

FLOOD RISK ASSESSMENT

PROPOSED RELOCATION OF DWELLING
NEW ACCESS & VEHICLE PARKING AREA,
MILL GREEN ROAD,
PINCHBECK,
SPALDING,
LINCOLNSHIRE.
PE11 3PU

RM ASSOCIATES

10 Main Street
Thorpe on the Hill
Lincoln
LN6 9BG
Tel 01522 681728
Mobile 07967 304737
Email : ray.rmassociates@gmail.com
September 2020 Version 1

RMA

Contents

INTRODUCTION	1
APPLICATION SITE.....	1
Table 1: Flood Zones Definition (Ignoring the presence of defences)	2
Table 2: Flood Risk Vulnerability Classification	2
Site Levels.....	3
DRAINAGE AUTHORITIES	3
Environment Agency	3
Flood Zones	3
Risk of Flooding from Rivers & Sea	4
River Welland.....	4
River Glen	5
Fluvial Levels & Flows.....	6
SOUTH HOLLAND DISTRICT COUNCIL.....	7
WELLAND & DEEPING INTERNAL DRAINAGE BOARD.....	7
FLOODING FROM OTHER SOURCES	8
SURFACE WATER FLOODING	9
SEQUENTIAL APPROACH	9
Table 3: Flood Risk Vulnerability and Flood Zones ‘Compatibility’	10
Sequential & Exception Test	10
DRAINAGE STATEMENT.....	11
Surface Water Drainage.....	11
Infiltration.....	11
Watercourse.....	11
Sewers	12
Foul Water Drainage	12
CLIMATE CHANGE	12
FLOOD PROTECTION	14
CONCLUSION	14

Figures

- Map 1 Environment Agency Flood Map.
- Map 2 Risk of Flooding from Rivers & Sea Map.
- Map 3 Tidal Modal Analysis, levels for East Coast and Wash: Immingham to the West Lighthouse
- Map 4 South Holland SFRA Residual Flood Hazard District 2115 0.1% Event Probability Map
- Map 5 South Holland SFRA Residual Peak Depth District 2115 0.1% Event Probability Map
- Map 6 South Holland SFRA Residual Peak Velocity District 2115 0.1% Event Probability Map
- Map 7 Surface Water Flood Map
- Plan 1 Location Plan
- Plan 2 Site Layout Plan
- Plan 3 Proposed Floor Plan & Elevations
- Plan 4 Topographical Survey
- Document 1 Wallingford Surface Water Storage Requirements for Sites
- Document 2 Infiltration Test

FLOOD RISK ASSESSMENT PROPOSED RELOCATION OF DWELLING, NEW ACCESS & VEHICLE PARKING AREA, MILL GREEN ROAD, PINCHBECK, SPALDING, PE11 3PU

INTRODUCTION

The Government has placed increasing priority on the need to take full account of the risk associated with flooding at all stages of the planning and development process. This seeks to reduce the future damage to property and the risk to life from incidents of flooding. Their expectations relating to flooding are contained in the National Planning Policy Framework Feb 2019, (NPPF), which identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications by avoiding inappropriate development in areas at risk from flooding and to direct development away from areas at highest risk.

The NPPF provides that development in areas at risk of flooding should be avoided and seeks to direct development away from areas at highest risk. There is a sequential, risk-based approach to the location of development avoiding where possible, flood risk to people and property managing any residual risk and taking account of the impacts of climate change.

This document has been prepared solely as a flood risk assessment and drainage statement on behalf of the client, Anglia UK Ltd. RM Associates accepts no responsibility or liability for any use of this document other than by the client, for the purposes for which it was originally commissioned and prepared. If any unauthorised Third Party comes into possession of this report; they rely on it at their own risk and RM Associates owe them no duty of care or skill. All comments contained in this report, including any conclusions are based upon information available at the time of writing the report. RM Associates accepts no liability if additional information exists or becomes available after the time of writing this report. This document is the copyright of RM Associates. The reproduction or transmission of all or part of this document, whether by photocopying or storing in any medium by electronic means or otherwise, without the prior written consent of RM Associates is prohibited.

This report contains public sector information licensed under the Open Government Licence v3.0.

APPLICATION SITE

The site is located at The Anglian Business Centre, Mill Green Road, Pinchbeck, Spalding, PE11 3PU within the South Holland District Council's administrative area. The National Grid Reference is TF 23402 24661. **Plan 1**

Planning approval Ref H14-0941-19 was granted on the 14th November 2019 for the erection of a residential dwelling. This application is to relocate the proposed dwelling and to provide a new access road and vehicle parking area. **Plan 2 & 3**

The National Planning Policy Framework Guidance NPPG defines three levels of flood risk depending upon the

annual probability of fluvial flooding occurring.

Zone 1 – Low Probability (<0.1%)

Zone 2 – Medium Probability (0.1 – 1.0%)

Zone 3 – High Probability (>1.0%)

The proposed development site is shown to be within Flood Zone 3a 'High Probability' as detailed on the Environment Agency's Flood Zone Maps without defences, and as defined in Table 1 of NPPG. **Map 1**

Table 1: Flood Zones Definition (Ignoring the presence of defences)

Flood Zone 3- High Probability
Definition 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. The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses 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 uses in times of flood Flood Risk Assessments requirements All proposals in this zone should be accompanied by a Flood Risk Assessment. Policy aims 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 techniques; • relocate existing development to land with a lower probability of flooding; • create space for flooding to occur by allocating and safeguarding open space for flood storage.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG the proposed residential development is classified as "More Vulnerable", with Table 1 of NPPG stating that such uses are appropriate in this zone subject to the Exception Test. All other uses are classified as "Less Vulnerable" with Table 1 of NPPG stating that such uses are appropriate in this zone.

Table 2: Flood Risk Vulnerability Classification

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. • Sites used for holiday or short-let caravan and camping, subject to a specific warning and Evacuation Plan.

Less Vulnerable

- Police ambulance and fire stations that are not required to be operational during flooding
- Buildings used for shops, financial, professional and other services, 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 agricultural and forestry.
- Waste treatment (except land fill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works that do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flood events are in place).

Site Levels

From the topographical survey the site is reasonably level, the levels vary from 3.19mODN to 2.78mODN averaging 3.00m ODN. The road level at the site entrance, is 3.28mODN. The ground level at the existing managers accommodation is 3.00mODN with a floor level 3.40mODN, it is proposed that with the ground level for the new replacement bungalow, being 3.00mODN, the floor level is to be raised to 3.30mODN. **Plan 4**

DRAINAGE AUTHORITIES

Environment Agency

The Environment Agency has permissive powers for reducing the risk of flooding from designated main rivers and from the sea.

The following potential sources of flooding affecting the development site has been identified as:

- From the River Welland (Tidal)
- The River Glen (Fluvial)
- Welland & Deepings Internal Drainage Board system

Flood Zones

The Flood Zone Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. In some locations, there are many kilometres of raised flood defences. To meet the requirements of the National Planning Policy Framework, these defences are removed in their entirety to produce the Flood Map for Planning (Rivers and Sea). The map therefore shows the full extent of areas that would be at risk of flooding if no defences existed and water could spread out across the floodplain.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding

assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map represents areas at risk of flooding for present day only and does not take account of climate change. In this area the main risk of flooding is from a breach to the tidal defences along the coastline that could affect the site. These maps show that the majority of the proposed development site is considered at a risk from flooding as it is all located within an area zoned as Flood Zone 3. **Map 1**

Risk of Flooding from Rivers & Sea

The Risk of Flooding from Rivers and Sea Map shows that the site is at Medium risk of flooding. Medium means that each year, this area has a chance of flooding of less than 1 in 30 (3.3%) but greater or equal to 1 in 100 (1%). This takes into account the effect of any flood defences that may be in this area. Flood defences reduce, but do not completely stop the chance of flooding as they can be overtopped or fail. **Map 2**

River Welland.

The River Welland lies some 2.55Km to the south-east of the site and is tidal down stream of Marsh Lane Sluice, the present day 1 in 200-year tide flood level is 5.98mODN. The tidal flood defences of the tidal River Welland consist of earth embankments which are in good condition and the crest heights are circa 7.00mODN.

From Lincolnshire & Northamptonshire Area Tidal Modal Analysis, levels for East Coast and Wash: Immingham to the West Lighthouse have an assessment date of 2017, which should be used in any consideration of future increases due to climate change. **Map 3**

Peak tide levels (2017) for the 1 in 200-year 50% confidence bound tide level is 5.98mODN at Marsh Lane. Peak tide levels (2120) tide level is 5.98mODN plus Higher Central climate change of 1025mm would be 7.01mODN.

Taking the precautionary approach, the Hazard Rating following a breach which in Flood Risk Assessment (FD 2320) Guidance for New Development Phase 2 R& D Technical Report these are classified as low <0.75, moderate 0.75-1.25, significant 1.25-2.50 and extreme >2.50 based upon an empirical measure of velocity and depth.

$$HR = d \times (v + 0.5) + DF$$

Where V = Flood flow velocity

(m/sec) D = Flood depth (m)

DF = A debris factor included to represent the greater damage, or risk of injury to people, that can occur if debris is swept along with the water. = 0.5 for depths <0.25 or 1.0 for depths.

For the degree of Flood Hazard to be classified as low HR must be <0.75

Flood Hazard			Description
	<0.75	Low	Caution – Flood Zone with shallow flowing water or deep standing water.
	0.75 – 1.25	Moderate	Danger for Some - (i.e. children) Danger Flood Zone with deep or fast flowing water.
	1.25 – 2.0	Significant	Danger for Most – Danger Flood Zone with deep fast flowing water.
	>2.0	Extreme	Danger for All – Extreme Danger Flood Zone with deep fast flowing water.

The 2017 Update to SHDC, SFRA has carried out a Tidal & Fluvial Hazard Mapping, for Spalding following a breach to the defences. The Hazard, Velocity and Depth Maps, year 2115, for the 1 in 1000-year event, shows that the site where the proposed dwelling and the other proposals, are to be located, are not shown to be within an area affected by flooding from a breach to the flood defences. **Maps 4, 5 & 6.**

River Glen

The River Glen lies some 1.3km to the north of the site and the present day 1 in 100-year flood level with 20% climate change is 4.87mODN. The flood defences of the River Glen between Herring Bridge and the A151 bridge consist of the B1180 Road which are in good condition and the crest heights for the right bank along this stretch of river are circa 5.90mODN. (SHDC SFRA).

The fluvial flood data for the model nodes shown on the map are set out in the tables below



Node Map

Fluvial Levels & Flows

Fluvial Flood Levels (mODN) The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).													
			Annual Exceedance Probability - Maximum Water Levels (mODN)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 6685	523603	326081	4.01	4.16	4.23	4.31	4.34	4.35	4.38	4.84	4.44	4.60	4.94
GLEN 7082	523224	325963	4.04	4.17	4.25	4.32	4.36	4.39	4.41	4.87	4.49	4.70	5.01
GLEN 7677	522687	325733	4.06	4.20	4.28	4.35	4.41	4.43	4.45	4.91	4.54	4.79	5.07

Fluvial Flood Flows (m³/s) The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m³/s).													
			Annual Exceedance Probability - Maximum Flows (m³/s)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 6761	523531	326057	25.95	29.44	31.06	33.13	34.59	35.32	35.84	43.56	38.87	48.22	56.95
GLEN 7181	523130	325934	25.69	29.20	30.85	32.93	34.37	35.09	35.60	43.18	38.62	48.05	56.90
GLEN 7776	522589	325726	25.40	29.03	30.65	32.71	34.14	34.86	35.37	42.73	38.33	48.07	56.87

This data is taken from the Welland Model (2016) and are the most up-to date currently available. The Environment Agency aim to review the models on a regular basis.

These levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

The site lies within the Anglian River Basin District, Peak River flows should be adjusted to reflect the latest climate change allowances. It must also be assumed, to provide a worst-case scenario, that flood defences have been raised during this period to cater for the rise in river level.

Using the Peak River Flows from the NPPG Climate change allowances shown in Table 1 in the spread sheet. The graph and data show a prediction for the increase in river levels for the 35% and 65% increase in river level.

Document 1

EXTRAPOLATED WATER LEVEL OUTPUTS AT NODE Glen 7082		
Upper End Scenario	5.05	mODN
Higher Central Scenario	4.80	mODN
Central Scenario	4.71	mODN

With the crest level of the B1180 road being circa 5.90mODN the climate change river levels for the Higher Central (35%) and Upper End (65%) would remain in channel. Based upon the crest heights of the flood defence the proposed site is protected with a freeboard of over 750mm.

The greatest risk of flooding of the site would therefore be from a breach to the tide earth embankments for

the River Welland.

The minimum mitigation measures required for developments that do have any ground floor sleeping shall be determined by the flood depths arising from the 2115 0.1% breach scenario. The finished floor Level FFL of any new dwellings shall be informed by the flood depths. For flood depths between 0 – 0.25m deep the FFL shall be set at a minimum of 300mm above the ground level.

With the main risk to flooding of the site being tidal flooding following a breach to the tidal defences, any flooding from fluvial flooding sources has been mitigated against.

With the average site ground level at the site for the replacement dwelling being circa 3.00mODN, the minimum floor level will be set at 3.30mODN. which is considered to be above the tidal breach level to the River Welland for 2115.

SOUTH HOLLAND DISTRICT COUNCIL

In order to inform the process of risk assessment and site selection the District Council commissioned Haskoning UK Ltd Consultants to prepare a Strategic Flood Risk Assessment in December 2002. They have carried out an update of this report and this report was published in January 2010 and this was further updated in February 2017.

This Flood Risk Assessment has taken the results of the (2017) updated South Holland Strategic Flood Risk Assessment (SHSFRA) into account in its findings.

The whole of the tidal flooding information has been replaced by the mapping from the latest Environment Agency Tidal Hazard mapping. Where the mapping for an area contains both fluvial and tidal components, the more severe of the two has been presented.

WELLAND & DEEPING INTERNAL DRAINAGE BOARD

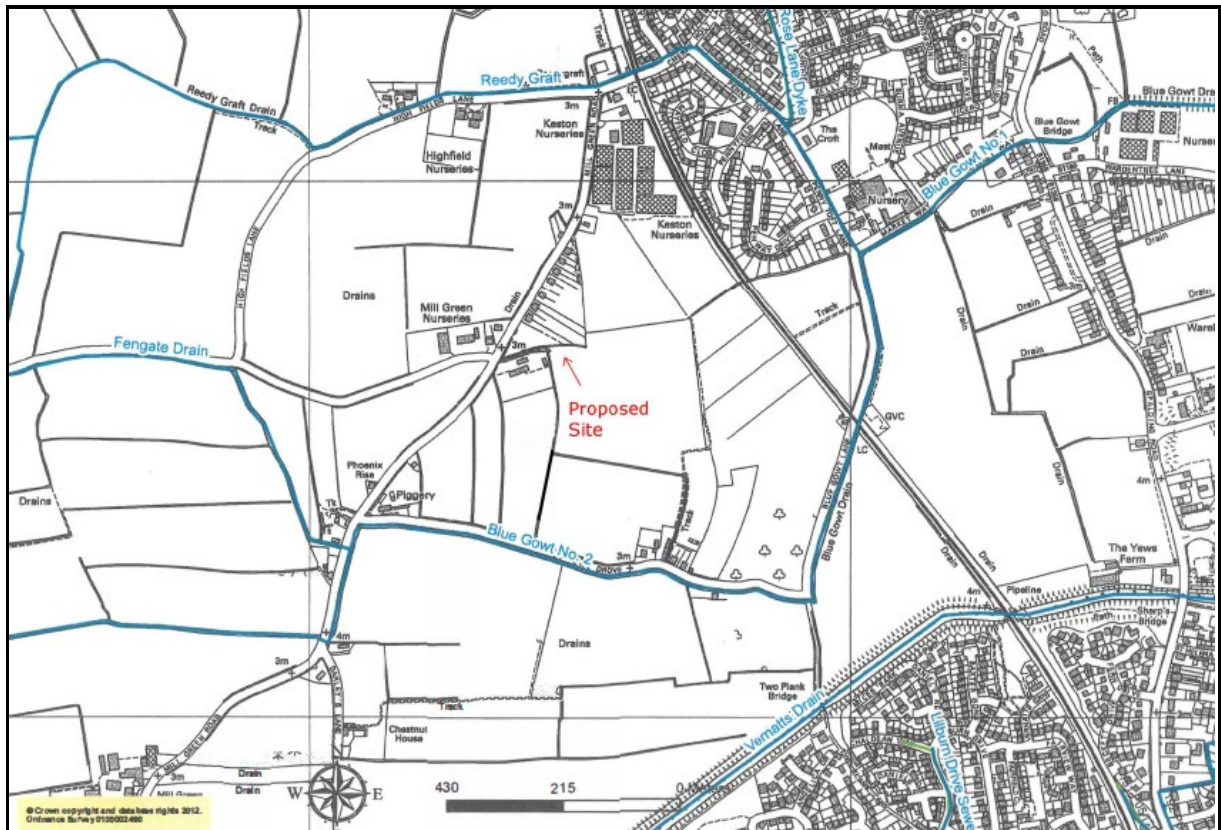
The proposed development site is located within Catchment area of Welland & Deepings Internal Drainage Board. The Board is responsible to operate and maintain the arterial fluvial system.

The Board's nearest watercourse to the site is the Blue Gowt No 2 some 500m south of the site.

The Board's prior written consent will be required for any of the following works:

- No person without the previous consent of the Board shall erect any building or structure, whether temporary or permanent, or plant any tree, shrub, willow or other similar growth within 9 metres of the landward toe of the bank where there is an embankment or wall or within 9 metres of the top of the batter where there is no embankment or wall, or where the watercourse is enclosed within 9 metres of the enclosing structure.

- No person shall, without the previous consent of the Board, for any purpose, by means of any channel, siphon, pipeline or sluice or by any other means whatsoever, introduce any water into the District or, whether directly or indirectly, increase the flow or volume of water in any watercourse in the District.
- The erection or alteration of any mill dam, weir or other like obstruction to the flow, or erection or alteration of any culvert within the channel of a riparian watercourse.



Welland & Deepings Drainage Map

FLOODING FROM OTHER SOURCES

Flooding is a natural process and can happen at any time from sources other than watercourses and the sea.

- Flooding from land can occur from intense rainfall, often over short duration of time that is unable to soak into the ground or enter the drainage system. However, with the natural topographic nature of the ground being flat, with no high ground around the site this will not cause any rapid inundation of the site and is likely only lead to local ponding of shallow depth and low velocity following the natural land contours. The property is also raised 300mm above the average ground level. The updated SFRA concluded that flooding from this source is limited to minor isolated cases and is not of strategic significance as regards to flood risk.
- The area is not known to suffer from any groundwater problems and therefore is taken as having no strategic significance as regards to flood risk.

- Flooding from sewers can occur from over loading from heavy rainfall caused by blockages or having inadequate capacity. The resulting back pressure could cause foul sewage to flow from manholes which would flow over areas of the carriageway at a lower level and be contained within the confines of the kerb lines following the natural land contour to the south-west. The Updated SFRA concluded that flooding from sewers is limited to minor isolated cases and is not of strategic significance as regards to flood risk.
- Non-natural or artificial sources of flooding such as reservoirs, lakes, or canals where water is stored above natural ground level could cause flooding if the structure fails or is over topped.

SURFACE WATER FLOODING

The majority of the site for the proposed units is not shown on the Low Risk scenario Surface Water flood maps, for the 1 in 1000-year event, to be affected from surface water flooding. This type of flooding is usually short lived and associated with heavy downpours of rain, thunderstorms etc. **Map 7**

The maps for surface water and revised maps for river and sea flooding define the risk as High, Medium, Low and Very Low. The chance of flooding for the area defined in any given year is shown below:

- **High:** greater than 1 in 30 (3.3%).
- **Medium:** between 1 in 100 (1%) and 1 in 30 (3.3%).
- **Low:** between 1 in 1000 (0.1%) and 1 in 100 (1%).
- **Very Low:** less than 1 in 1000 (0.1%)

Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area.

There is a caveat on the Defra Data website, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they are indicative, these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

SEQUENTIAL APPROACH

When applying the sequential approach for flood risk in accordance NPPF the site would fall into Flood Zone 3 (High Probability) as shown on the Environment Agency's Flood Map without defences in place.

The Environment Agency categorise land into one of three Flood Zones.

- Flood Zone 1 is Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as

‘clear’ on the Flood Map – all land outside Zones 2 and 3)

- Flood Zone 2 is Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
- Flood Zone 3a is Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed use is classified as, “Less Vulnerable” use, Table 1 of NPPG states that such uses are appropriate in this zone (as summarised in Table 3 NPPG)

Table 3: Flood Risk Vulnerability and Flood Zones ‘Compatibility’

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Flood Zone 1	✓	✓	✓	✓	✓
	Flood Zone 2	✓	✓	Exception Test Required	✓	✓
	Flood Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Flood Zone 3b Functional Floodplain	Exception Test Required	✓	✗	✗	✗

Sequential & Exception Test

NPPF Guidance Paragraphs 155 - 165 requires development within high areas of flood risk be determined using a sequential risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account the impacts of climate change.

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The NPPF states that development should not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. It is important to note that the Sequential Test does not specifically mean that sites such as this cannot be developed, rather that sites at less risk should be developed first. The whole of the surrounding area is shown on the Flood Map for Planning to be in Flood Zone 3 and there are no other sites in a lower flood zone.

With the site having an extant planning approval for a residential dwelling it is concluded that the site satisfies the Sequential Test and Part 1 of the Exception Test.

This Flood Risk Assessment confirms that Part 2 of the Exceptions Test has been satisfied and demonstrates that

the proposed residential development can be carried out in a safe and sustainable manner.

For the proposed new access road and parking areas the Planning Practice Guidance states: - When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere.

The proposal needs a dedicated base and cannot operate on a disaggregated basis, which would result in multiple trips across the district to access various elements of the project. It is therefore considered that the Sequential Test has been satisfied. With these being Less Vulnerable uses of land, the exception test is not required.

DRAINAGE STATEMENT

Surface Water Drainage

The drainage statement for the extant planning approval, for the site, proposed to utilise attenuation techniques to reduce the storm water discharge from the proposed buildings and to minimise the impact of the development on the surrounding area and to comply with guidelines, which require at least one workable solution for managing surface water. An allowance was made for the run-off from the roof of the proposed dwelling.

In accordance with recognised guidance, National Planning Policy Framework 2012, there is a hierarchy of where surface water should discharge. This hierarchy should be followed where practicable, and is as follows:

- 1) Infiltration
- 2) Watercourse
- 3) Public sewer

Infiltration

No infiltration methods are to be utilised for the disposal of surface water from the new and altered buildings as the infiltration tests for soakaways were negative. **Document 2**

Watercourse

Under the extant planning approval, it was proposed that a surface water connection to a watercourse will be used as the method of disposal of surface water from the proposed and extended roof areas of the buildings, after attenuation at a maximum discharge rate of 5 litres/sec. (default Greenfield rate)

The surface water from the relocated dwelling will be collected into underground pipes to convey the flows to the attenuation pond approximately 4.1m x 9.0m x 1.00m, (or similar) attenuation pond with 1:2 side slopes will provide 37m³ of storage with 0.30m of freeboard. The pond will be located in the adjacent field and the discharged limited to 5 l/sec to the adjacent watercourse shown on the drainage plan.

The proposed vehicle storage area and the proposed access road will be constructed with a hardcore subbase topped with gravel so would mimic the existing ground conditions.

As there is a positive drainage system capable of receiving flows from the development there is no likely impact on neighbouring property.

Any drainage routes through the Site will be maintained both during the works on Site and after completion of the works. The upstream and downstream riparian owners and any areas that are presently served by any drainage routes passing through or adjacent to the Site, will not be adversely affected by the development, as there are no changes to these, proposed by the development.

The management of Anglia UK Ltd will be responsible for the maintenance of the entire surface water drainage system.

Sewers

There are no proposals to discharge surface water to sewers.

Foul Water Drainage

There are no additional proposals for the need for additional foul drainage requirements.

As there is a positive drainage system capable of receiving flows from the development there is no likely impact on neighbouring property.

CLIMATE CHANGE

Global warming is now recognised that it is likely to affect the frequency and severity of extreme events as both tidal and fluvial flooding. The Climate change allowances in the NPPF Guidance was updated on the 19th February 2016 and again on the 17th December 2019.

The site is located within the Anglian River Basin, for sites within Flood Zone 3a and for “Less Vulnerable” land uses the Higher Central and Central river flow allowances figures in Table 1 should be used.

Table 1 Peak river flow allowances by river basin district (1961 to 1990 baseline)				
River basin District	Allowance category	Total potential change anticipated for ‘2020s’ (2015 to2039)	Total potential change anticipated for ‘2050s’ (2040 to2069)	Total potential change anticipated for ‘2080s’ (2070 to2115)
Anglian	Upper End	25%	35%	65%
	Higher Central	15%	20%	35%
	Central	10%	15%	25%

The effect of global warming on peak rainfall allowances is given in Table 2.

Table 2 Peak rainfall intensity allowance in small and urban catchments (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%
Higher Central	5%	10%	20%

The annual sea rise due to climate change is given in NPPF and the recommended contingency allowances are stated in Table 3

Table 3 Peak sea level allowance for each epoch in (mm) per year with cumulative sea level rise for each epoch in brackets (use 1981 to 2000 baseline)						
Area of England) (Use River Basin	Allowance	2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125	Cumulative Rise 2000 to 2125 (m)
Anglian	Higher Central	5.8 (203mm)	8.7 (261mm)	11.6 (348mm)	13 (390mm)	1.20m
Anglian	Upper End	7 (245mm)	11.3 (339mm)	15.8 (474mm)	18.1 (543mm)	1.6m

The tidal flood defences consist of earth embankments are, they are in good condition and are well maintained by the Environment Agency.

Climate Change using Higher Central allowances

Base year 2017 – 2035 @ 5.8mm/year (18 years x 5.8mm) = 104.4mm

2036 – 2055 @ 8.7mm/year (30 years x 8.7) = 261mm

2066 – 2095 @ 11.6mm/year (30 years x 11.6) = 348mm

2096 – 2120 @ 13mm/year (24 years x 13) = 312mm

Overall total = **1025mm**

From Information requested from the Environment Agency the Main risk of flooding of the site is from the tidal River Welland which is located some 2.55 Km east of the site and is tidal down stream of Marsh Lane Sluice, the 1 in 200-year tide flood level for year Present Day (2006) at Marsh Road (Tidal River) 0.5% (1 in 200) = 5.98mODN. Peak tide levels (2116) at Marsh Road (Tidal River) 0.5% (1 in 200) = 5.98mODN plus climate change allowances from Table 3 of 1.21mm = 7.11mODN

The tidal flood defences of the tidal River Welland consist of earth embankments which are provided with a soak dyke on the landward toe, they are in good condition and the minimum crest heights are 7.57mODN, this provides a protected freeboard of 360mm.

With the floor level being decided from the breach tidal flood depths, any flooding from fluvial sources is considered to be less.

FLOOD PROTECTION

Any impact of damage to the properties can be foreseen and mitigated against by relatively simple design and construction techniques. There are two forms of flood protection works: -

- **Flood-resistance or proofing works:** - these try to reduce the amount of water entering a building.
- **Flood-resilient works:** - these reduce the amount of damage caused by water entering the building.

The proposed amenity building will have the following resilient measures incorporated in the construction in accordance with "Improving the flood performance of new buildings" CLG (2007).

- The ground floor level for the proposed building is to be raised 300mm above the existing ground level.
- Arrange for all service circuits to be routed at high level and where practical socket outlets and switchgear. to be a minimum of 0.5m above the raised ground floor level.

CONCLUSION

- The proposed development site is shown to be within Flood Zone 3a 'High Probability' as detailed on the Environment Agency's Flood Zone Maps without defences.
- The site does have the protection of both tidal and fluvial flood defences which are well maintained by the Environment Agency.
- The 2017 Update to SHDC, SFRA has carried out a Tidal Hazard Mapping, River Welland upstream of Welland Bridge, following a breach to the defences. The Tidal Hazard, Velocity and Depth Maps, year 2115, for the 1 in 1000-year event, shows that the site where the proposed dwelling and industrial units are to be located are not within an area affected by flooding from a breach to the flood defences.
- The ground floor level for the dwelling is to be raised 300m above the existing average ground level with the proposed level set at 3.30mODN, which is considered to be above the 2115 climate change breach level at the site. This accords with the FFL in the extant planning approval. With regard to flood risk, there is nowhere on the site to locate the dwelling where it would be at a lower level of flood risk.
- The Flood Risk Vulnerability Classification in Table 2 of NPPG the proposed residential development is classified as "More Vulnerable", with Table 1 of NPPG stating that such uses are appropriate in this zone subject to the Exception Test. All other uses are classified as "Less Vulnerable" with Table 1 of NPPG stating that such uses are appropriate in this zone.
- The drainage strategy for the development is the utilisation of on- site Suds attenuation methods with attenuated flows discharged to a watercourse as approved by the extant planning approval. .
- Flooding from other sources is unlikely to affect the site.

- No obvious constraints have been identified that may impact the proposed development and the type of mitigation measures that can be used to reduce the flood risk, there is no increase in the flood risk to others. Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation is maintained for the lifetime of the development.
- Any impact of damage to the properties can be foreseen and mitigated against by relatively simple design and construction techniques. They will be constructed using materials which are flood resilient construction as stated in the report.

Flood map for planning

Your reference
Anglia UK

Location (easting/northing)
523554/324633

Created
24 Sep 2020 13:35

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/>

Map 1



Flood map for planning

Your reference

Anglia UK

Location (easting/northing)

523554/324633

Scale

1:2500

Created

24 Sep 2020 13:35

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

0 20 40 60m

Page 2 of 2

Flood risk

Extent of flooding

Location

Anglia UK

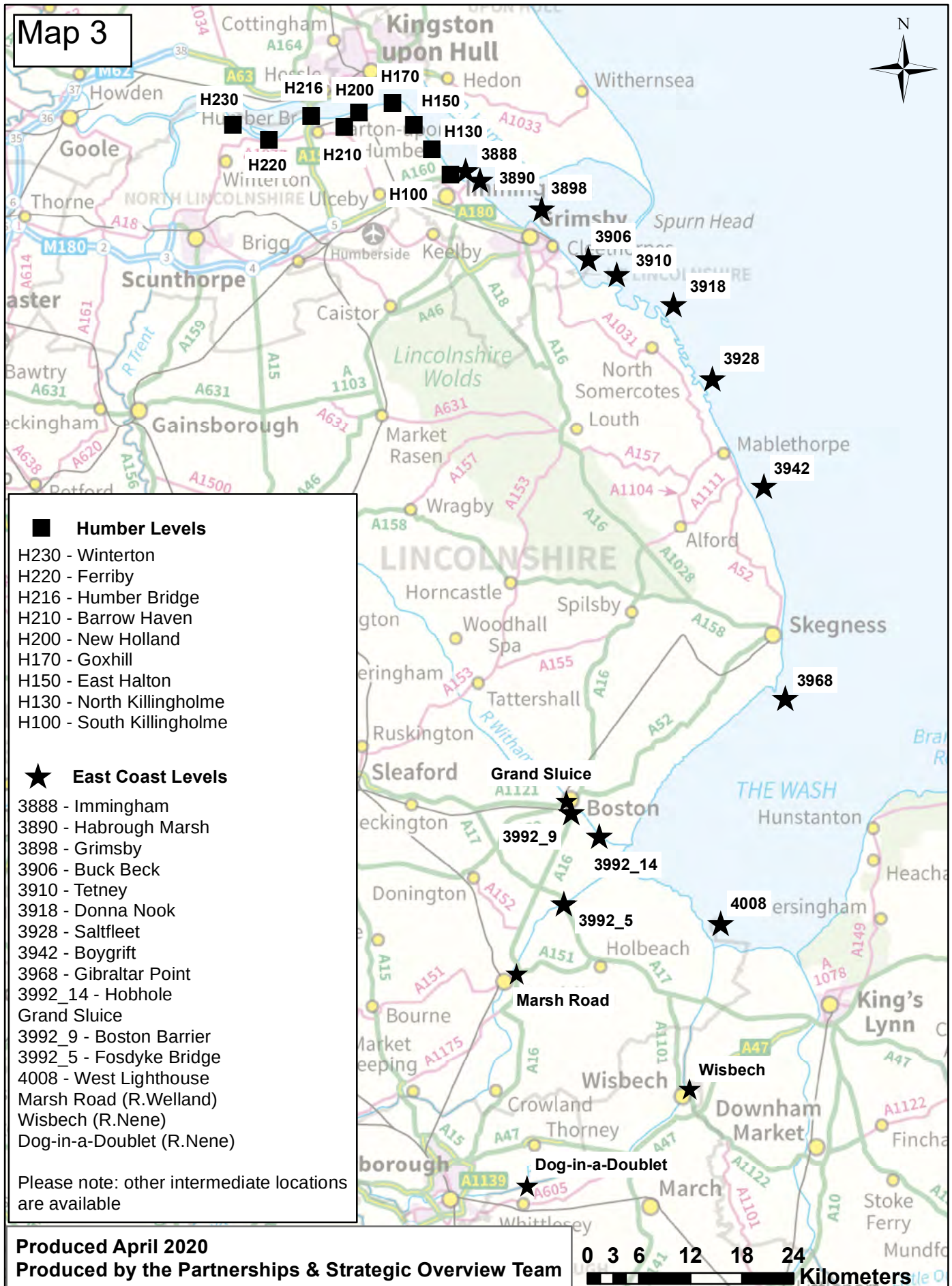
Map 2



Extent of flooding from rivers or the sea

 High
 Medium
 Low
 Very low

Tidal Level Location Map Lincolnshire & Northamptonshire Area



2014 Interim Water Level Profile

REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL METRES ODN																				
				1			10			50			100			200			300			1000		
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound		
				5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%
H230	Winterton	493420	422830	5.13	5.14	5.15	5.47	5.51	5.56	5.67	5.74	5.82	5.74	5.83	5.92	5.81	5.90	6.00	5.84	5.94	6.03	5.94	6.02	6.06
H220	Ferriby	497550	421150	5.03	5.04	5.05	5.38	5.42	5.47	5.59	5.67	5.77	5.67	5.77	5.89	5.74	5.86	6.00	5.78	5.91	6.06	5.91	6.04	6.19
H216	Humber Bridge	502478	423914	4.97	4.98	4.99	5.33	5.37	5.42	5.55	5.64	5.74	5.64	5.75	5.88	5.72	5.86	6.02	5.75	5.92	6.10	5.88	6.09	6.31
H210	Barrow Haven	506380	422620	4.91	4.92	4.93	5.27	5.31	5.36	5.50	5.60	5.72	5.60	5.73	5.89	5.69	5.86	6.08	5.74	5.94	6.18	5.87	6.17	6.51
H200	New Holland	508020	424330	4.86	4.87	4.88	5.21	5.26	5.31	5.45	5.55	5.67	5.55	5.68	5.84	5.64	5.81	6.03	5.68	5.89	6.13	5.82	6.12	6.47
H170	Goxhill	511970	425440	4.66	4.67	4.68	5.00	5.04	5.09	5.24	5.34	5.46	5.33	5.47	5.65	5.43	5.61	5.85	5.47	5.69	5.96	5.62	5.95	6.37
H150	East Halton	514450	422870	4.58	4.59	4.60	4.91	4.96	5.01	5.15	5.25	5.38	5.25	5.39	5.57	5.34	5.53	5.77	5.39	5.62	5.90	5.54	5.89	6.33
H130	North Killingholme	516530	420000	4.50	4.51	4.52	4.82	4.87	4.92	5.05	5.15	5.28	5.15	5.28	5.46	5.24	5.42	5.66	5.29	5.51	5.78	5.43	5.77	6.19
H100	South Killingholme	518700	417120	4.41	4.41	4.42	4.72	4.77	4.82	4.95	5.05	5.17	5.05	5.18	5.35	5.14	5.32	5.55	5.18	5.40	5.67	5.33	5.66	6.08
3888	Immingham*	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01

NOTE:

- The base date for the data is 2014.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- The information is due to be updated in mid-2020
- *The levels for Immingham are taken from the 2018 Coastal Flood Boundary dataset.

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

CFB REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL IN METRES ODN																						
				1			10			50			100			200			300			1000				
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound				
				2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%
3888	Immingham	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01		
3890	Haborough Marsh	522100	416512	4.14	4.15	4.17	4.48	4.51	4.60	4.70	4.77	4.97	4.80	4.90	5.16	4.90	5.03	5.38	4.94	5.10	5.51	5.11	5.34	5.97		
3898	Grimsby	529295	413162	3.98	3.99	4.01	4.31	4.34	4.43	4.53	4.60	4.80	4.61	4.71	4.97	4.71	4.84	5.19	4.74	4.90	5.31	4.88	5.11	5.74		
3906	Buck Beck	534709	407369	3.87	3.88	3.90	4.19	4.23	4.31	4.41	4.50	4.68	4.50	4.61	4.86	4.61	4.75	5.10	4.64	4.82	5.22	4.80	5.05	5.66		
3910	Tetney	538035	405537	3.85	3.86	3.89	4.17	4.22	4.30	4.40	4.50	4.67	4.49	4.61	4.86	4.60	4.75	5.10	4.63	4.82	5.21	4.80	5.06	5.66		
3918	Donna Nook	544641	401997	3.82	3.83	3.86	4.14	4.19	4.27	4.38	4.48	4.65	4.47	4.60	4.85	4.58	4.74	5.10	4.63	4.82	5.22	4.81	5.08	5.68		
3928	Saltfleet	549131	393360	3.78	3.79	3.82	4.11	4.16	4.26	4.36	4.46	4.64	4.47	4.59	4.86	4.57	4.74	5.11	4.63	4.83	5.25	4.83	5.11	5.74		
3942	Boygrift	555131	380860	3.72	3.74	3.77	4.06	4.11	4.22	4.33	4.43	4.65	4.43	4.57	4.87	4.56	4.73	5.13	4.62	4.83	5.28	4.85	5.15	5.82		
3968	Gibraltar Point	557652	356181	4.16	4.17	4.20	4.51	4.56	4.67	4.76	4.85	5.08	4.85	4.97	5.27	4.94	5.10	5.49	4.99	5.18	5.63	5.14	5.41	6.09		
3992_14	Hobhole	535990	340116	4.96	4.97	5.01	5.40	5.44	5.56	5.66	5.76	5.98	5.78	5.90	6.20	5.88	6.04	6.44	5.92	6.11	6.57	6.03	6.31	6.99		
	Grand Sluice*	532366	344510	4.93	4.94	4.98	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
3992_9	Boston Barrier	532754	342852	4.93	4.94	4.98	5.41	5.45	5.57	5.73	5.83	6.05	5.85	5.97	6.27	5.93	6.09	6.49	5.94	6.13	6.59	5.98	6.26	6.94		
3992_5	Fosdyke Bridge	531886	332234	4.87	4.88	4.92	5.31	5.35	5.47	5.58	5.68	5.90	5.71	5.83	6.13	5.82	5.98	6.38	5.87	6.06	6.52	6.01	6.29	6.97		
4008	West Lighthouse	550094	329971	4.87	4.88	4.91	5.21	5.26	5.37	5.46	5.56	5.78	5.56	5.68	5.98	5.66	5.82	6.21	5.71	5.90	6.35	5.86	6.14	6.81		
-	Marsh Road	525988	324065	-	5.04	-	-	5.44	-	-	5.73	-	-	5.85	-	-	5.98	-	-	-	-	-	-	-		
-	Wisbech	546110	309940	-	4.83	-	-	5.25	-	-	5.53	-	-	5.66	-	-	5.78	-	-	-	-	-	-	-		
-	Dog-in-a-Doublet	527200	299287	-	3.67	-	-	4.00	-	-	4.22	-	-	4.32	-	-	4.42	-	-	-	-	-	-	-		

See next page for notes

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

The following notes apply to all CFB sites (ie all on table excluding Marsh Road, Wisbech, Dog-in-a-Doublet)

- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

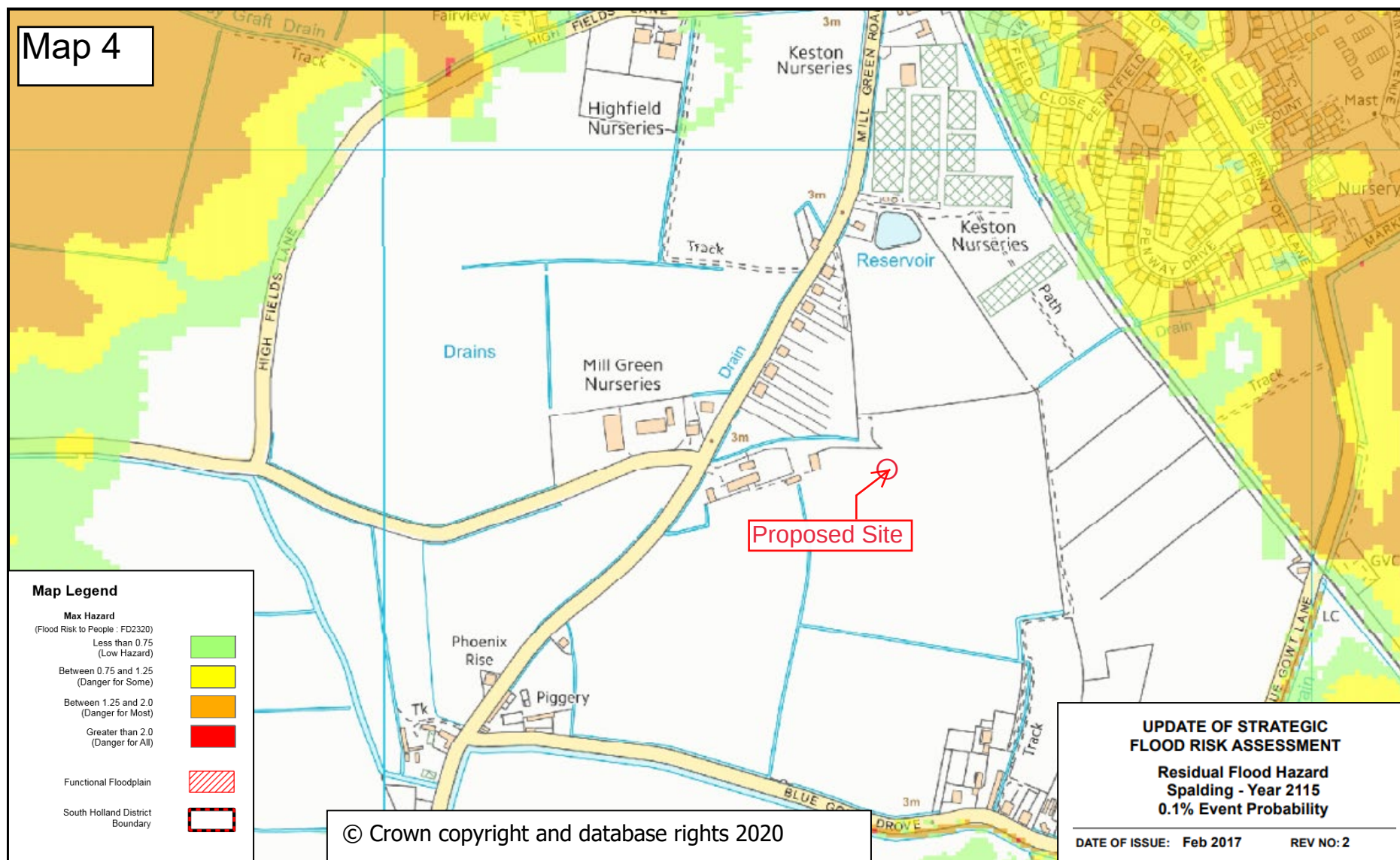
The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These levels will be updated as their respective tidal river models are updated.

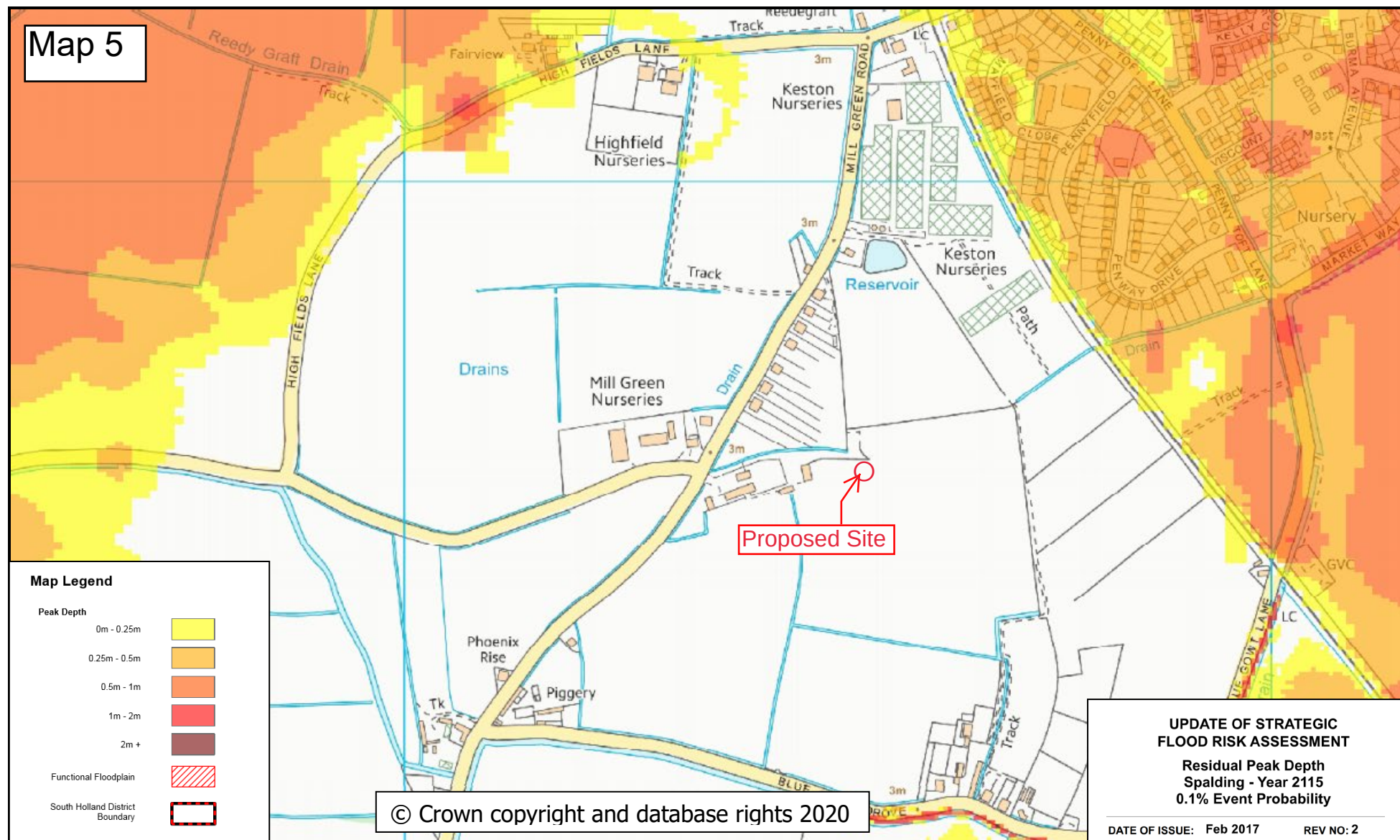
The following notes apply to Grand Sluice

- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

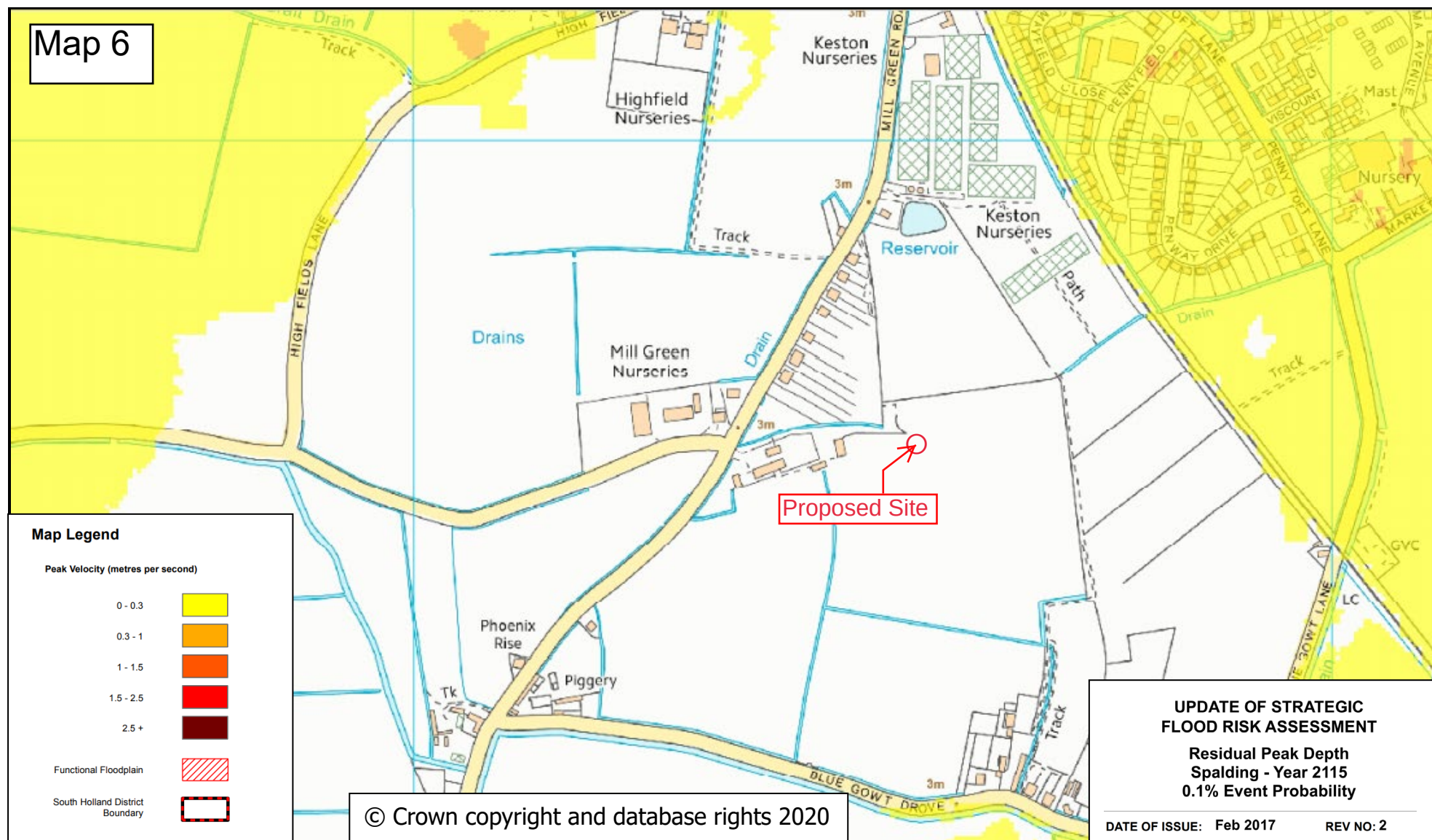
Map 4



Map 5



Map 6



Flood risk

Low risk: depth

Location

Anglia UK

Map 7

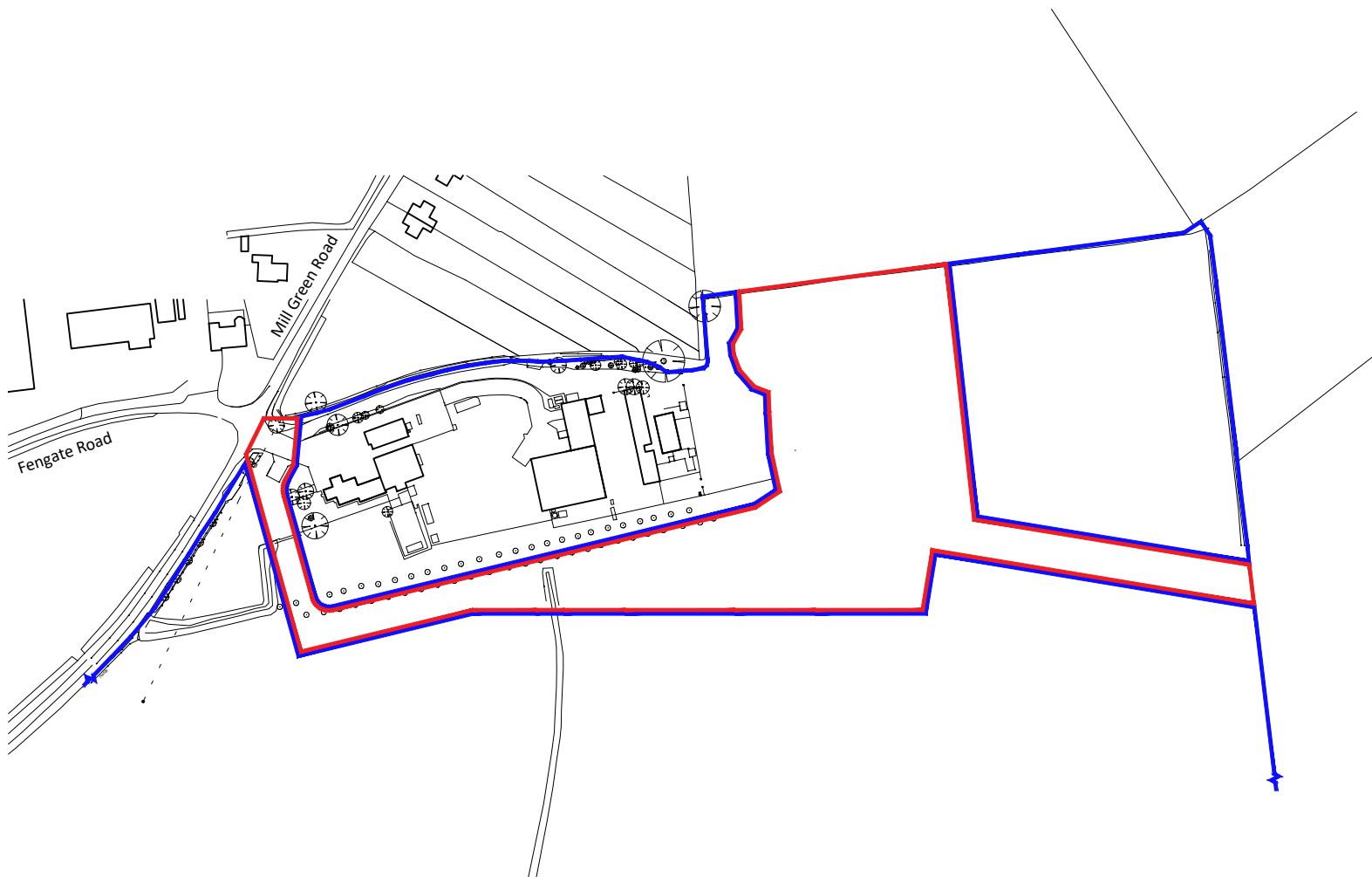


Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm

Plan 1



Notes

Copyright

© Robert Doughty Consultancy Limited.
All rights described in the Copyright, Designs and Patents Act 1988 have been asserted.

Ordnance Survey Map

© Crown Copyright. OS Licence No: AR 100010613.

Rev	Description	Date
-----	-------------	------

rdc
Robert Doughty
Consultancy

32 High Street, Helpringham
Sleaford, Lincolnshire, NG34 0RA

Tel: 01529 421646
Email: admin@rdc-landplan.co.uk
Web: www.rdc-landplan.co.uk

Client

Anglia UK Ltd

Project

Vehicle storage & managers accommodation replan
Mill Green Road, Pinchbeck

Drawing

Location Plan

Scale @ A4

1: 2500

Date

07/09/20

Drawn By

WW

Checked By

LMS

Job Number

823-22

Status

PL

Purpose of Issue

Planning

Drawing No.

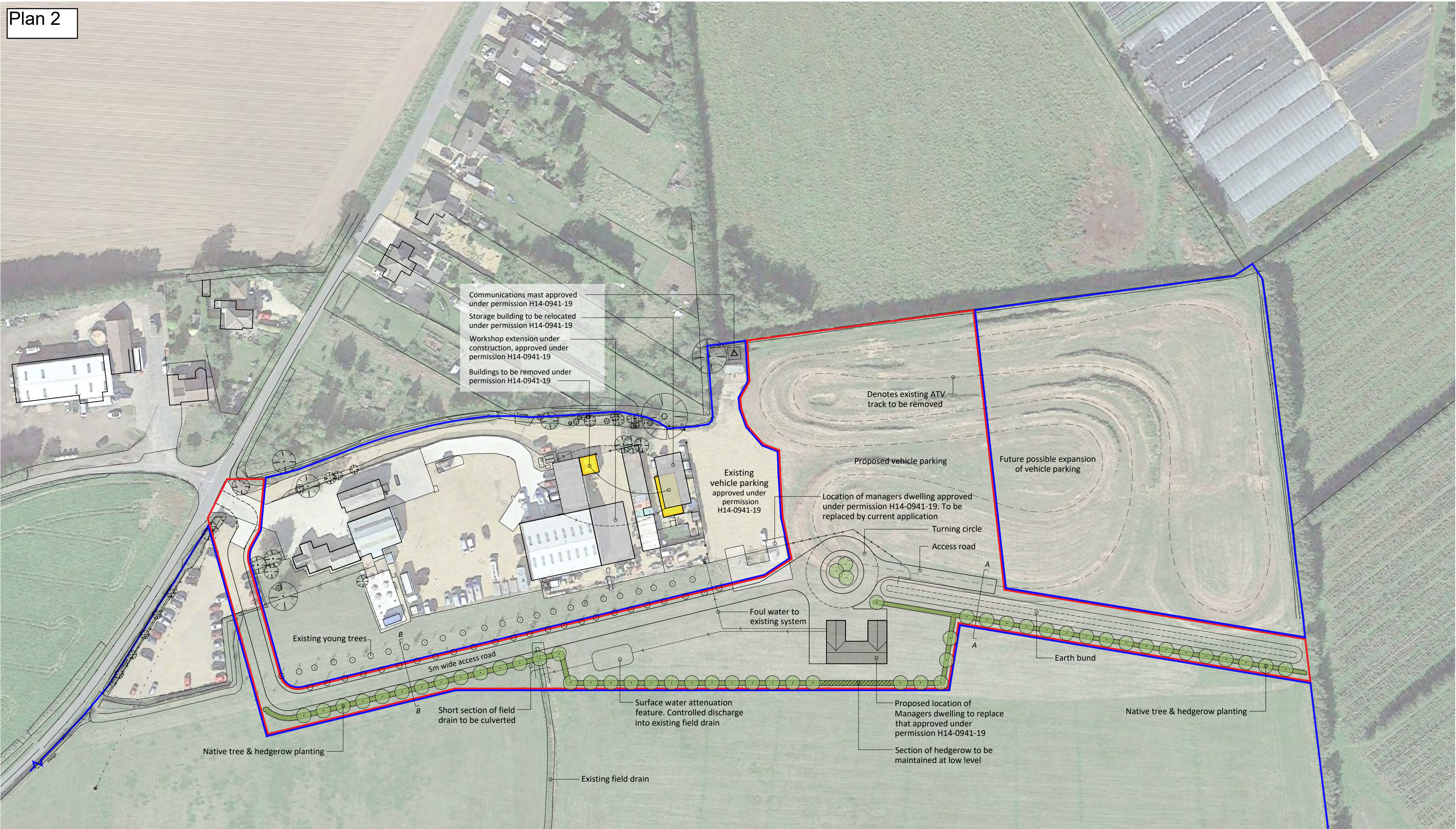
823-22_PL_LP01

Rev

-



0 20 40 60 80 100m



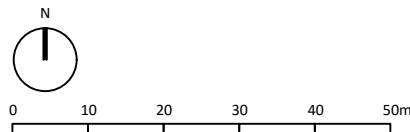
Notes

Copyright
© Robert Doughty Consultancy Limited.
All rights described in the Copyright, Designs and Patents Act 1988 have been asserted.

Ordnance Survey Map
© Crown Copyright. OS Licence No: AR 100010613.

Dimensions
All dimensions shown are for the purposes of obtaining the relevant planning permission only.

CDM 2015
This drawing is for illustrative purposes and/or obtaining the relevant planning permission only. It should not be used for construction and accordingly, risk identification under the Construction (Design & Management) Regulations 2015 has not been undertaken.



Rev	Description	Date
-----	-------------	------



32 High Street, Helpringham
Sleaford, Lincolnshire, NG34 0RA

Tel: 01529 421646
Email: admin@rdc-landplan.co.uk
Web: www.rdc-landplan.co.uk

Client
Anglia UK Ltd

Project
Vehicle storage & managers accommodation replan
Mill Green Road, Pinchbeck

Drawing
Proposed Site Plan

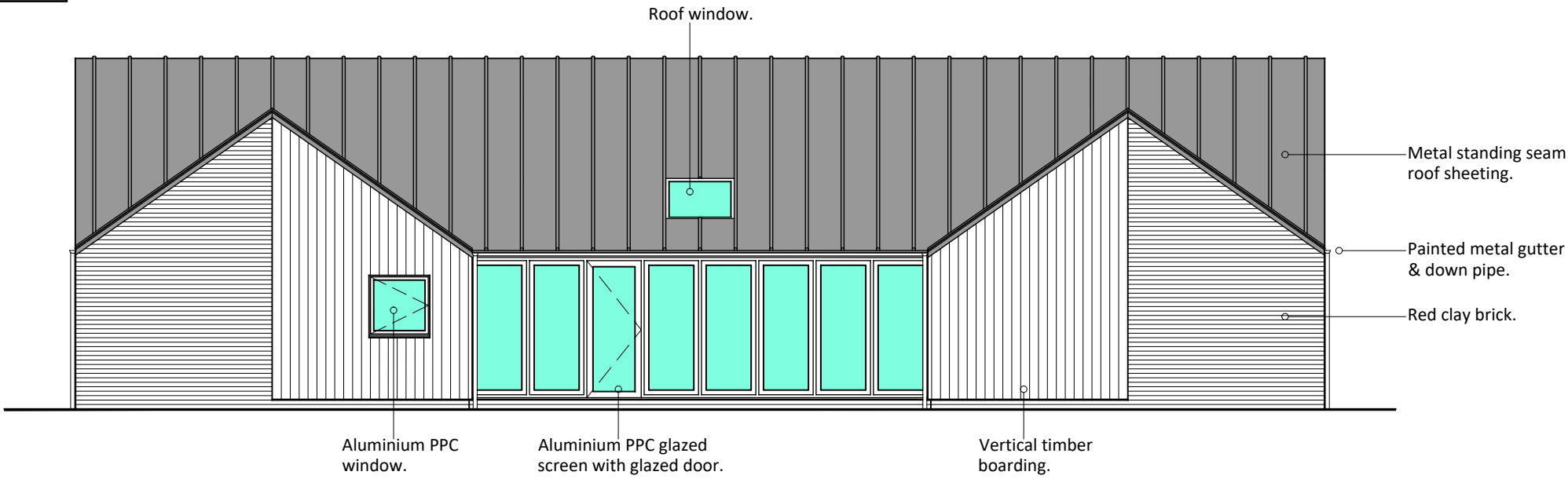
Scale @ A2 1: 1000	Date 07/09/20
------------------------------	-------------------------

Drawn By WW	Checked By LMS
-----------------------	--------------------------

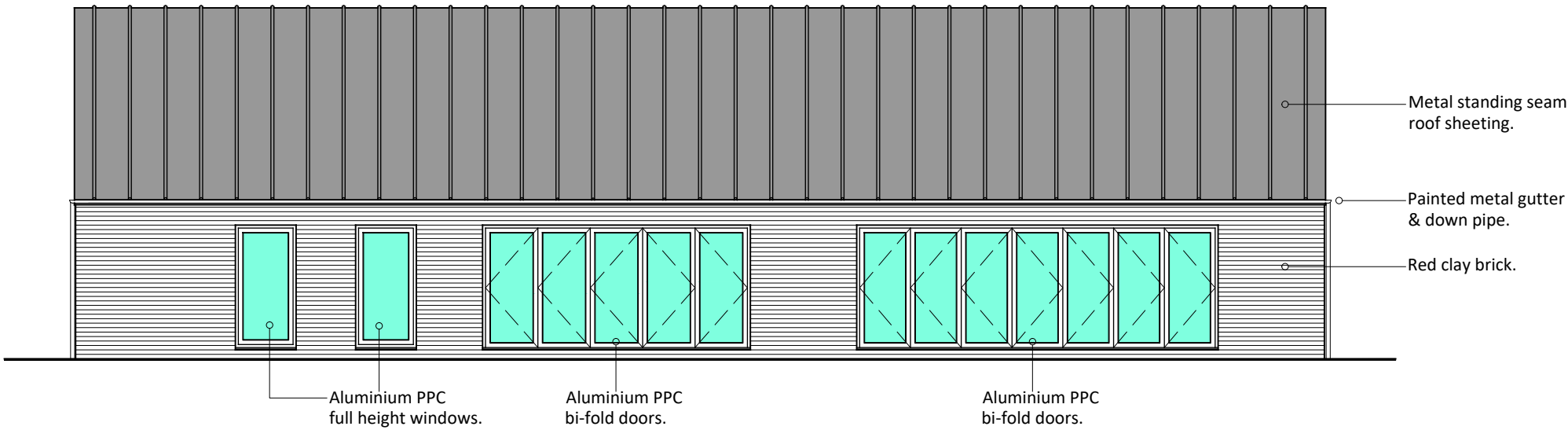
Job Number 823-22	Status PL	Purpose of Issue Planning
-----------------------------	---------------------	-------------------------------------

Drawing No. 823-22_PL_SP01	Rev -
--------------------------------------	-----------------

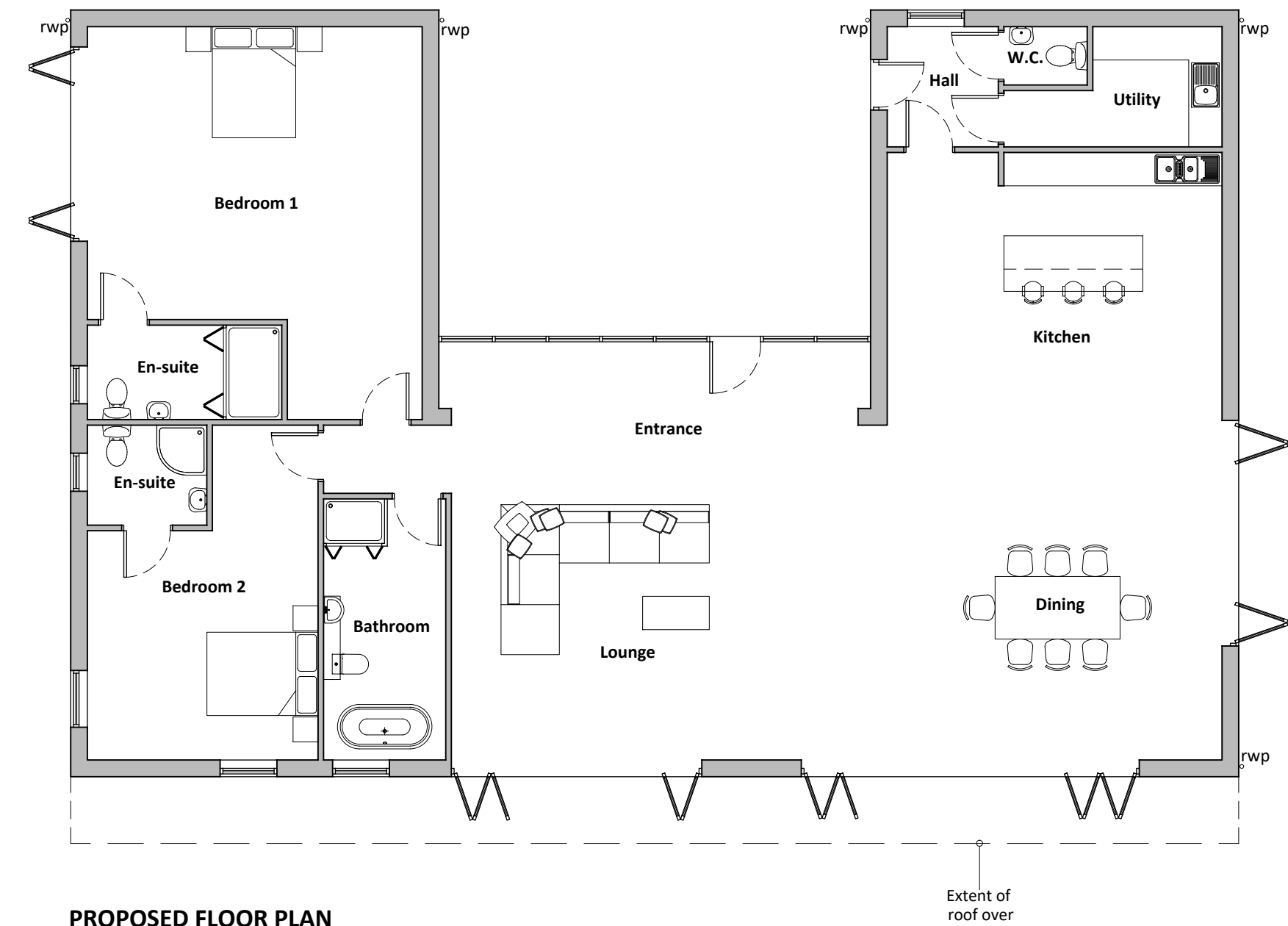
Trees					
Qty	Species	Girth (cm)	Height (cm)	Root Zone	Specification
15	Acer campestre	6-8	150-175	CG	Selected Standard
12	Alnus glutinosa	6-8	150-175	CG	Selected Standard
11	Carpinus betulus	6-8	150-175	CG - BR	Selected Standard
7	Prunus avium	6-8	150-175	CG	Selected Standard
8	Tilia cordata	6-8	150-175	CG	Selected Standard
53					
All Selected Standard trees to be Clear Stemmed to 1.8m					
Native Hedgerow Mix					
Qty	Species	% Mix	Height (cm)	Root Zone	Specification
240	Prunus spinosa	10	60-80	Bare Root	1+1
240	Prunus padus	10	60-80	Bare Root	1+1
240	Acer Campestre	10	60-80	Bare Root	1+1
240	Rosa canina	10	60-80	Bare Root	1+1
240	Corylus avellana	10	60-80	Bare Root	1+1
1200	Crataegus monogyna	50	60-80	Bare Root	1+1
2400					
For gapping-up and new lengths of hedgerow, use double staggered row at 350mm centres and 350mm between rows. For strengthening existing hedge, use double staggered row at 350mm centres and 350mm between rows. Single species groups maximum 5 no.					



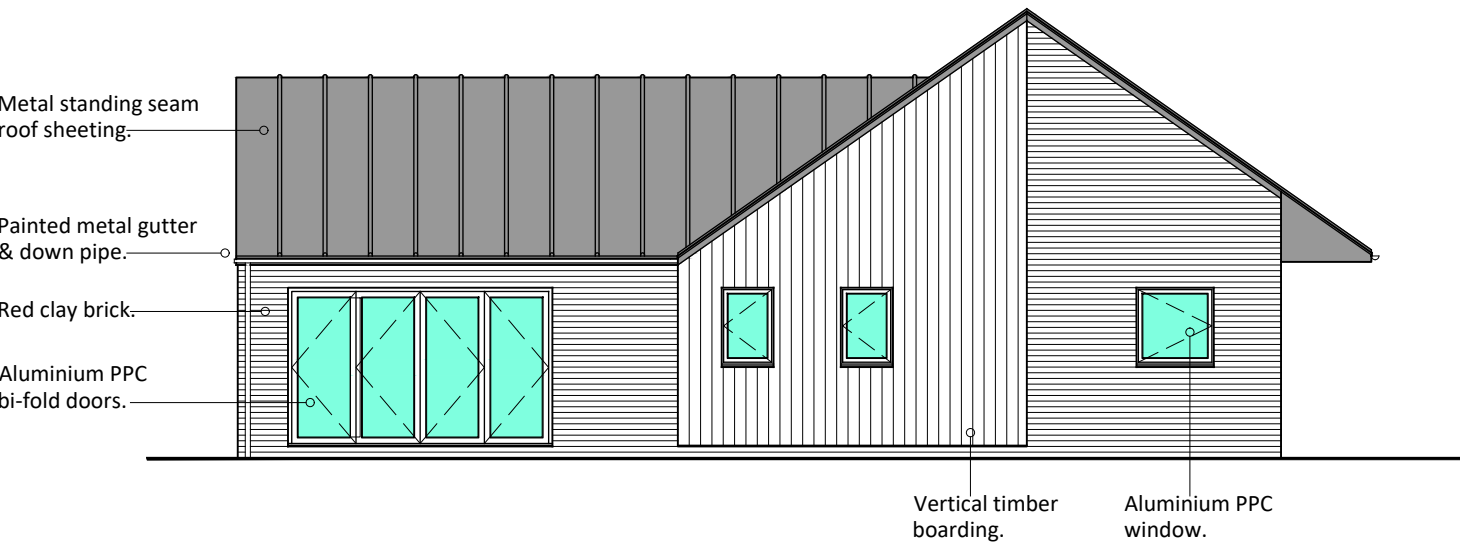
NORTH ELEVATION



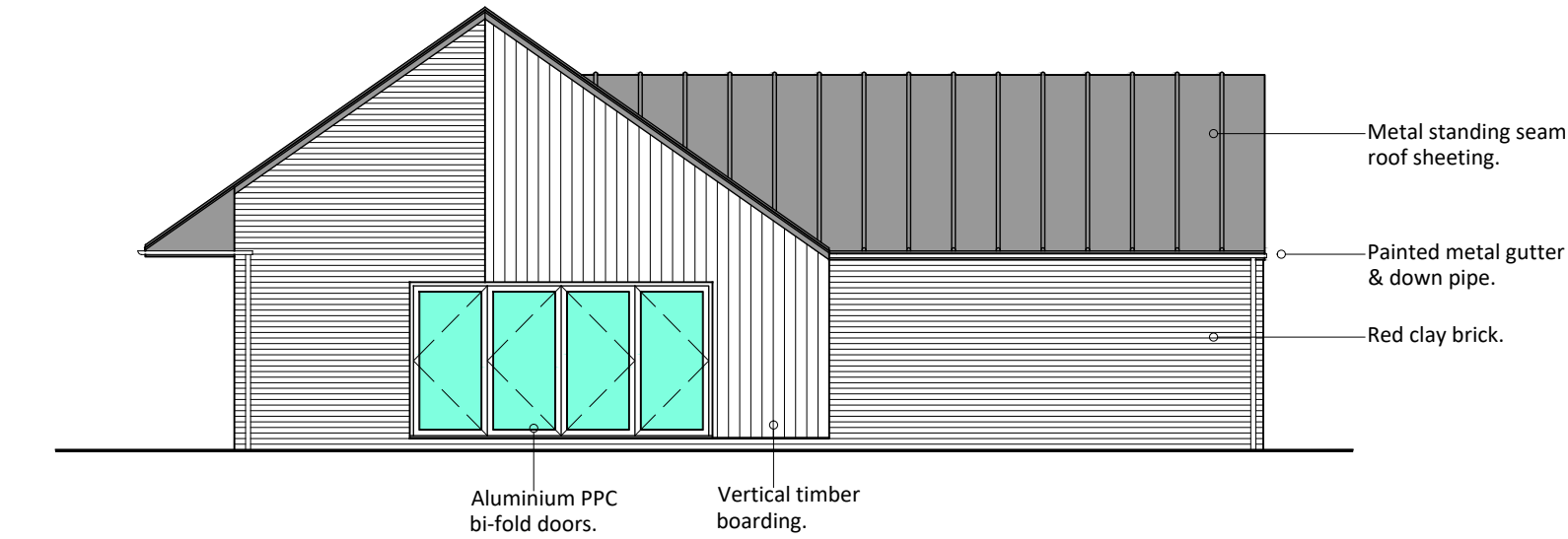
SOUTH ELEVATION



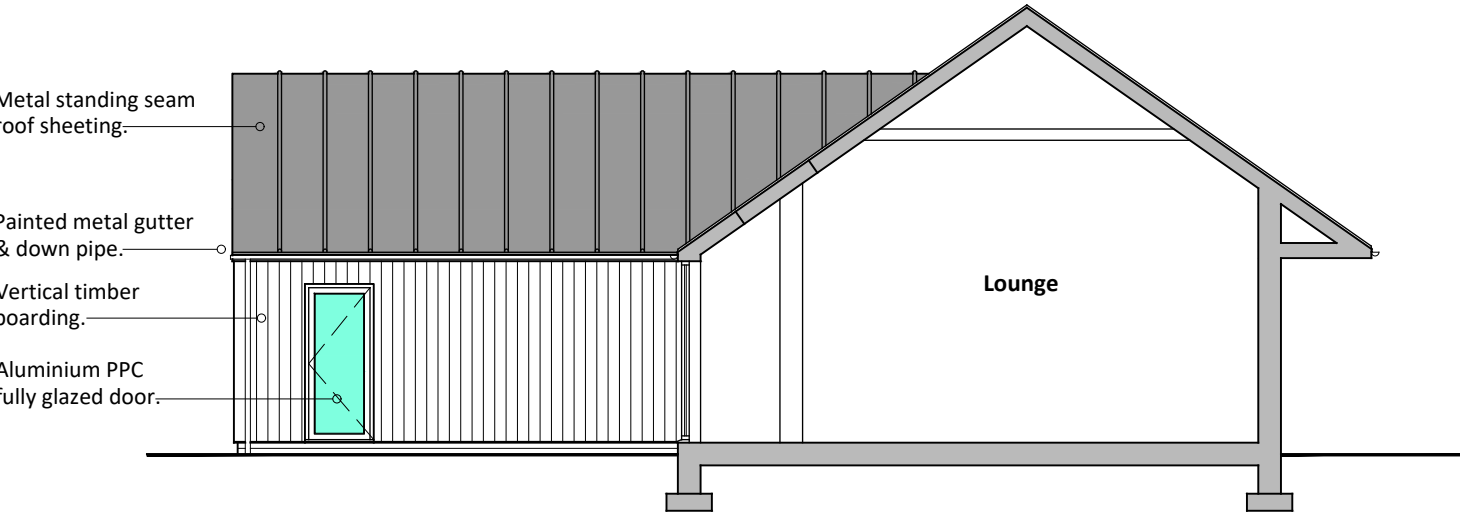
PROPOSED FLOOR PLAN



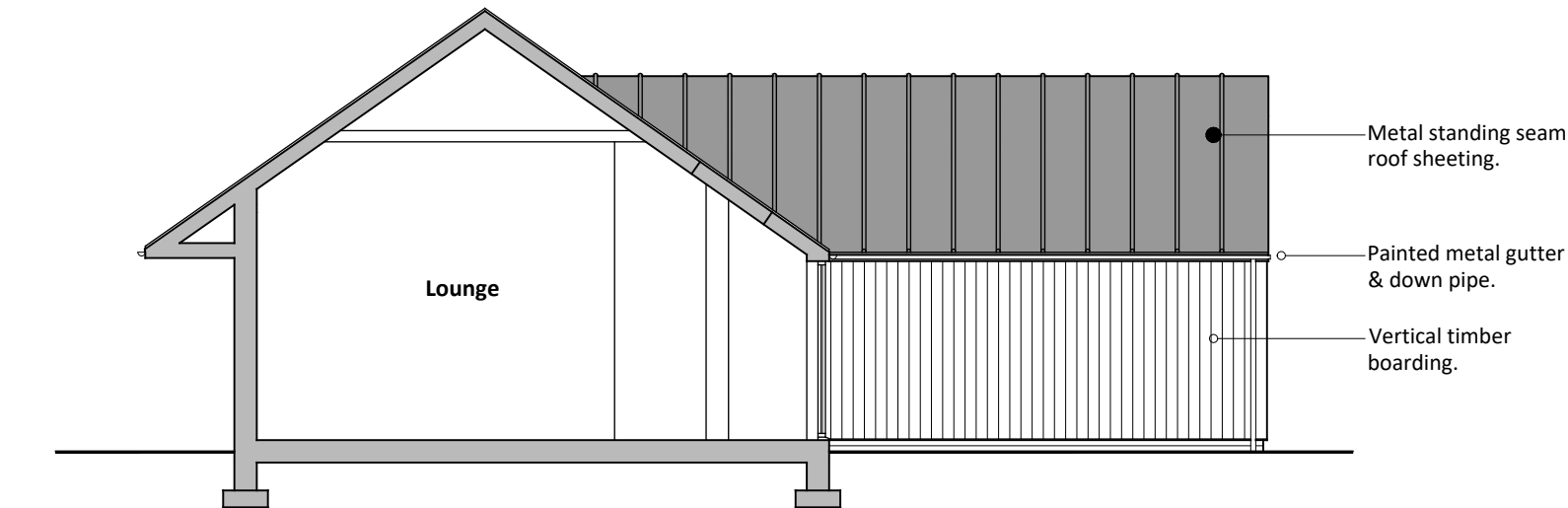
EAST ELEVATION



WEST ELEVATION



EAST ELEVATION



WEST ELEVATION

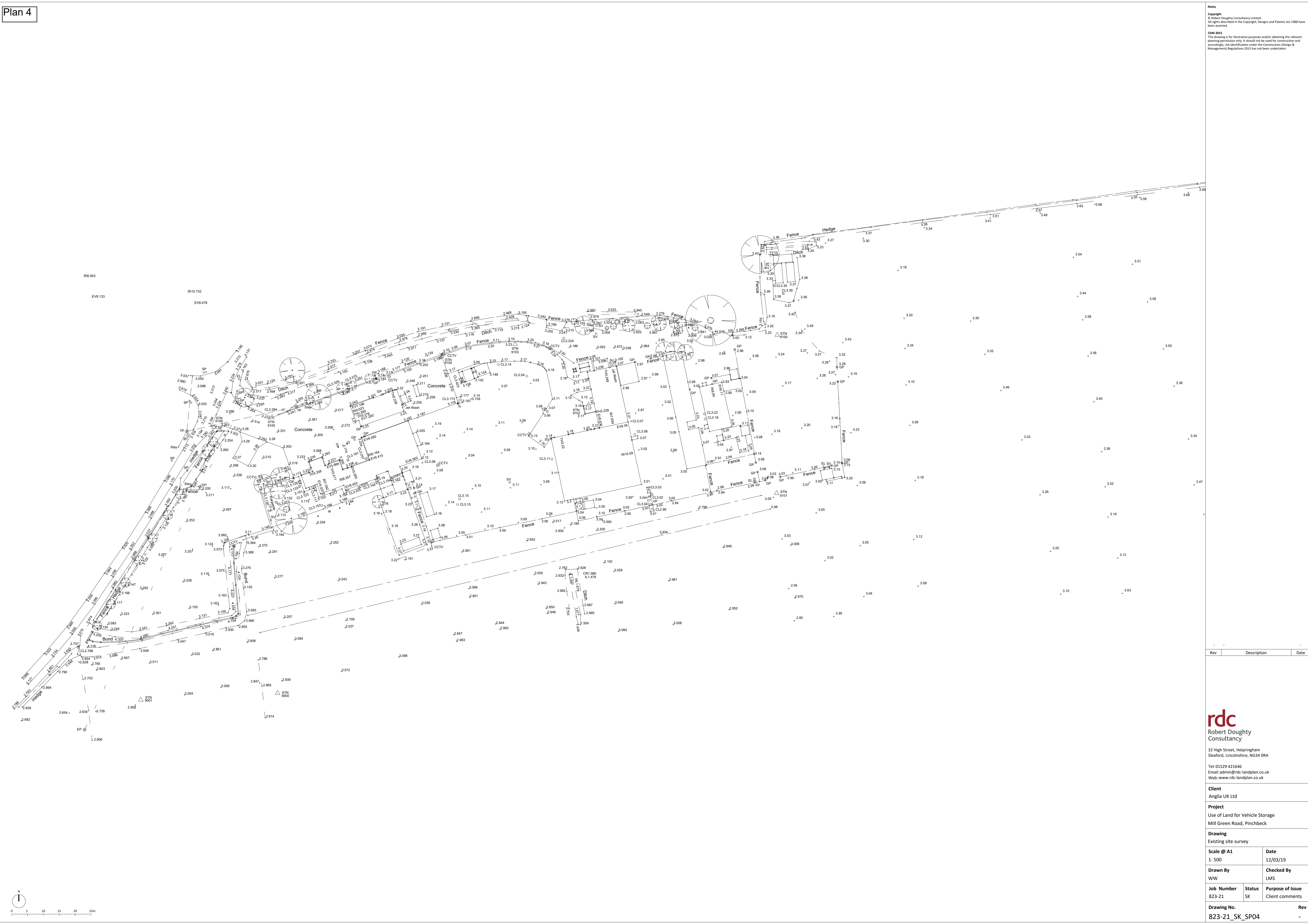
Notes

Copyright
© Robert Doughty Consultancy Limited.
All rights described in the Copyright, Designs and Patents Act 1988 have been asserted.

Dimensions
Use figured dimensions only. All dimensions should be checked against on site conditions and any discrepancies should be brought to the attention of Robert Doughty Consultancy Limited.

CDM 2015
As part of our designer duties under the Construction (Design & Management) Regulations 2015, we have minimised the risks as far as reasonably practicable whilst carrying out our normal design process. Any items that would require additional identification or explanation of risks remaining are detailed on this drawing and/or in the accompanying risk register. However, we deem the design and construction described on this drawing is not past the realms of capability for a competent Principal Contractor using traditional methods of construction.

Rev	Description	Date
rdc Robert Doughty Consultancy		
32 High Street, Helpringham Sleaford, Lincolnshire, NG34 0RA Tel: 01529 421646 Email: admin@rdc-landplan.co.uk Web: www.rdc-landplan.co.uk		
Client Anglia UK Ltd		
Project Vehicle storage & managers accommodation replan Mill Green Road, Pinchbeck		
Drawing Proposed Dwelling - Plan & Elevations		
Scale @ A2 1: 100		Date 07/09/20
Drawn By MG		Checked By PSS
Job Number 823-21	Status MG	Purpose of Issue Planning
Drawing No. 823-22_PL_GA01		Rev -



Notes
Copyright
© Robert Doughty Consultancy Limited.
All rights described in the Copyright, Designs and Patents Act 1988 have been asserted.
CDM 2015
This drawing is for illustrative purposes and/or obtaining the relevant planning permission only. It should not be used for construction and accordingly, risk identification under the Construction (Design & Management) Regulations 2015 has not been undertaken.

Rev	Description	Date
-----	-------------	------

rdc
Robert Doughty
Consultancy
32 High Street, Helpingham
Sleaford, Lincolnshire, NG34 0RA
Tel: 01529 421646
Email: admin@rdc-landplan.co.uk
Web: www.rdc-landplan.co.uk

Client
Anglia UK Ltd

Project
Use of Land for Vehicle Storage
Mill Green Road, Pinchbeck

Drawing
Existing site survey

Scale @ A1 1: 500	Date 12/03/19
-----------------------------	-------------------------

Drawn By WW	Checked By LMS
-----------------------	--------------------------

Job Number 823-21	Status SK	Purpose of Issue Client comments
-----------------------------	---------------------	--

Drawing No. 823-21_SK_SP04	Rev -
--------------------------------------	-----------------

Site Name
Date
Comments:
Environment Agency CCN
Number

Anglia UK Pinchbeck
Sept 20
FRA
CCN-2017-58571

INPUT DATA
TO BLUE CELLS
ONLY

Model Information

Model Name
Date of Model
Model Node
Modelled Results

Welland Model
Jul-16
Glen 7082

OUTPUTS IN
YELLOW CELLS

Re-order based on Flow	FLOW	LEVEL
2	25.69	4.04
5	29.2	4.17
10	30.85	4.25
20	32.93	4.32
50	34.37	4.36
75	35.09	4.39
100	35.6	4.41
200	38.62	4.49
100+20	43.12	4.87
1000	48.05	4.70
1000+20	56.9	5.01

Attenuation Factor

-0.93 % FOR 1:100

1.34 % FOR 1:1000

Note: Higher attenuation factors mean
results through extrapolation will be
over estimated

River Basin
Time Horizon
AEP Scenario

Anglian
Up to 2115
100 AEP

**MAKE SURE YOU COPY THE FORMULA VARIABLES AND R² ON THE
GRAPHS TAB 1**

EXTRAPOLATED WATER LEVEL OUTPUTS AT NODE Glen 7082

Upper End Scenario	5.05	mODN
Higher Central Scenario	4.80	mODN
Central Scenario	4.71	mODN

Log Interpolation

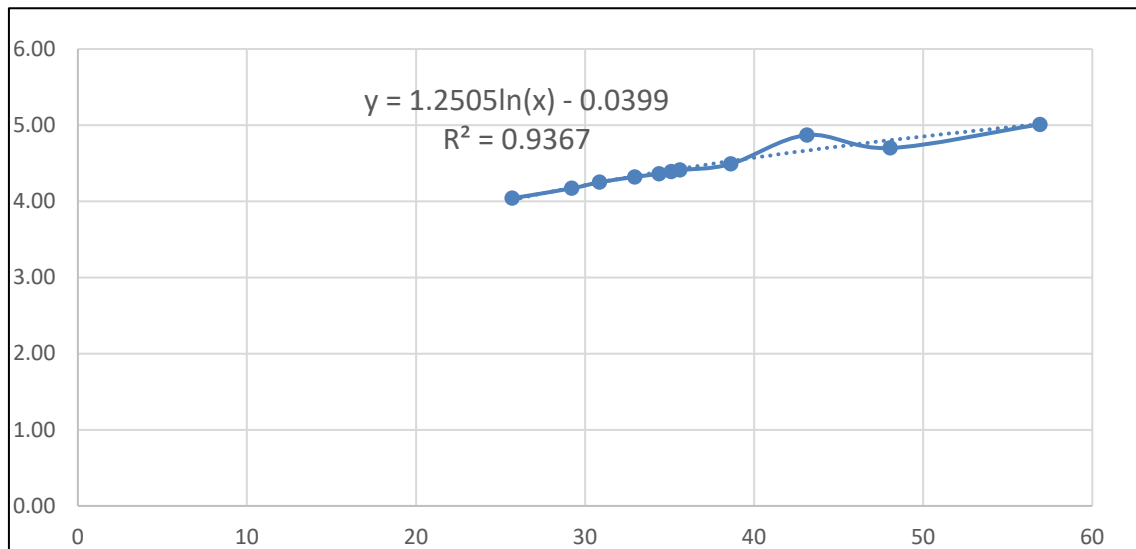
EQUATION >

1.2505

-0.0399

<
include
sign ie
+/-

	1 in 100		1 in 1000	
	FLOW	LEVEL	FLOW	LEVEL
65%	58.74	5.05	79.28	5.43
35%	48.06	4.80	64.87	5.18
25%	44.50	4.71	60.06	5.08



R² value

0.9367

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Anglia (UK) Limited, Mill Green Road, Pinchbeck
Client: Anglia (UK) Limited

Project No: C14686
Sheet No: 1/1

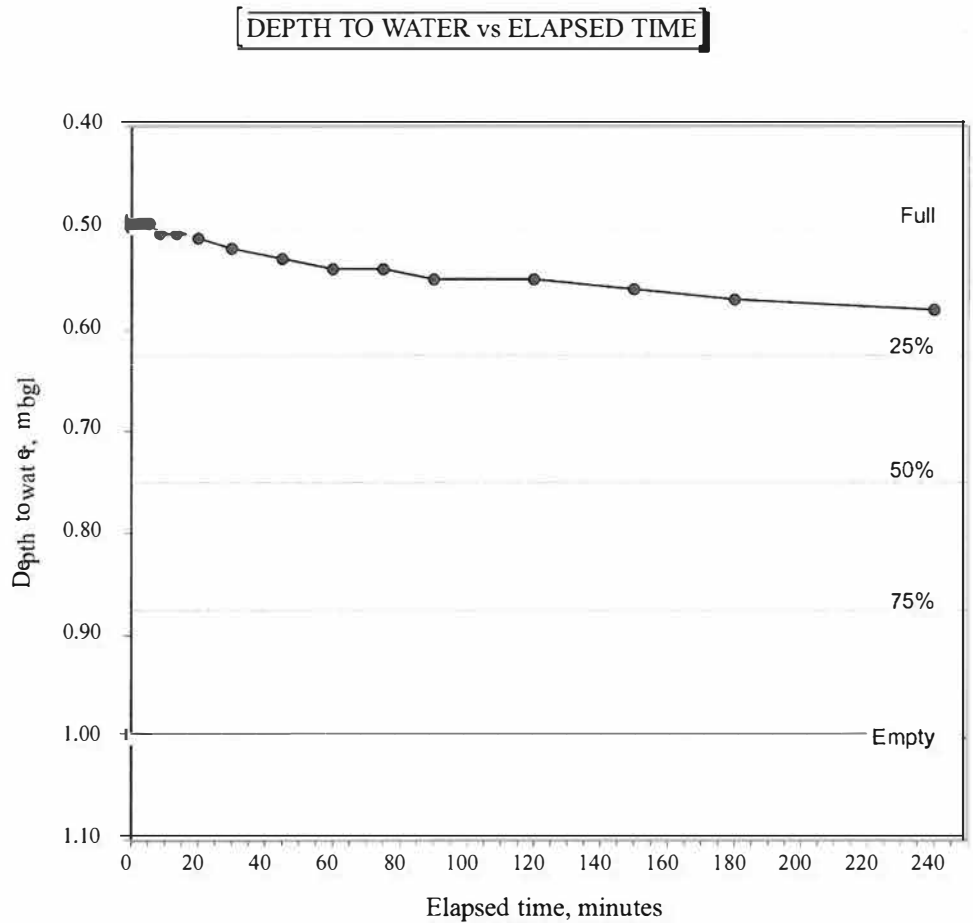
Trial Pit: TP1 FIRST FILLING
Depth: 1.00
Length: 1.00
Width: 0.30

Description of Stratum under test: Firm, brown and orange brown, slightly sandy, silty CLAY

Depth to water prior to test: dry
(below ground level)

Elapsed Time min	Depth to Water m
0	0.50
1	0.50
2	0.50
3	0.50
4	0.50
5	0.50
7	0.50
10	0.51
15	0.51
20	0.51
30	0.52
45	0.53
60	0.54
75	0.54
90	0.55
120	0.55
150	0.56
180	0.57
240	0.58

All dimensions given in metres



$$f = (V75-V25)/A50(T75-T25)$$

V75-V25 = 0.075
A50 = 0.950
T75-T25 = 2340

Soil Infiltration Rate $f = 5.62E-07$ m/s