodgate Farm landscape enhancement feature for use by the public in association with existing and proposed Public Rights of Way.

4.3 The proposed scheme intends to include an alternative landscape feature to the Buck Barn area of the site, comprising a sculpted 'amphitheatre' formed at the western edge of the approved feature. The final agreed landform also involves a number of modest changes to other elements of the previously approved scheme, in particular at Floodgates Farm. This feature is proposed to be amended to increase its footprint and with a higher quality landscape finish in lieu of the existing approved bund.

4.4 In addition, the proposed scheme intends to change the permanent vehicular access arrangements of the site. At present, Hill House Farm and the existing light industrial unit to the south are each accessed direct off junctions on to the A24. Under this proposal, the temporary construction access to the site off the A272, would be made permanent. Access would be extended south from this, around the eastern edge of the landscape enhancement feature to deliver a permanent new dedicated access to Hill House Farm. In conjunction with this, the existing access to the A24 would be permanently closed. Changes are also proposed to the approved Public Right of Way that is to be provided upon completion of the works. This would be amended to follow the revised alignment and design of the landscape enhancement feature, in particular at Buck Barn. This would enable an improved vista from the Public Right of Way towards Knepp Castle Estate. It would also provide connectively to the A24 via the proposed permanent access road.

4.5 In order to facilitate and encourage greater public access to the site, the scheme also proposes the provision of a new public car park for users of the existing and proposed Public Right of Way. This would be located at the southern end of the Floodgates Farm landscape enhancement feature. This car park would be available for users both of the proposed Public Right of Way running north, and the existing Public Right of Way that runs west.

5.0 Flood Risk Appraisal

Introduction

- 5.1 This section provides an appraisal of each form of flooding, potential pathways, flood risk, and a review of any relevant historic flooding evidence obtained. It is necessary to ensure that the proposed development will not increase the flood risk to the area round Knepp Park.

Fluvial Flooding

- 5.2 Fluvial sources include rivers, streams and ditches. Fluvial flooding occurs when the receiving catchment inflow in the river exceeds the flow capacity of the river channel. Rainfall intensity and duration, groundwater levels and overland flow directly contribute to the overwhelming of river channel capacity which forces waters to spill into the adjacent floodplain. This effect has been analysed UK wide by the EA to identify existing development within the floodplain, and inform the design of new development in the floodplain.
- 5.3 The whole of the site is located in Flood Zone 1 which comprises land assessed as having a less than 1 in 1000 year annual probability of river flooding. The EA mapping can be seen in [Appendix E](#).

Coastal, Tidal & Estuarial Flooding

- 5.4 Coastal, tidal and estuarial flooding is caused by high tides and extreme weather conditions impacting land in the vicinity of the sea and estuaries.
- 5.5 The proposed development is not located near to a tidal influenced watercourse. Therefore, the development is not at risk of coastal, tidal and estuarial flooding.

Groundwater Flooding

- 5.6 Groundwater flooding commonly occurs during wet winter months after long periods of rainfall, where groundwater levels are seasonally high and exceed the capacity of the aquifers, rising above the surface topsoil.
- 5.7 Groundwater flooding is likely to occur in low-lying areas underlain by regional aquifers of commonly chalk or sandstone. The area of the proposed development site is underlain by predominantly Head, Alluvium and Weald Clay formations that are not generally susceptible to groundwater flooding.
- 5.8 The EA groundwater online mapping shows the sites superficial deposits to lie within a Secondary A aquifer. The Environment Agency online mapping confirms that Bedrock is designated as a Secondary A aquifer.
- 5.9 The Alluvium is designated a Category A Secondary aquifer by the Environment Agency. The clay, mudstones and siltstones of the Weald Clay are designated unproductive strata and the sands, sandstones and limestones of the Weald Clay are designated Category A Secondary aquifers.
- 5.10 The EA online mapping shows the site is located within an area designated as a minor aquifer with intermediate vulnerability to groundwater.

Flooding from Overland Flow/Pluvial Flooding

- 5.11 Flooding from overland flow occurs when intense rainfall is unable to infiltrate into the ground or enter drainage systems resulting in localised flooding in low spots that provide no means of outfall.
- 5.12 The governments 'Risk of Flooding from Surface Water' map shows the site to be in an area of low and medium risk of surface water flooding on the site. The mapping shows areas of low risk flooding within the centre of the site, with medium risk flooding areas along the northern boundary of the site and along the route of the Knepp Pond estuary. The Government Surface Water Flood Mapping can be seen in [Appendix G](#).

- 5.13 During the construction phase of the Tor feature and landscaped bunds it is likely there will be an increase in the suspended solids concentrations in the surface water draining from the unvegetated surfaces.
- 5.14 Drainage from the central landscaped bund is likely to flow generally to the west towards the Knepp Mill Pond and the drainage system that surrounds Hill House Lawn.

Flooding from Artificial Drainage Systems

- 5.15 In order to control and convey surface water runoff from impermeable surfaces in urban areas, underground surface water sewers or combined sewers (foul and surface water) are often utilised in urban areas. Pipes, culverts etc have a finite capacity and therefore pose a risk of flooding due to the risk of siltation, blockage or collapse.

Flooding from Infrastructure Failure

- 5.16 Infrastructure can be designed to store, carry and protect the flow of water. For example, reservoirs store water, a canal stores/transfers water and a flood defence protect land from flood water. Failure of these water related infrastructure forms can cause flooding.
- 5.17 The Flood Warning Information Service shows that the site is not located within an area at risk of reservoir or canal flooding.

6.0 Flood Risk Mitigation

Introduction

- 6.1 This section details the proposed management and mitigation design measures implemented to avoid, reduce or control the potential flood risk associated with the site.

Mitigation against Flood Risk

- 6.2 The proposed Floodgates Farm and the landscaped bunds are located in Flood Zone 1. Other than the temporary access road and access road no hard surfacing will be used in the construction of the landscaped bunds. The construction of the proposed Floodgates Farm areas and the landscaped bunds will not significantly affect the volume of surface water run off generated at the site.
- 6.3 Prior to restoration surface water drainage from the landscaping has the potential to carry sediment to the east and north east where roads and buildings are located outside the site and to the west where siltation of the tributary of the River Adur to the north of the Knepp Mill Pond is undesirable.
- 6.4 During the construction period temporary perimeter drains will be excavated around the area of the landscape bunds and the Floodgates Farm landscape features. Surface water draining from the north of the bunds will pass through temporary settlement ponds before flowing into the tributary of the River Adur to the north of the Knepp Mill Pond.
- 6.5 Temporary drainage ditches or shallow berms will be necessary to control surface water runoff from the proposed bunds and soil storage area as the development progresses. To reduce the concentration of suspended solids in the surface water runoff prior to drainage to the watercourses it will be necessary for channelled surface water to pass through settlement ponds.

Revised Site Topography

- 6.6 The landscaping enhancement features alter the sites topography by increasing the areas of land raising in some areas and having steeper slopes. This is shown in [Appendix C](#). The steepest proposed slope on site will have a gradient of 1 in 3. Under normal circumstances surface water runoff will infiltrate into the ground or run off the land. A 1 in 3 gradient is not considered a steep slope and the land will be vegetated so this change in ground levels is unlikely to impact on existing surface water runoff rates. Erosion can occur if water is concentrated in a certain areas, however, due to the relatively flat slope, vegetation and catchment area erosion is unlikely to occur. However, during construction of the land enhancement features is recommended that the slope is monitored.

Car Park Drainage Strategy

- 6.7 The proposed development will have an increase in the amount of hardstanding areas on site from the proposed carpark in the south eastern corner. Therefore, there will be an increase in surface water runoff from the development. A drainage strategy has been put in place so that the proposed development does not result in an increase in surface water that could cause potential flood risk to both the development and the neighbouring sites.
- 6.8 The carpark area has been calculated as 0.04 ha. UKSuds has been used to calculate the QBar Greenfield runoff rate for the developable area, showing a result of 5.59/s/ha or 0.22 l/s. A discharge rate of 1l/s is recommended to prevent blockage.
- 6.9 MicroDrainage software was used to determine the volume required to attenuate the runoff from storm events up to the 1 in a 100 year storm (+ 40% increase for climate change). Based on MicroDrainage source control calculations the approximate amount of attenuation storage required is approximately between 16 m³ and 25m³ based on a restriction of 1l/s and for storm events up to 1 in 100year plus 40% climate change. This is shown in [Appendix I](#).
- 6.10 In order to attenuate the additional surface water from the development it is proposed to have an 300mm deep permeable paving with 30% voids which provides a storage volume of 36m³. Surface water will be restricted into the existing Knepp Castle drainage system to 1 l/s. This is illustrated in Figure 6.1.

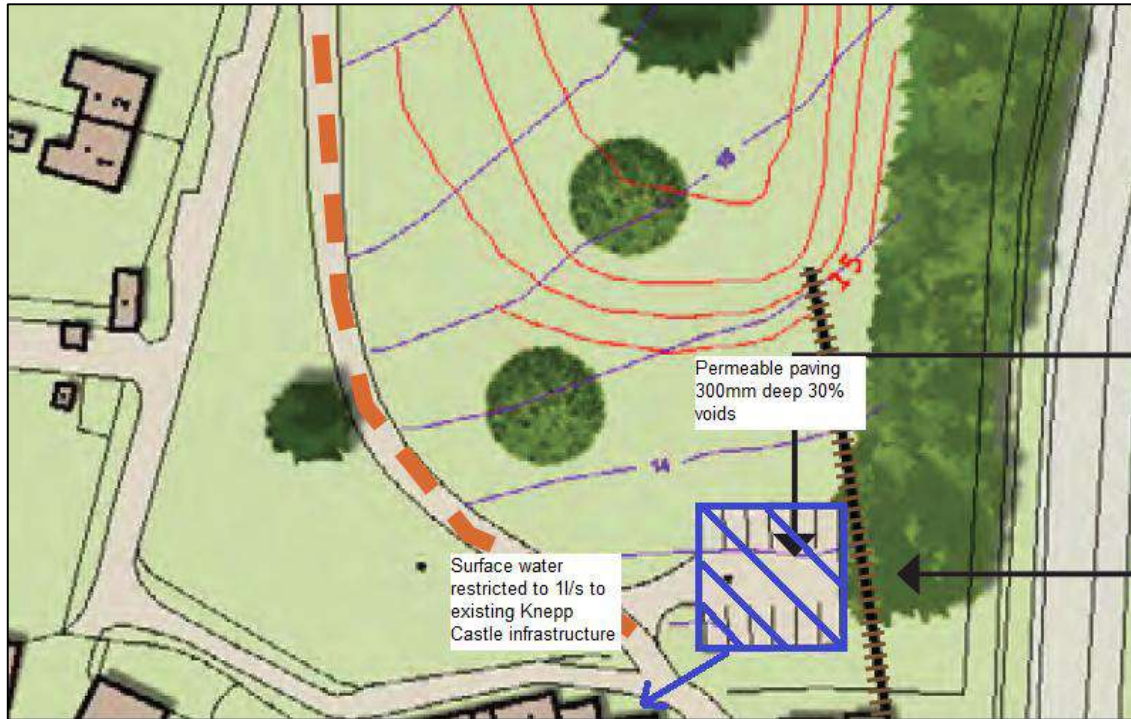


Figure 6.1 Proposed Drainage Strategy

Flood Risk Mitigation Summary

- 6.11 This section has shown that the potential risk of flooding at the proposed development is low, with the development proposals offering suitable mitigation measures to ensure safety of users, construction workers and developments on and off site. This is based on the development proposals incorporating the mitigations measures provided above.

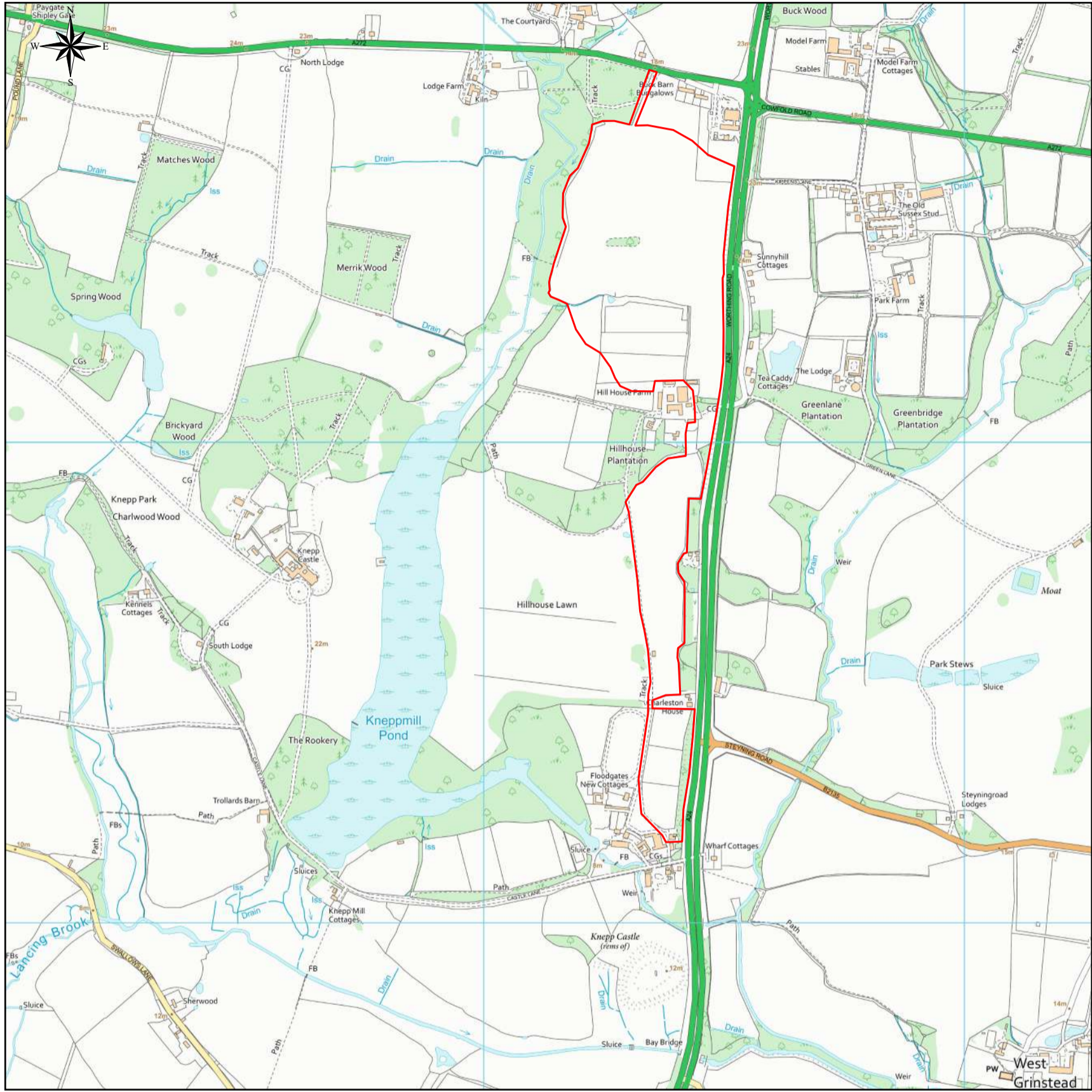
7.0 Summary and Conclusions

- 7.1 This FRA has been produced by Motion on behalf of Matthews (Sussex) Ltd to support a planning application for the reprofiling of the north-eastern section of Knepp Castle Estate.
- 7.2 In 2018 Motion undertook an FRA to support a planning application for the dredging of the Mill Pond located within the Knepp Castle Estate, along with land reprofiling and landscape enhancement features. It is understood that this scheme gained planning permission.
- 7.3 In February 2019 Motion undertook a revised FRA which incorporated the changes made to the consented scheme. The scheme has been revised again and the application now no longer includes the proposals for the dredging of Knepp Mill Pond or the creation of the wetland habitat. This is because they are previously approved elements which are being implemented as approved under the current consent.
- 7.4 The main modifications to the Scheme involve:
- ▶ Revised form to the Buck Barn landscape enhancement feature;
 - ▶ Revised form to Floodgate Farm landscape enhancement feature;
 - ▶ Change the permanent vehicular access arrangements on the site;
 - ▶ The existing light industrial unit to the south would also be provided with a dedicated access route; and
 - ▶ Provision of public car park at the southern end of the Floodgate Farm landscape enhancement feature for use by the public in association with existing and proposed Public Rights of Way.
- 7.5 The proposed development will include the construction of surface water management drainage to mitigate the risks associated with surface water and silt runoff during the development.
- 7.6 Flood mitigation and resilience measures have been designed so as to mitigate the flood risk posed by the dredging and reprofiling works.
- 7.7 The whole of the site is located within Flood Zone 1.
- 7.8 Surface water drainage is included in the development design to mitigate against any risks associated with the flow of surface water to off-site receptors.
- 7.9 All imported materials will be inert and certified, most likely the result of construction and demolition waste.
- 7.10 The landscape enhancement features are not believed to have an impact on surface water runoff or erosion. However, during construction of the land raising it is recommended that the slope is monitored.
- 7.11 In order to attenuate the additional surface water from the development it is proposed to have an 300mm deep permeable paving with 30% voids which provides a storage volume of 36m³. Surface water will be restricted into the existing Knepp Castle infrastructure to 1 l/s.
- 7.12 This FRA has been carried out in accordance with the NPPF and the PPG and it is concluded that the proposed development will not impede significantly flood flows at the site or increase the risk of flooding in the area round Knepp Park.

Appendix A

Site Location Plan

Indicative Site Plan



This Plan includes the following Licensed Data: Plans Ahead PDF Printed Plan OS VectorMap Local Raster by the Ordnance Survey National Geographic Database and incorporating surveyed revision available at the date of production. Reproduction in whole or in part is prohibited without the prior permission of Ordnance Survey. The representation of a road, track or path is no evidence of a right of way. The representation of features, as lines is no evidence of a property boundary. © Crown copyright and database rights, 2019. Ordnance Survey 0100031673

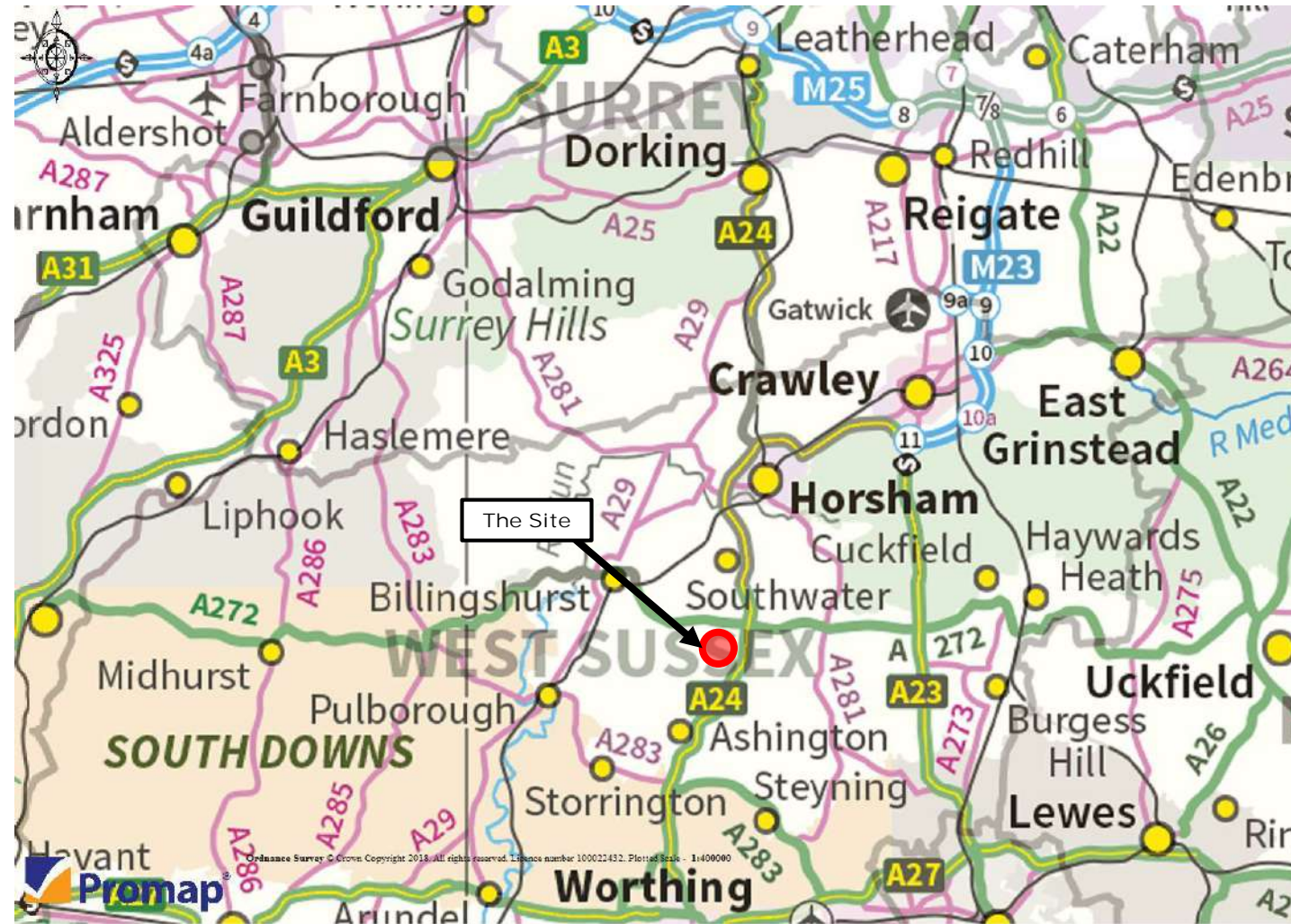
0m 250m 500m 750m 1000m

Scale: 1:10000, paper size: A3

260-04-050

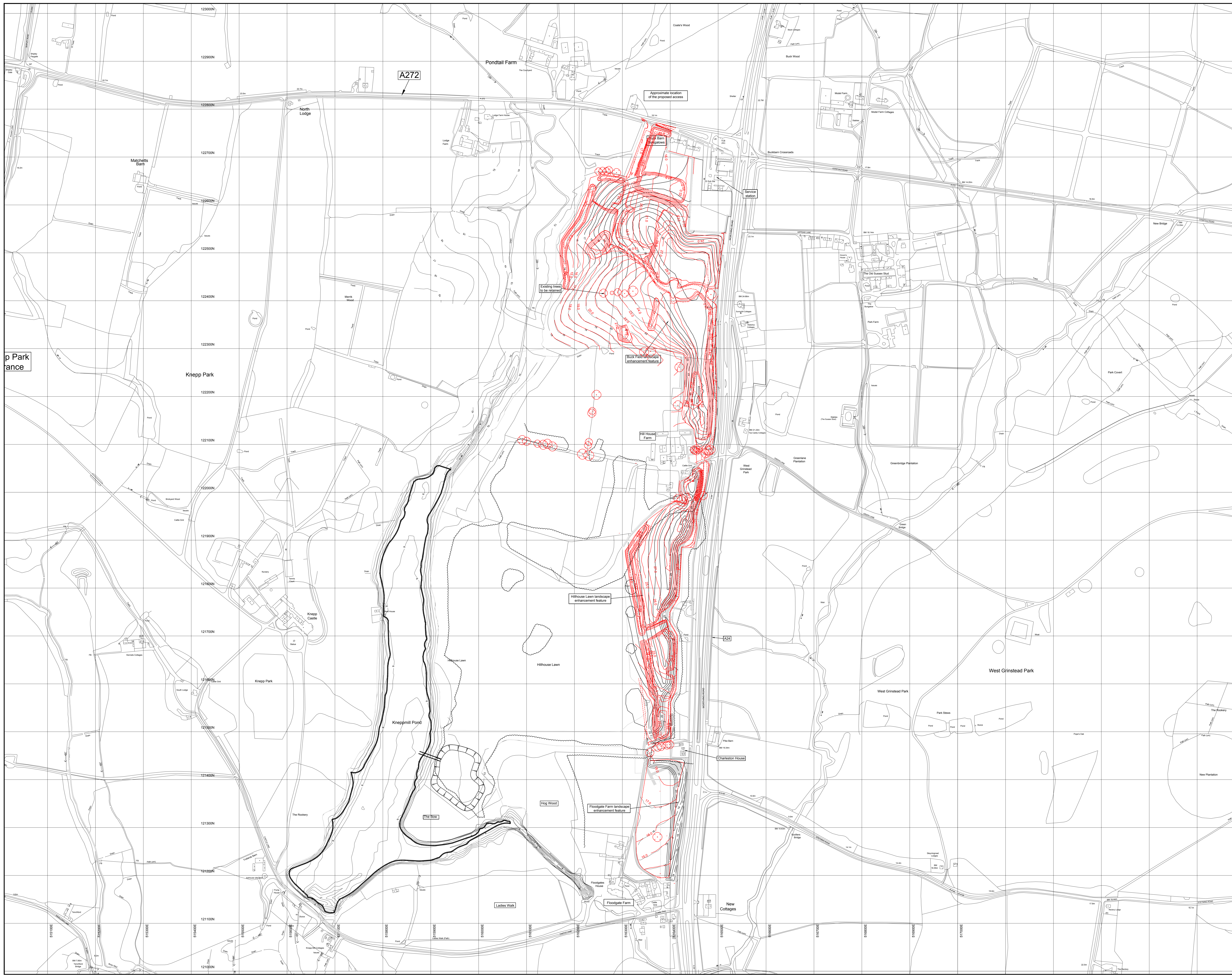


plans ahead by emapsite™



Appendix B

Topographical Survey



Street Layout

Grid

LEGEND

BANKING		WALL	
BUSHES & HEDGES		BUILDING	
TREES		OPEN SIDED BUILDING	
GATES		GLASS ROOFING	
		CONTOURS	

ABBREVIATIONS (WHERE APPLICABLE)

ARCH HEAD HEIGHT	AHH	MARKER	MOR
ARCH SPRINGER HEIGHT	AHS	MONITORING WELL	MW
ARCH SPRINGER LEVEL	ASL	NOTICE BOARD	NB
AR VALVE	AV	COVERHEAD WIRES	CPW
BD LEVEL	BL	PARKING METER	PM
BRISMA BEACON	B	ROOF LEVEL	RL
BOLLARD	BOL	ROOF LEVEL	RE
BRICKWORK	BW	ROAD SIGN	RS
BRITISH TELECOM MANHOLE	BTHM	RODDING EYE	RE
BUS STOP	BS	RETAINING WALL	RTW
CABLE TV	CTV	RAIN WATER PIPE	RWP
COVER LEVEL	CL	SLICE VALVE	SV
CABLE MARKER	CM	SOFT LEVEL	SFL
COLUMN	CP	STOP COOK	SC
EAVES LEVEL	EAV	STRUCTURAL SUB LEVEL	SSL
ELECTRICAL COVER	EC	TRIE STUM	ST
ELECTRICITY CONTROL BOX	ECCB	SOIL AND VENT PIPE	SVP
FLOOR BED	FB	TELEPHONE CALL BOX	TCB
FLOUNDER HOLE	FH	TELEPHONE POLE	TP
FINISHED FLOOR LEVEL	FLL	TOP OF KERB	TK
FIRE HYDRANT	FH	TUNNEL	TL
FLOOR LEVEL	FL	TRAFFIC LIGHT	TL
FLAG STAFF	FS	TOP OF WALL	TW
GAS PIPE	GP	UNABLE TO LIFT	UTL
GAS VALVE	GV	UNABLE TO SURVEY	UTS
GALLY	G	VENT PIPE	VP
GATE STOP	GS	WATER METER	WM
WASH OUT	WO	WATER LEVEL	WL
WASTE PIPE	WP	WASH OUT	WO
WATER TANK	WT	WASTE PIPE	WP
LAMP POST	LP	WATER TANK	WT
		WATER VALVE	WV

FENCES

BARBED WIRE FENCE	BWF	LARCH LAP FENCE	LLF
CORRUGATED IRON FENCE	CIF	METAL RAILING FENCE	MRF
CLOSE BOARD FENCE	CBF	POST AND CHAIN FENCE	PCF
CHAIN LINK FENCE	CLF	POST AND CHAIN FENCE	PCF
CHESTNUT PALING FENCE	CPF	POST AND RAIL FENCE	PRF
FENCE POST	FP	POST AND RAIL FENCE	PRF
INTERWOVEN FENCE	IF	STEEL PALISADE SECURITY FENCE	SPSF
IRON RAILING FENCE	IRF	TUBULAR STEEL RAIL FENCE	TSRF

REV. NOTES

QIM SURVEYS LTD
REGISTERED FIRM
Certificate Number: GB 6562
ISO 9001

THE SURVEY ASSOCIATION
A MEMBER OF
REGISTERED FIRM
Certificate Number: GB 111414
ISO 14001

Notes:
Grid and levels relate to OS GPS Active Network.
Red Line - May 2017 As Built Survey
Black Lines - Existing Planning Approval
Volume of remaining fill is 94,380 cm, this excludes any temporary works/material to be removed from site

Maltby Surveys Ltd
2 QUEENS ROAD
HAYWARDS HEATH
WEST SUSSEX
RH16 1EB
Tel: 01444 416246
Fax: 01444 417697
E-Mail: MLS@maltbysurveys.com
WebSite: http://www.maltbysurveys.com

SURVEYED	MT	MATTHEWS GROUP
DRAWN	MT	
CHECKED	RM	

RICS

SCALE
1/2500 (A0 Sheet)

KNEPP CASTLE

**TOPOGRAPHIC SURVEY MAY 2017
OVERLAID ON EXISTING PLANNING
APPROVAL**

Job No	Rev	Drawing Number
KNEPP		KNEPP ASBUILT MAY 2017



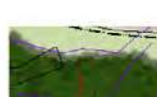


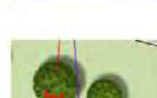




Date : May 2017

Appendix C

Restoration Proposals



KEY

-  **Proposed Contours**
Proposed new contours.
-  **Existing Contours**
Existing and previously approved contours.
-  **Existing Woodland**
Existing woodland to be retained.
-  **Existing Tree Specimens**
Existing tree specimens to be retained.
-  **Proposed Planting**
Proposed native tree and shrub planting.
-  **Proposed Tree Specimens**
Proposed individual tree specimens.
-  **Proposed Footpath**
Proposed pedestrian footpath to be accessible to the public.
-  **Proposed Access Roads**
Proposed new access routes.
-  **Proposed Acoustic Fencing**
Proposed new acoustic fencing.
-  **Proposed Picnic Area**
Proposed picnic area with views south.

Existing planting

Proposed planting

Proposed public footpath

Retained haul route to form new permanent access

Proposed acoustic fencing

Hillhouse Farm

Proposed Public Footpath

Existing light industrial unit served by new access route (A24 access closed)

Existing Planting

Proposed acoustic fencing

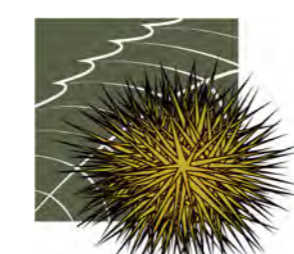
Proposed Planting

Proposed Public Car Park

Proposed acoustic fencing

FOR DESIGN TEAM
INFORMATION /
DISCUSSION ONLY

REV	DESCRIPTION	DATE	INITIALS
01	Layout updated for planning	23-10-19	AR
02	Layout updated following comments	04-11-19	AR



Ramsay & Co
Landscape Architecture
The Studio, 68 Cuckfield Road, Hurstpierpoint, West Sussex, BN6 9SB
T: 01273 834 198 M: 07973 770047 E: landscape@ramsayandco.com www.ramsayandco.com

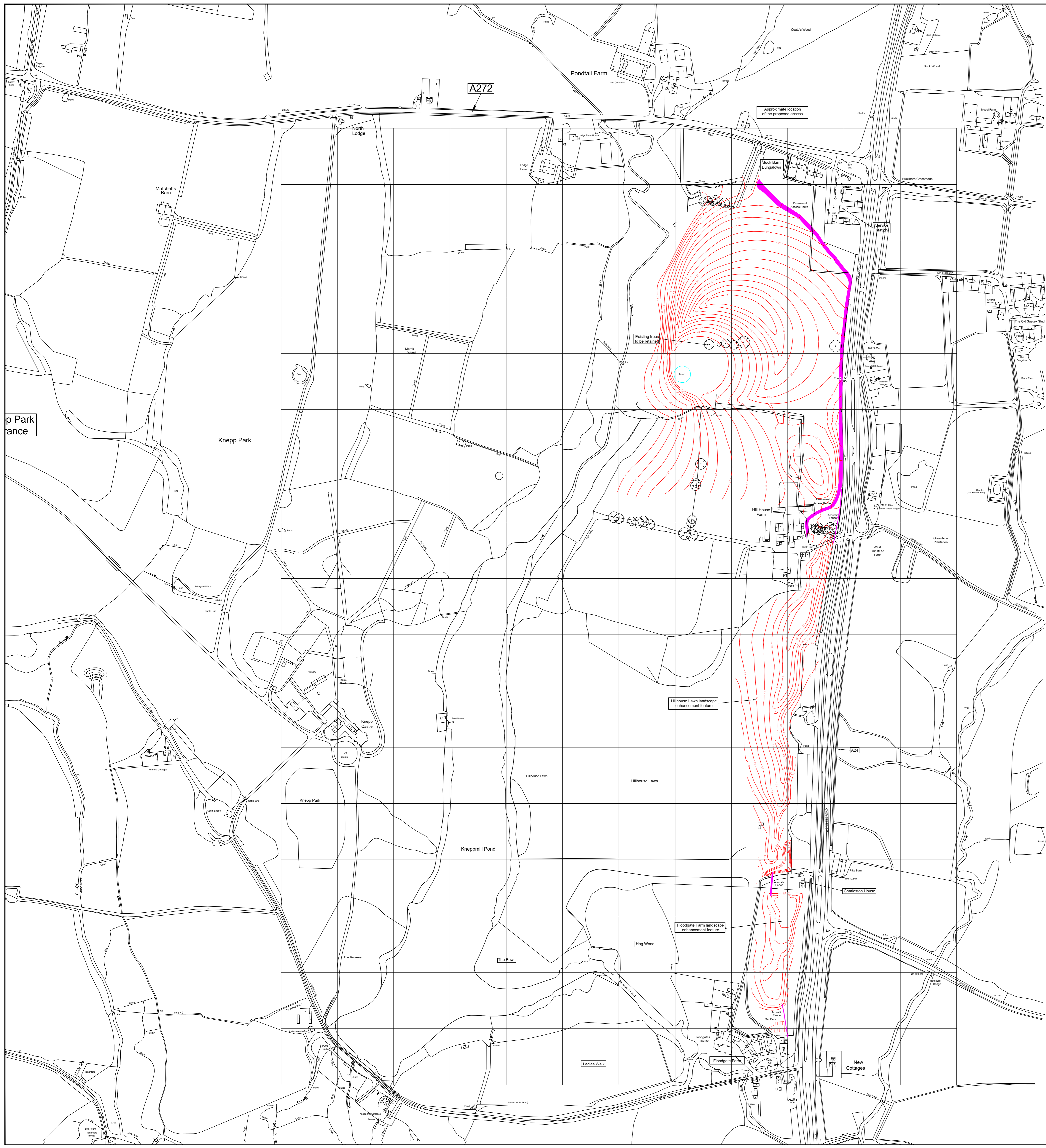
Project Title
Proposed Landform: Knepp Castle Estate, East Grinstead, W. Sussex

Drawing Title
Figure 01: Proposed Masterplan

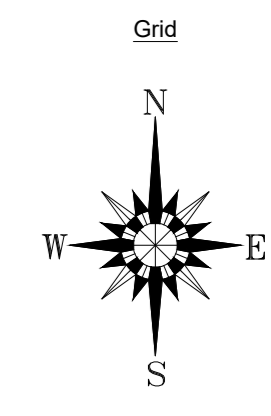
Scale Not To Scale	Initials AR	Date 09-05-19
Drawing Number RCO201 / Fig 01	Revision 02	

Appendix D

Modifications to the currently consented scheme



Sheet Layout



LEGEND

BANKING	WALL
BUSHES & HEDGES	BUILDING
TREES	OPEN SIDED BUILDING
GATES	GLASS ROOFED
	CONTOURS

ABBREVIATIONS (WHERE APPLICABLE)

ARCH HEAD HEIGHT	AHH	MARKER	MOR
ARCH SPRINGER HEIGHT	AHS	MONITORING WELL	MW
ARCH SPRINGER LEVEL	ASL	NAME PLATE	NP
AIR VALVE	AV	OVERHEAD WIRES	OWI
BED LEVEL	BL	PARKING METER	PM
BRUSH REASON	BR	ROOF LEVEL	RL
BOLLARD	B	ROAD SIGN	RS
BRITISH TELECOM BOX	BTB	ROOF EYE	RE
BRITISH TELECOM MANHOLE	BTM	RETAINING WALL	RTW
BROWWORK	BRW	RAIN WATER PIPE	RWP
BUS STOP	BS	SLICE VALVE	SV
CABLE TV	CTV	SOFT LEVEL	SL
COVER LEVEL	CL	STOP COCK	SC
CABLE MARKER	CM	STRUCTURAL SLAB LEVEL	SSL
COLUMN	CP	TREE STUMP	ST
CONCRETE POST	CCP	SOIL AND VENT PIPE	SVP
EAVES LEVEL	EAV	THRESHOLD LEVEL	TL
ELECTRICAL COVER	ELC	TELEGRAPH POLE	TP
ELECTRICITY CONTROL BOX	ECB	TELEPHONE CALL BOX	TCB
ELECTRICITY POLE	EP	TOP OF KERB	TK
EARTH ROD	ER	TUNNELL	TR
FLOOR BED	FB	TRAFFIC LIGHT	TL
FINISHED FLOOR LEVEL	FLL	TOP OF WALL	TW
FIRE HYDRANT	FH	UNABLE TO SURVEY	UTS
FLOOR LEVEL	FL	VENT PIPE	VP
FLAG STAFF	FS	WATER METER	WM
GAS PIPE	GP	WATER LEVEL	WL
GAS VALVE	GV	WASH OUT	WO
GALLY	G	WASTE PIPE	WP
GATE STOP	GS	WATER TANK	WT
INSPECTION COVER	IC	WATER VALVE	WV
INVERT LEVEL	L		
LAMP POST	LP		

FENCES

BARBED WIRE FENCE	BWF	LARCH LAMP FENCE	LLF
CORRUGATED IRON FENCE	CIF	METAL RAILING FENCE	MLF
CLOSE BOARD FENCE	CBF	POST AND CHAIN FENCE	PCF
CHAIN LINK FENCE	CLF	POST AND RAIL FENCE	PRF
CHESTNUT PALING FENCE	CPF	POST AND RAIL FENCE	PRF
FENCE POST	FPS	POST AND RAIL FENCE	PRF
INTERWOVEN FENCE	IFW	STEEL PALISADE SECURITY FENCE	SSPF
IRON RAILING FENCE	IRF	TUBULAR STEEL RAIL FENCE	TSRF

 Certificate Number: GB 6562	 A MEMBER OF THE SURVEY ASSOCIATION	 Certificate Number: GB 11414
---------------------------------	--	----------------------------------

Notes:
 Grid and levels relate to OS GPS Active Network.
 Red Line - Proposed Contours

Maltby Surveys Ltd
 2 QUEENSDALE ROAD
 HAYWARDS HEATH
 WEST SUSSEX
 RH16 1EB
 Tel: 01444 416246
 Fax: 01444 417697
 E-Mail: ML@maltbysurveys.com
 WebSite: http://www.maltbysurveys.com

SURVEYED	MT	MATTHEWS GROUP SCALE 1/2500 (A0 Sheet)
DRAWN	MT	
CHECKED	RM	
KNEPP CASTLE		
PROPOSED LANDSCAPE AREA AS DESIGNED BY KIM WILKIE		
Job No	Rev	Drawing Number
KNEPP		KW/Knepp/100 L
Date	August 2019	

Appendix E

EA Flood Mapping

Flood map for planning

Your reference
Knepp Castle

Location (easting/northing)
515712/121808

Created
23 May 2018 8:46

Your selected location is in flood zone 3, an area with a high probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

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

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

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

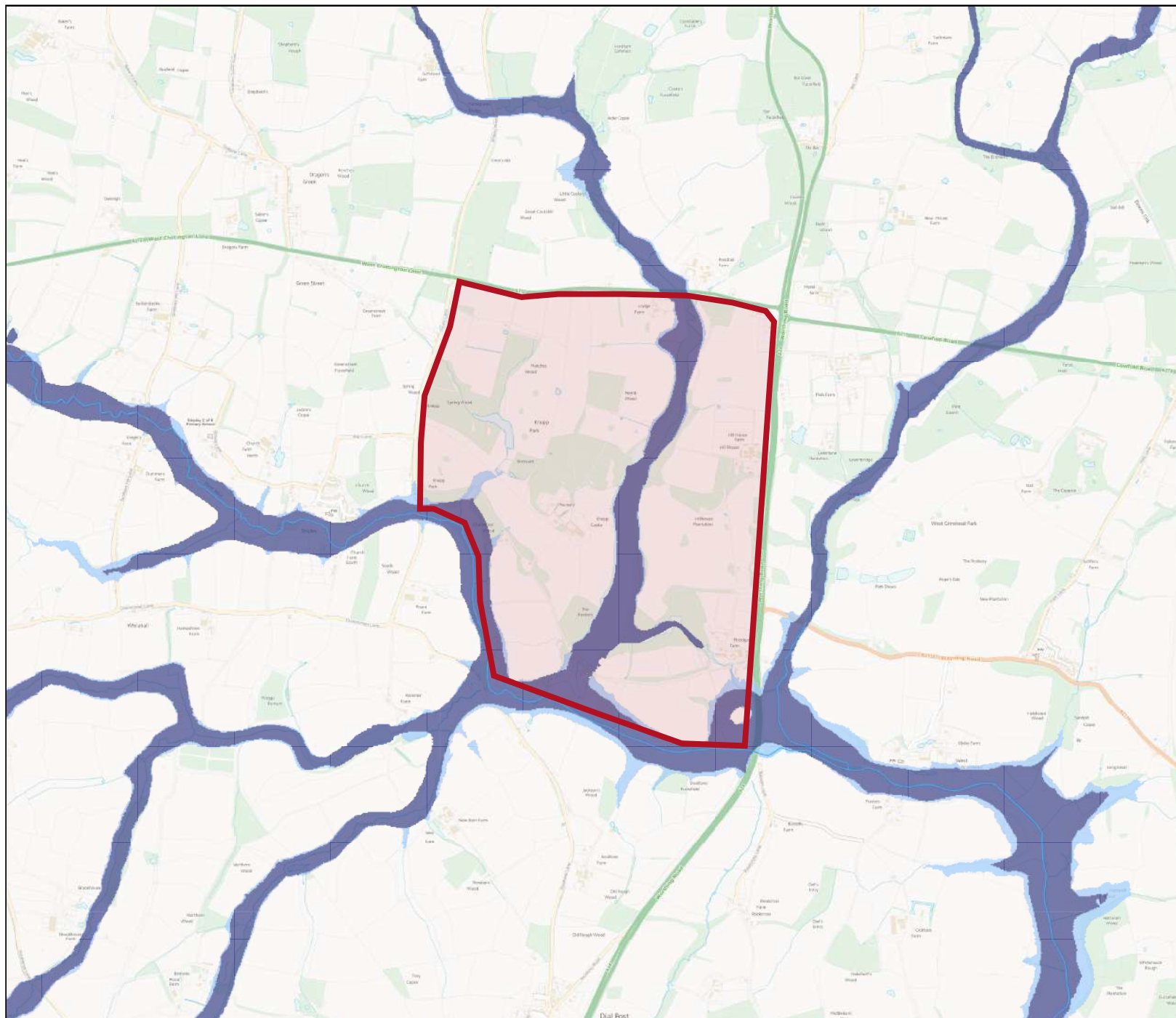
Flood map for planning









Your reference
Knepp Castle

Location (easting/northing)
515712/121808

Scale
1:25000

Created
23 May 2018 8:46



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

0 200 400 600m

Appendix F

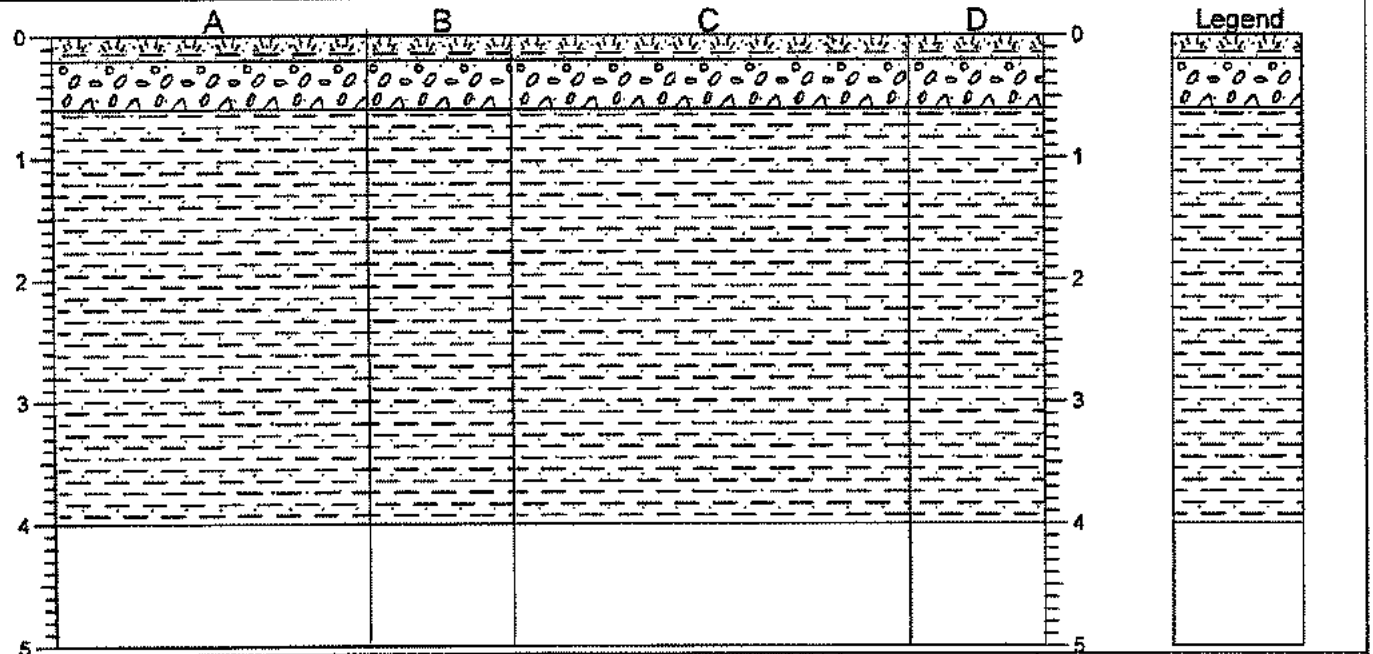
BGS Boreholes and Site Testing



Baddesley Colliery Offices,
Main Road,
Baxterley, Atherstone,
Warwickshire, CV9 2LE
Tel. 01827 717891
Fax. 01827 718507

TRIAL PIT LOG

Project Knepp Castle		Client Knepp Castle Estate		Date 14/06/07
Job No MAT/KC/PDH/2631/01	Ground Level (mAOD) 13.00	Co-Ordinates (NGR) E 121417.000 N 515993.000		Trial Pit No TP1
Contractor		Location West Grinstead, Sussex		Sheet 1 of 1



STRATA			SAMPLES & TESTS			
Depth	Reduced level	Water Depth	DESCRIPTION	Depth	Type	Test result
0.20	12.80		Soft light brown sandy with rootlets and occasional angular cobbles (TOPSOIL)	0.55	HSV	72/50/51(KPA)
			Slightly clayey gravelly SAND. Gravel is fine. (WEALD CLAY)			
0.60	12.40		Firm grey occasionally orange sandy CLAY with frequent thin bands of black clayey mudstone (WEALD CLAY)			
			1.60 - 1.67 Band of grey mudstone in clay			
			3.70 - 3.80 Band of black shale			
4.00	9.00		END OF TRIAL PIT			

Trial pit dimensions are approximate.

GENERAL REMARKS

Ground level and co-ordinates recorded with a handheld GPS.

All dimensions in metres Scale 1:62.5	Method/ Plant Used JCB 3CX	Logged By PDH
--	---	-------------------------

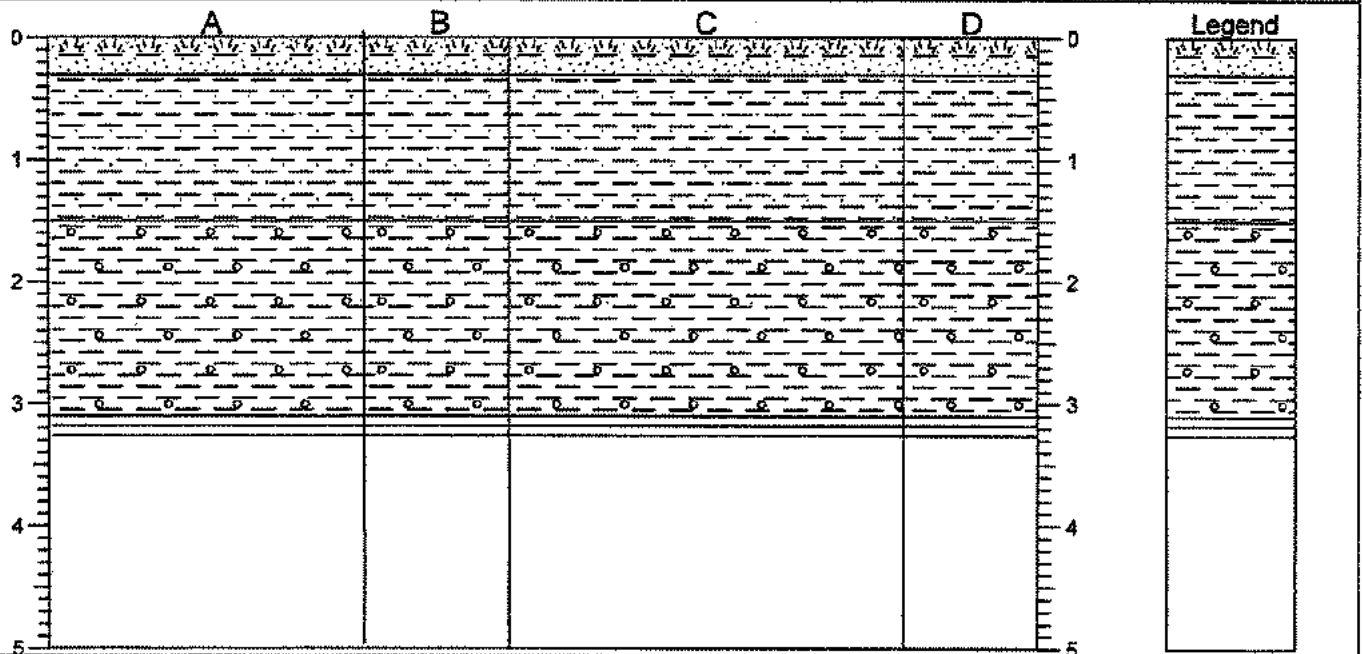
AGS3 UK TP 2 CL88.GPJ MJCARTER.GDT 9/2/10



Baddeley Colliery Offices,
Main Road,
Baxterley, Atharstone,
Warwickshire, CV6 2LE
Tel. 01827 717891
Fax. 01827 718507

TRIAL PIT LOG

Project Knepp Castle		Client Knepp Castle Estate		Date 14/06/07
Job No MAT/KC/PDH/2631/D1	Ground Level (mAOD) 11.00	Co-Ordinates (NGR) E 521456.000 N 115932.000		Trial Pit No TP2
Contractor		Location West Grinstead, Sussex		Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	Reduced level	Water Depth	DESCRIPTION	Depth	Type	Test result
0.30	10.70		Soft light brown sandy with rootlets and occasional angular cobbles. (TOPSOIL)	0.70	HSV	128/112/98 (KPa)
			Soft red orange very sandy CLAY with occasional angular gravel. (WEALD CLAY)			
			1.00 - 1.00 Becoming more clay rich			
1.50	9.50		Firm yellow brown to grey gravel CLAY with occasional thin bands of black clay and black shale. (WEALD CLAY)			
3.10	7.90		Hard grey MUDSTONE. (WEALD CLAY)	3.10	HSV	117/100 (Kpa)
3.26	7.74		END OF TRIAL PIT			

Trial pit dimensions are approximate.

GENERAL REMARKS

Slow groundwater seepage at the base of the trial pit. Ground level and co-ordinates recorded with a hand held GPS

All dimensions in metres Scale 1:62.5	Method/ Plant Used JCB 3CX	Logged By PDH
--	---	-------------------------

AGS3 UK TP 2 0566.GPJ MJCARTER.GDT 8/2/10

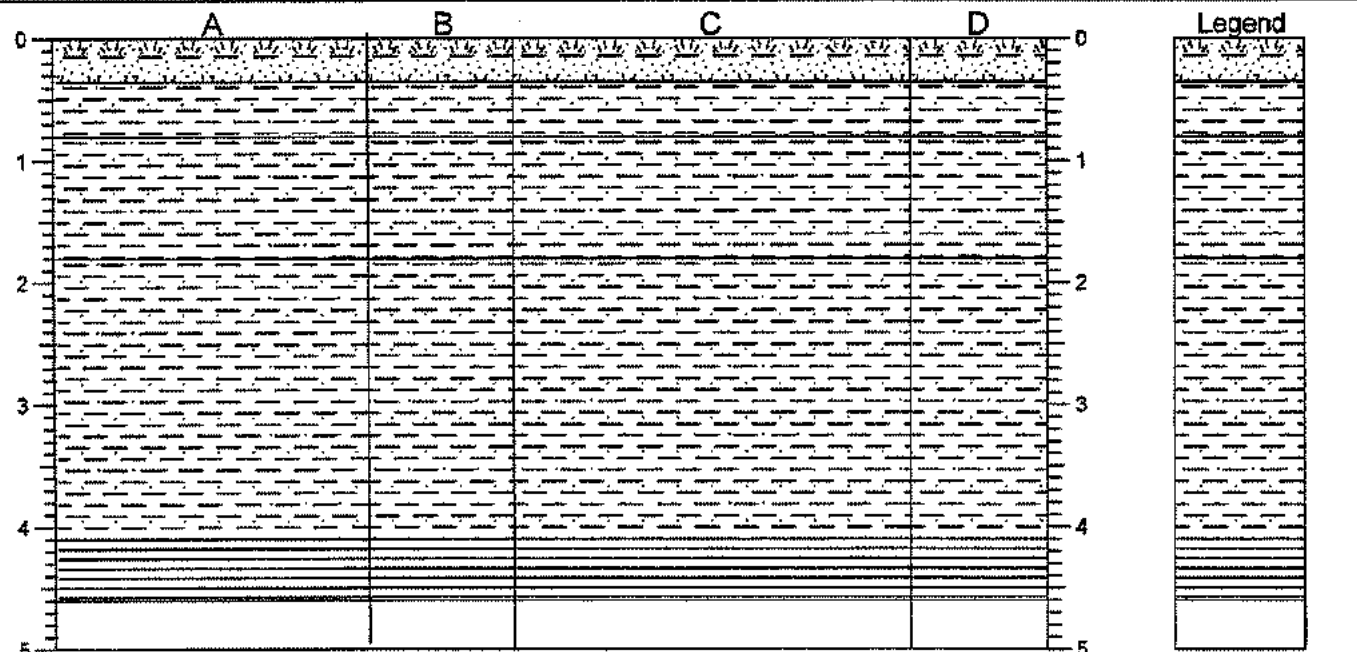


Beddesley Colliery Offices,
Main Road,
Baxley, Atherstone,
Warwickshire, CV9 2LE
Tel. 01827 717881
Fax. 01827 718507

Technical advisers on environmental issues

TRIAL PIT LOG

Project Knepp Castle		Client Knepp Castle Estate		Date 14/06/07
Job No MAT/KC/PDH/2631/01	Ground Level (mAOD) 15.00	Co-Ordinates (NGR) E 122563.000 N 516006.000		Trial Pit No TP3
Contractor		Location West Grinstead, Sussex		Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	Reduced level	Water Depth	DESCRIPTION	Depth	Type	Test result
			Firm light brown sandy with occasional coarse gravel. (TOPSOIL)			
0.35	14.65		Soft orange grey slightly sandy CLAY with rare thin bands of stiff grey clay. (WEALD CLAY)			
0.80	14.20		Firm fissured brown orange mottled grey sandy CLAY (WEALD CLAY)	0.70	HSV	76/101/100/98 (KPa)
1.80	13.20		Firm grey brown slightly sandy CLAY (WEALD CLAY) 2.05 7cm piece of bark. Sand is absent 2.90 Rare angular fragments of shale 3.20 - 3.27 Band of possible carbonate material			
4.10	10.90		Very weak fractured dark blue grey MUDSTONE. (WEALD CLAY)	3.80	HSV	60/117/110 (KPa)
4.60	10.40		END OF TRIAL PIT			

Trial pit dimensions are approximate.

GENERAL REMARKS

Ground level and co-ordinates recorded with a handheld GPS.

AG63 UK TP 2 GLOB.GPJ MJCARTER.GDT 14/06/07

All dimensions in metres Scale 1:62.5	Method/ Plant Used JCB 3CX	Logged By PDH
--	---	-------------------------



ALcontrol Geochem

Unit 7-8 Hawarden Business Park
 Manor Road (off Manor Lane)
 Hawarden
 Deeside
 CH5 3US
 Tel: (01244) 528700
 Fax: (01244) 528701
 email: mkt@alcontrol.co.uk
 website: www.alcontrol.co.uk

M.J. Carter Associates
 Baddesley Colliery Offices
 Main Road
 Baxterley
 Atherstone
 Warwickshire
 CV9 2LE

ATTN: Paul Hubbard

MJCA RECEIVED					
9 JUL 2007					
ACTION		POH	MAT/KC		
F	GD	GT	SH		CC

CERTIFICATE OF ANALYSIS

Date: 03 July, 2007
Our Reference: 07/09839/02/01
Your Reference: MAT/KC KNEPP
Location: Not Specified

A total of 16 samples was received for analysis on Friday, 08 June 2007 and completed on Wednesday, 27 June 2007. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials- whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Signed

Diane Whittlestone Jane Sevmour David O'Hare Caroline Suttie
 Customer Services Customer Services Customer Services Customer Services

Valid if signed by any of the above signatories.

Compiled By

Phil Sommerton



ALcontrol Geochem Analytical Services

Sample Descriptions

Job Number: 07/09839/02/01
Client: M.J. Carter Associates
Client Ref: MAT/KC KNEPP

Grain sizes
 <0.063mm Very Fine
 0.1mm - 0.063mm Fine
 0.1mm - 2mm Medium
 2mm - 10mm Coarse
 >10mm Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
S2		Brown	<0.063mm	Silty Clay with some Vegetation	1
S3		Beige	<0.063mm	Silty Clay with some Vegetation	1

* These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.
 We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials-whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.
 Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
 † Sample Description supplied by client

Validated
 Preliminary

ALcontrol Geochem Analytical Services Table Of Results

* ISO 17025 accredited
 * MCERTS accredited
 * Subcontracted test
 * Shown on prev. report

Job Number: 07/09839/02/01
 Client: M.J. Carter Associates
 Client Ref. No.: MAT/KC KNEPP

Matrix: SOLID
 Location: Not Specified
 Client Contact: Paul Hubbard

Sample Identity	S2	S3									Method Code	Units
Depth (m)												
Sample Type	SOLID	SOLID										
Sampled Date	06.06.07	06.06.07										
Sample Received Date	06.06.07	06.06.07										
Batch	1	1										
Sample Number(s)	1-2	3-4										
Total Sulphate	2300	810									TM129 ^g _M	<100 mg/kg
Free Water Soluble	6.5	4.3									TM129 ^g _M	<3.5 mg/kg
Arsenic	14	12									TM129 ^g _M	<3.0 mg/kg
Cadmium	1.6	<0.3									TM129 ^g _M	<0.3 mg/kg
Chromium	13	36									TM129 ^g _M	<4.5 mg/kg
Copper	24	24									TM129 ^g _M	<6 mg/kg
Lead	33	57									TM129 ^g _M	<2 mg/kg
Mercury	<0.6	<0.6									TM129 ^g _M	<0.6 mg/kg
Nickel	19	23									TM129 ^g _M	<0.9 mg/kg
Selenium	<3	<3									TM129 ^g _M	<3 mg/kg
Zinc	140	100									TM129 ^g _M	<2.5 mg/kg
Nitrate (soluble) as NO3	10	<1									TM102 ^g _M	<1 mg/kg
Acid Soluble Sulphide	<50	<50									TM101	<50 mg/kg
Total Organic Carbon	28	5.9									TM132 ^g _M	<0.2 %
Phenols Monohydric	<0.15	<0.15									TM062 ^g _M	<0.15 mg/kg
Total Cyanide	<1	<1									TM153 ^g _M	<1 mg/kg
Ammoniacal Nitrogen as N	<15	<15									TM024 ^g _M	<15 mg/kg
Elemental Sulphur	220	150									TM136 ^g _M	<70 mg/kg
pH Value	6.43	6.03									TM153 ^g _M	<1.00 pH Units
TPH C6-40	2900	630									TM154 ^g _M	<10 mg/kg
PAH Total	<10	<10									TM154	<10 mg/kg

All results expressed on a dry weight basis.

Date: 03.07.2007

ALcontrol Geochem Analytical Services Table Of Results - Appendix

Job Number: 07/09839/02/01
Client: M.J. Carter Associates
Client Ref. No.: MAT/KC KNEPP

Report Key : Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP No Determination Possible * Subcontracted test
 NFD No Fibres Detected » Result previously reported (Incremental reports only)
 # ISO 17025 accredited M MCERTS Accredited
 PFD Possible Fibres Detected EC Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981	Determination of total suspended solids in waters	✓		NA	
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium in soil samples	✓	✓	WET	
TM062	MEWAM BOOK 124 1988.EMSO/ Method 17.7, Second Site property, March 2003	Determination of Phenolic compounds by HPLC with electro-chemical detection	✓	✓	WET	
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water	✓		NA	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser	✓		NA	
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser	✓		NA	
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser			WET	
TM102	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Total Oxidised Nitrogen using the Kone Analyser	✓		DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer			DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓		DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓	✓	DRY	
TM132	In - house Method	ELTRA CS800 Operators Guide	✓	✓	DRY	
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓	✓	WET	
TM136	Method 17.10, Second Site property, March 2003	Determination of Sulphur by HPLC	✓		DRY	

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

ALcontrol Geochem Analytical Services

Table Of Results - Appendix

Job Number: 07/09839/02/01
Client: M.J. Carter Associates
Client Ref. No.: MAT/KC KNEPP

Report Key :

NDP	No Determination Possible		Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10 ⁻⁷
NFD	No Fibres Detected	*	Subcontracted test
#	ISO 17025 accredited	»	Result previously reported (incremental reports only)
PFD	Possible Fibres Detected	M	MCERTS Accredited
		BC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

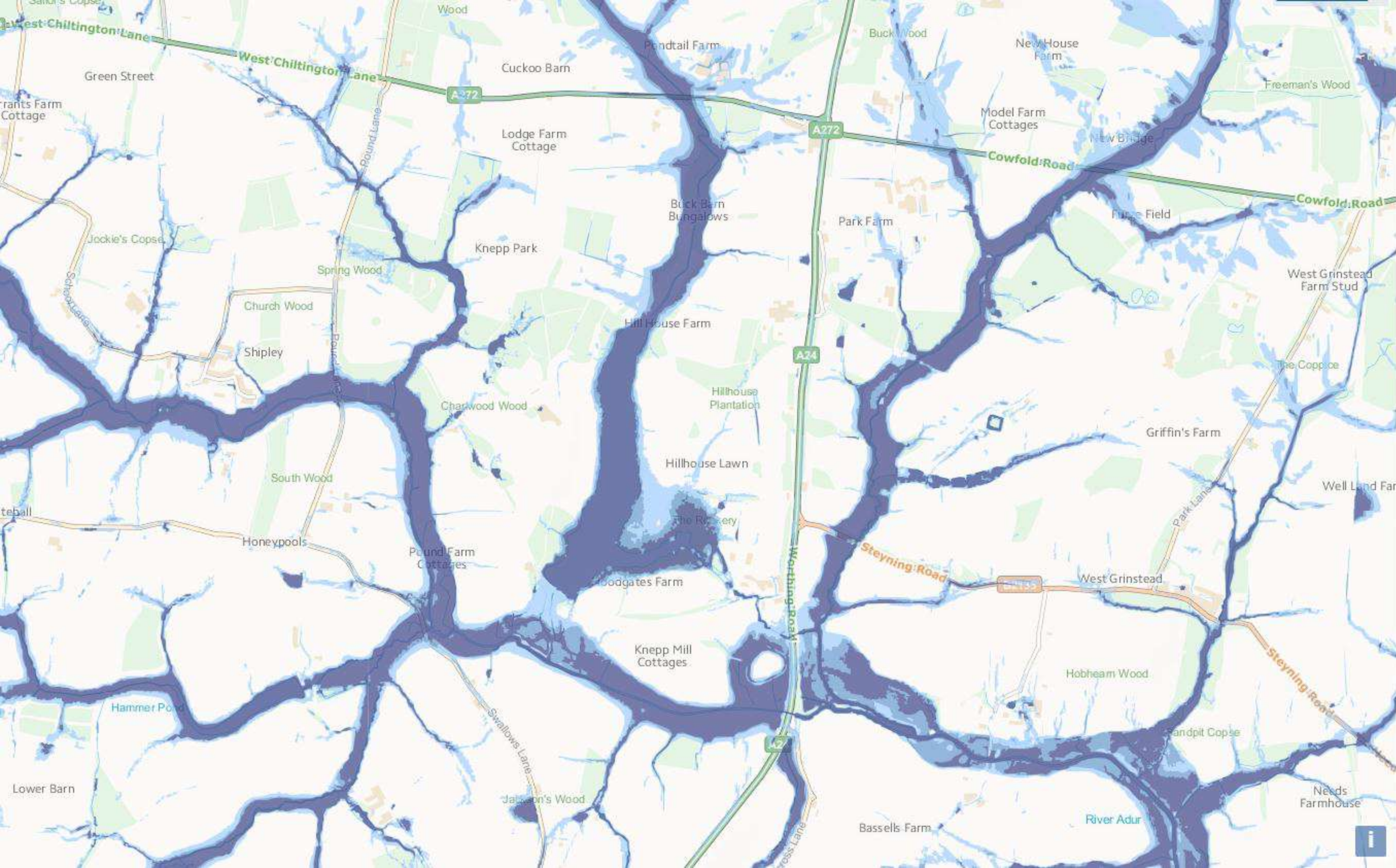
Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample	Surrogate Corrected
TM153	Method 4500A,B,C, L, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the "Skalar SANS+ System" Segmented Flow Analyser	✓		WET	
TM154	In - house Method	Determination of Petroleum Hydrocarbons by EZ Flash GC-FID in the Carbon range C6- C40			WET	
TM154	In - house Method	Determination of Petroleum Hydrocarbons by EZ Flash GC-FID in the Carbon range C6- C40	✓		WET	

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Appendix G

Government Long Term Surface Water Flood Maps



Flood risk



High



Medium



Low



Very low



Location you selected



Appendix H

QBar Calculations

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	794	794
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	5.59	5.59
1 in 1 year (l/s):	4.76	4.76
1 in 30 years (l/s):	12.87	12.87
1 in 100 year (l/s):	17.85	17.85
1 in 200 years (l/s):	20.92	20.92

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix I

MicroDrainage Storage Calculations

Quick Storage Estimate

Micro Drainage

Variables

FSR Rainfall		Cv (Summer)	0.750
Return Period (years)	100	Cv (Winter)	0.840
Region	England and Wales	Impermeable Area (ha)	0.040
Map	M5-60 (mm) 20.000	Maximum Allowable Discharge (l/s)	1.0
	Ratio R 0.350	Infiltration Coefficient (m/hr)	0.00000
		Safety Factor	2.0
		Climate Change (%)	40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 16 m³ and 25 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600