FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
DAM GATE, HOLBEACH

FINAL REPORT

ECL1023/SEAGATE HOMES

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Seagate Homes in respect of a development that consists of twenty one residential dwellings at Dam Gate, Holbeach.

A planning application for the proposed development is to be submitted by Seagate Homes.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located on land off Dam Gate, Holbeach, Spalding, Lincolnshire, PE12 7BH. The National Grid Reference of the site is 53656/32446.

The location of the site is shown in Figure 1.

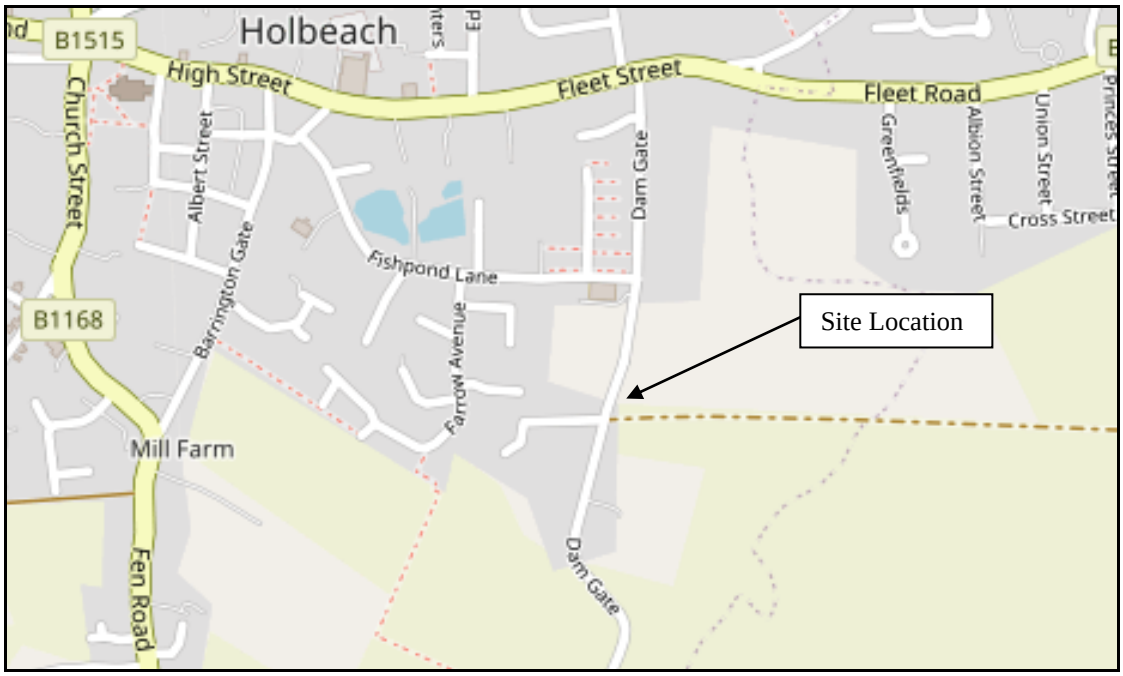


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the eastern side of Dam Gate to the north east of Castle Drive. The site consists of an area of agricultural land. To the north and east of the site is a development approved under application H09-0332-16. The area of development is approximately 0.6 hectares.

A topographic survey of the site has been undertaken and is provided in Attachment 1. Ground levels are typically between +2.1m OD and +2.4m OD. The carriageway level of Dam Gate to the west of the site is +2.8m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water at the site drains through the network of local drains and hence to the IDB drain system. There is a riparian drain on the southern boundary of the site and an IDB high priority watercourse forms the western boundary of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by West Walton Formation Mudstone and Siltstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of twenty one dwellings. The dwellings will have two storeys. Details of the proposed development are provided in Attachment 1.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding

2.5 Flood Zones

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located within Flood Zone 3, an area with a high probability of flooding.

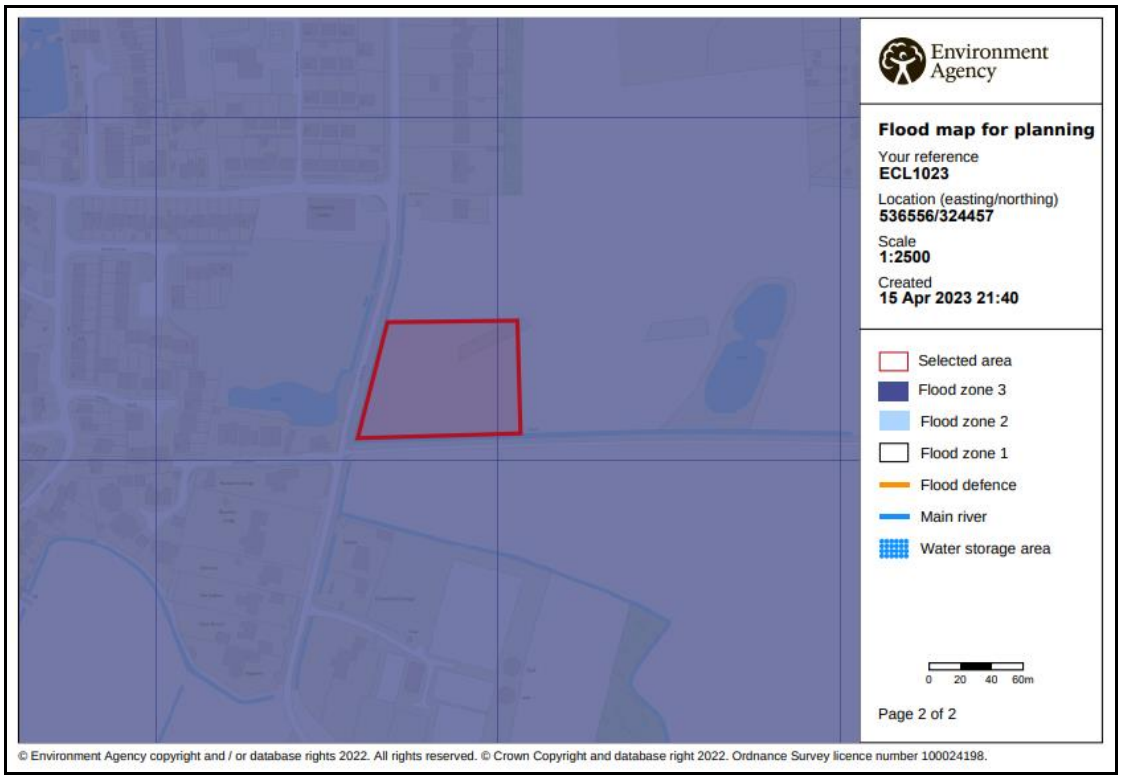


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- in general the site has a very low risk of surface water flooding (annual probability less than 0.1%) and in some areas close to the western and southern boundaries the site has a low risk of surface water flooding (annual probability between 0.1% and 1%); and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is outside the 'Low Hazard' area	The site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The site is outside the area at risk of flooding.	The peak flood depth is between 0.5m and 2.0m.

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for dwellings and is classified as 'More Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'More Vulnerable' therefore it is necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test and Exception Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such, opportunities to undertake the development at an alternative site with a lower flood risk are limited. At this location it is not possible to position the development on higher ground within the proposed site.

The SFRA states that as it is necessary to use the refined flood risk information (hazard and depth maps) to assist with the application of the Sequential Test. The refined flood risk information contained within the SFRA demonstrates the site is not at risk during the 1% annual probability fluvial and 0.5% annual probability tidal event in 2115. The site therefore has a low probability of flooding and is considered to pass the Sequential Test.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

The Local Plan has a target of a net increase of at least 11,681 dwellings in South Holland over the 25-year local plan period. The Plan considers this new housing is

required to ensure the sustainability of the Local Plan area. The proposed development will contribute to this target.

Section 5 of this Flood Risk Assessment describes the flood mitigation measures and the management of the residual risks, demonstrating that this development will be safe and not increase flood risk elsewhere. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The South Holland IDB district is protected by the Wash tidal defences along the Holbeach Marsh frontage with embankment levels at a minimum of +7.0m OD. The Wash tidal defences are approximately 10km from the site. The River Nene tidal defences are 12km to the east of the site. The River Welland tidal defences are approximately 9km to the north west of the site. All three defences are the responsibility of the Environment Agency.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by South Holland IDB. There is an IDB High Priority Watercourse on the western boundary of the site. The site and the surrounding land are within the Little Holland catchment and drains to the Little South Holland Drain which discharges to the South Holland Main Drain at the Little Holland Pumping Station. The South Holland Main Drain discharges to the tidal River Nene at the Sutton Bridge Outfall Sluice.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the South Holland Internal Drainage Board and the Environment Agency are generally good.

4.2 Sources of Flooding

A summary of the sources of flooding is provided in Table 2.

Source of Flooding	Level of Risk
Drainage Network Flooding	The risk is assessed in Section 4.3.
Surface Water Flooding	Based upon the EA maps the risk is very low/low.
Fluvial Flooding	The risk is assessed in Section 4.3.
Tidal Flooding	The risk is assessed in Section 4.3.
Reservoir Flooding	Based upon the EA maps the site is not at risk of flooding from reservoirs.
Groundwater Flooding	There is no evidence to suggest the site is at risk of groundwater flooding.

Table 2 – Sources of Flooding

4.3 Probability of Flooding

The probability of flooding associated with blockages in the South Holland IDB drainage system is low due to the maintenance standards achieved and managed by the IDB. Failure of Little Holland Pumping Station could lead to an increase level of risk within the IDB catchment.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the South Holland IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The site is within an area benefitting from defences. The flood embankments to the Wash and the River Nene and River Welland tidal defences provide protection during a 0.5% annual probability (1 in 200 chance each year) event. The flood risk from the Wash is lowered further by second line defences and various informal banks constructed during the reclamation of Holbeach Marsh.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded. Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1% annual probability (1 in 100 chance each year), caused no flooding to any residential properties.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased tide levels.

The tidal flood level during the 0.5% annual probability (1 in 200 chance each year) event inclusive of climate change to 2115 is estimated to be 7.2m AOD. The minimum defence level of the Wash, River Nene, and River Welland embankments is 7.0m AOD. During such an event it is likely that wave and wind action would cause overtopping of the tidal defences. However, the second line defences with embankment levels of 6.0m AOD would further reduce the probability of flood water reaching the development site. This level of risk is confirmed by the SFRA.

In summary the site is not at risk for the design life of the development (i.e., 100 years).

4.6 Residual Risk

The South East Lincolnshire SFRA includes maps demonstrating the impact of climate change in 2116. The Residual Peak Depth maps within the SFRA indicate the

maximum flood depths associated with a breach of the tidal defences. These show that when climate change allowances are applied to the combination of a 1% annual probability (1 in 100 chance each year) fluvial event and a 0.5% annual probability (1 in 200 chance each year) tidal event the site is not at risk. An extract from this map is shown in Figure 3.

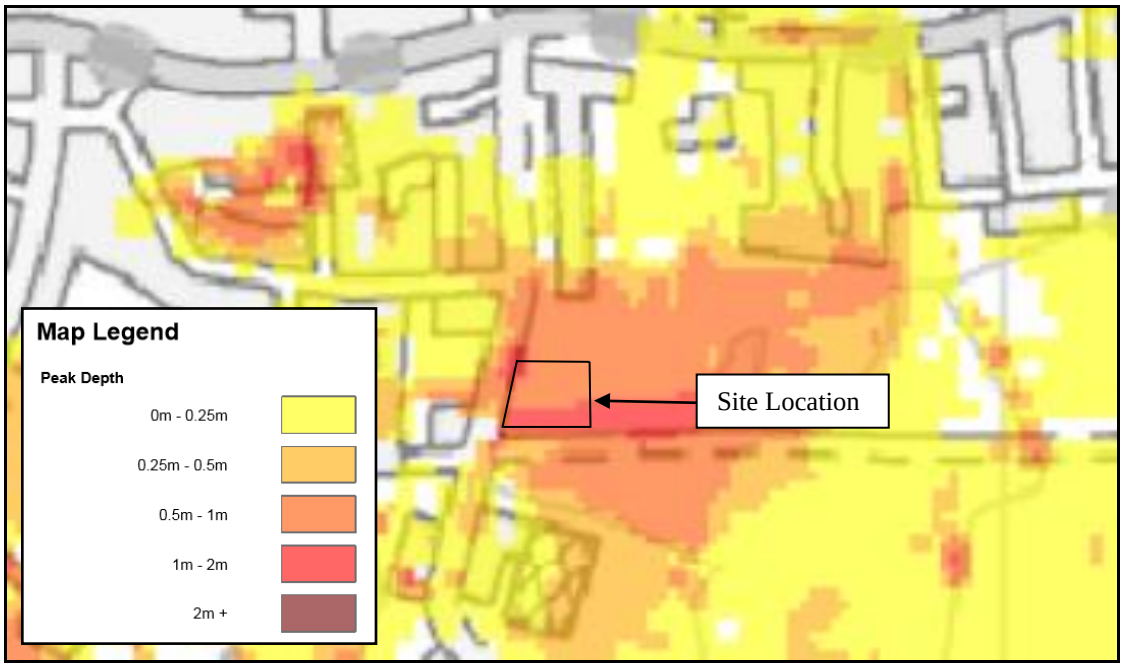


Figure 3 – SFRA 2116 Residual Peak Depth Map

Figure 3 shows that in general the site is at risk during a breach with a depth between 0.5m and 1.0m however a strip of land along the southern boundary is at risk with depths between 1.0m and 2.0m. Based upon the topographic survey and Figure 3 the flood level is estimated to be +3.2m OD.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Little Holland Pumping Station or Sutton Bridge Outfall Sluice could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 0.5% annual probability (1 in 200 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development, it is not anticipated that the site would flood from overtopping of the defences.

The SFRA considers the residual risk associated with a breach in the defences in 2116. When a breach during the 0.5% annual probability (1 in 200 chance each year) tidal event is considered, the site is at risk with depths between 0.5m and 1.0m and a strip of land along the southern boundary is at risk with depths between 1.0m and 2.0m. The flood level is estimated to be +3.2m OD.

The proposed arrangement increases the impermeable area and therefore there will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

Based upon the information available during the preparation of this flood risk assessment and the South East Lincolnshire Standing Advice Matrix it is recommended that:

- finished floor levels of the dwellings are to be 1.0m above surrounding ground level;
- any dwellings in locations where ground levels are less than +2.2m OD are to have 0.6m of flood resistant construction above finished floor level; and
- all dwellings are to have flood resilient construction to +3.5m OD.

The risk of flooding is lowered as the proposed dwellings are 2 storeys with all sleeping accommodation on the first floor.

The developer should ensure that the eventual occupiers of the dwellings are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupier of the dwellings should register to receive flood warnings.

Should there be a failure of Little Holland Pumping Station or Sutton Bridge Outfall Sluice and conditions were such to put properties and land at risk of flooding, the

Internal Drainage Board would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

A sustainable drainage strategy is to be prepared for the development so that stormwater from the development will not affect any adjoining properties or increase the flood risk elsewhere.

6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

- The proposed development consists of twenty one 2 storey residential dwellings on Dam Gate, Holbeach.

- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.

- The proposed development is in Flood Zone 3. The site benefits from defences on the Wash, River Nene, and River Welland that provide protection during the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200) tidal event including climate change.

- The site is at risk should there be a breach during the 1% fluvial / 0.5% tidal annual probability event including climate change.

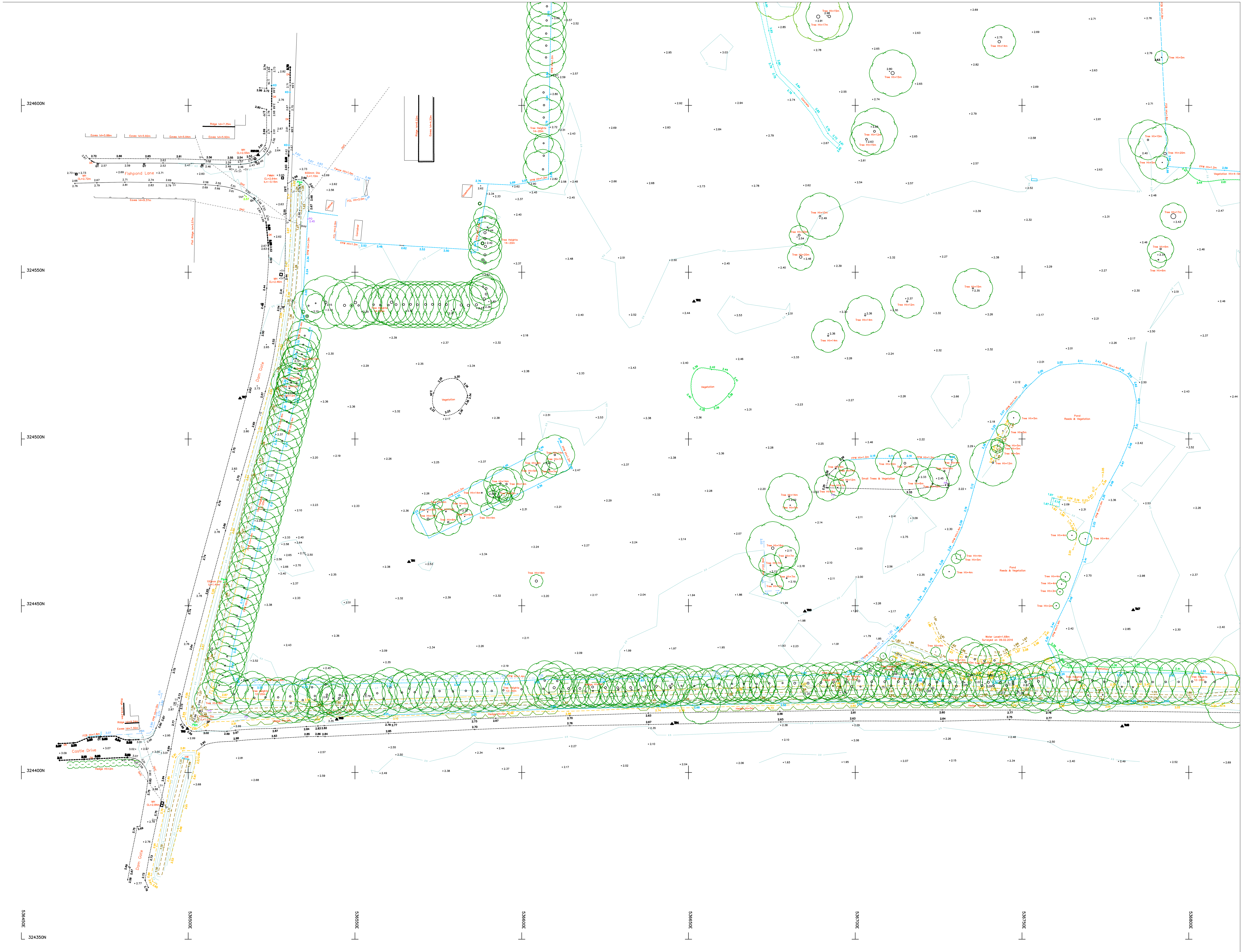
- It is recommended that the finished floor levels are 1.0m above ground level, there is 0.6m of flood resistant construction above finished floor level where ground levels are less than +2.2m OD and there is flood resilient construction to +3.5m OD.

- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

TOPOGRAPHIC SURVEY

CONCEPT BLOCK PLAN


324600N
324550N
324500N
324450N
324400N
324350N
536450E
536500E
536550E
536600E
536650E
536700E
536750E
536800E
Fishpond Lane
Dam Gate
Castle Drive
Eaves lvl=5.88m
Eaves lvl=5.92m
Eaves lvl=5.94m
Eaves lvl=5.92m
Ridge lvl=7.35m
Eaves lvl=9.37m
Flat Ridge lvl=5.57m
Ridge lvl=6.22m
Eaves lvl=4.33m
MH CL=2.55m
MH CL=2.72m
FWMH CL=2.64m IL=-0.15m
600mm Dia IL=1.10m
Fence Ht=1.0m
FCL Ht=2.0m
Cabinet
Container
Greenhouse
FPW Ht=1.2m
FPW Ht=1.0m
FPW Ht=1.4m
MH CL=2.46m
Tree Heights 14–20m
Tree Heights 12–20m
Vegetation
Small Trees & Vegetation
Pond Reeds & Vegetation
Water Level=1.68m Surveyed on 09.02.2016
Concrete
FCB Ht=1.8m
Vegetation Ht=4–5m
Hedge Ht=5m
Hedge Ht=2m
100mm Dia IL=1.44m
450mm Dia IL=1.03m
Ridge lvl=9.24m
Eaves lvl=7.30m
FPR Ht=1.0m
MH CL=2.84m

DAMGATE PADDOCK - HOLBEACH



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Do not scale plans - use figure or grid dimensions where given. Any deviation from the drawing is to be reported to the originator immediately.

IF IN DOUBT ASK !

DAMGATE PADDOCK
DAMGATE, HOLBEACH

CONCEPT BLOCK PLAN
(21 UNITS)

1:500 @A3 22.03.2023 MD

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HOMES