FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
58 SEAS END ROAD, MOULTON SEAS END

FINAL REPORT

ECL0254/G R MERCHANT LTD

DATE MAY 2020

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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 Mr & Mrs P Whiting in respect of a residential development that consists of five dwellings at Cassini Lodge, Seas End Road, Moulton Seas End.

A planning application for the proposed development is to be submitted by G R Merchant Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Cassini Lodge, 58 Seas End Road, Moulton Seas End, Spalding, Lincolnshire, PE12 6LD. The National Grid Reference of the site is 53206/32699.

The location of the site is shown in Figure 1.

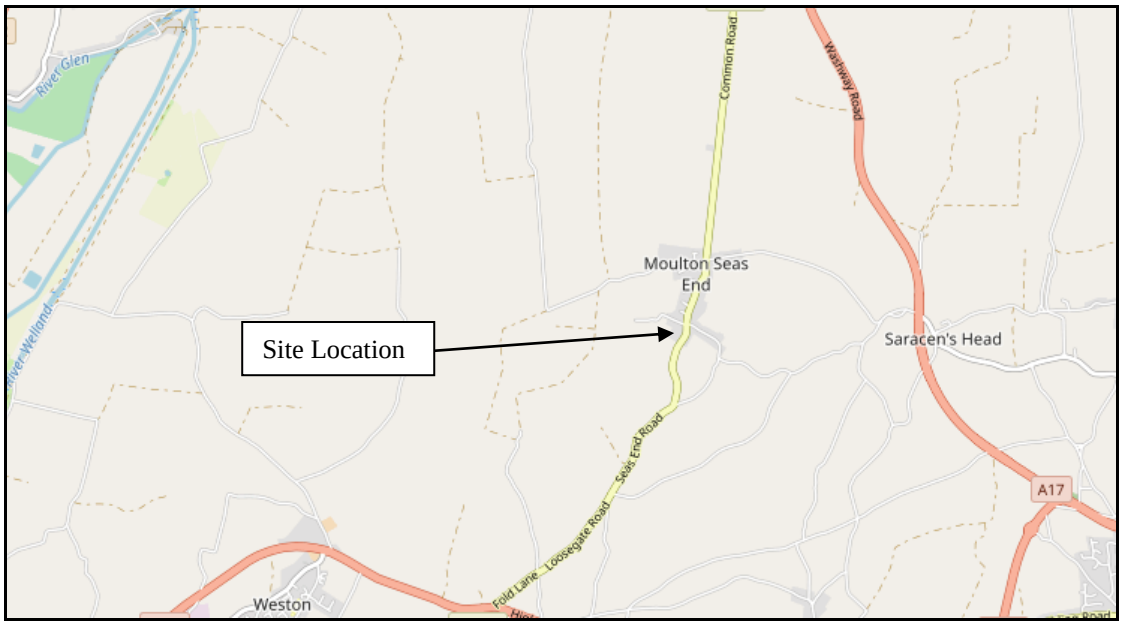


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is located on land adjacent to and east of Cassini Lodge, 58 Seas End Road. The site is currently a grass paddock with outbuildings to the existing property on the western side of Seas End Road. The area of development is approximately 0.48 hectares.

Environment Agency LIDAR show that site levels vary between +3.3m OD and +3.5m OD with the higher levels towards the eastern boundary of the site closest to Seas End Road. The level of Seas End Road adjacent to the site is +3.6m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water at the site naturally drains through soakaway and hence to the IDB drain system. There is a riparian drain on the western side of Seas End Road approximately 30m south of the site. The nearest IDB Watercourse is approximately 200m west 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 five new dwellings. The dwellings will be detached, three dwellings will be single storey and two will have two storeys.

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

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

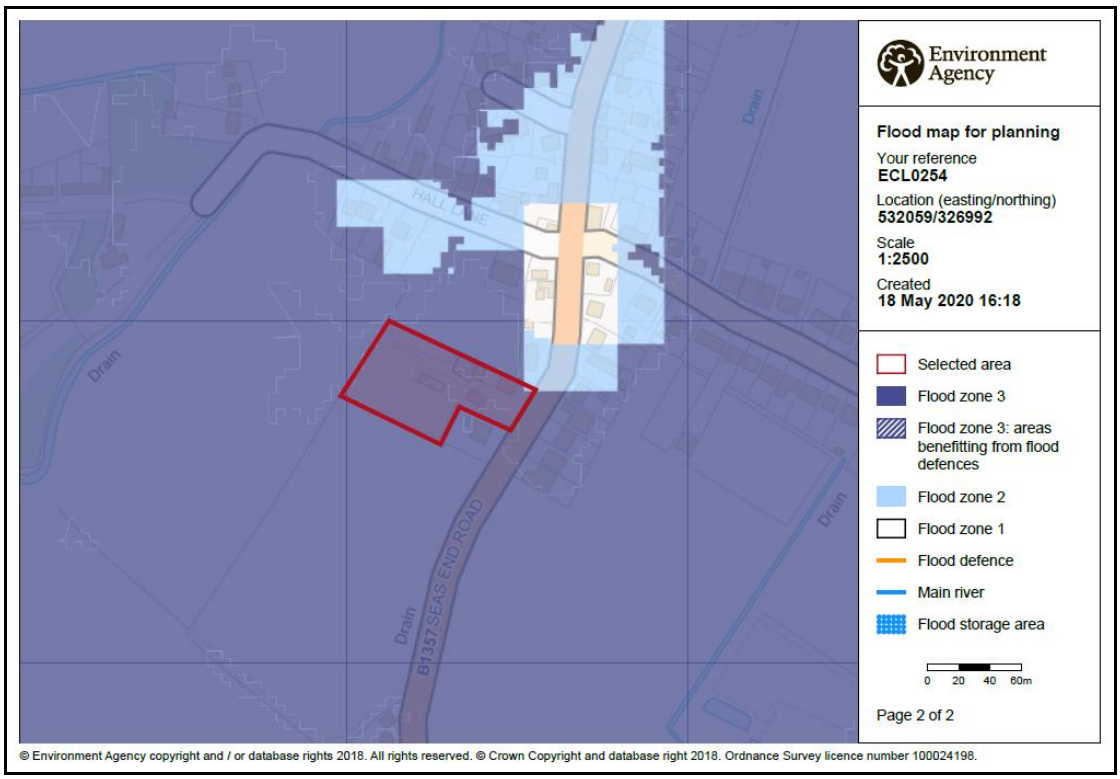


Figure 2 – Environment Agency Flood Map for Planning

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%);
- part of 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 Some' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal event	The site is outside the area at risk of flooding.	The peak flood depth at the site is between 0.0m and 0.25m.

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 and Exception Test

The Sequential Test and Exception Test are required to be applied by the Local Planning Authority.

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 present day 1% fluvial and 0.5% tidal event. 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 development site within the South Holland Internal Drainage Board is protected by the River Welland tidal defences between Spalding and Fossdyke. The defences are 4.3 km north west of the site and minimum embankment levels of +7.0m OD.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated every 5 years.

There is an extensive local drainage network managed by South Holland IDB. There is an IDB Watercourse 200m west of the site. The site and the surrounding land are within the Lords catchment and drain in a northerly direction to discharge to the River Welland at Lords Sluice Outfall.

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

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the IDB drainage system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of Lords Sluice Outfall; and
- overtopping and breaching of the River Welland tidal defences.

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.

The standard of drainage provided by South Holland IDB is assessed at 2% annual probability (1 in 50 chance each year), compatible with the Department of the Environment, Food and Rural Affairs (DEFRA) target level of service for rural drainage and flood defence works. The risk associated with flooding due to events greater than 2% annual probability (1 in 50 chance each year) is lowered due to the South

Holland IDB high priority watercourses incorporating a freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

The site is within an area benefitting from defences. The River Welland tidal defences provide protection during a 0.5% annual probability (1 in 200 chance each year) event.

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 flood level in the River Welland at Fossdyke during the 0.5% annual probability (1 in 200 chance each year) event inclusive of climate change to 2069 is estimated to be 6.41m AOD. The minimum defence level of the River Welland embankments is 7.0m AOD.

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 the 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 100 chance each year) tidal event the peak flood depth at the site is between 0.0m and 0.25m.

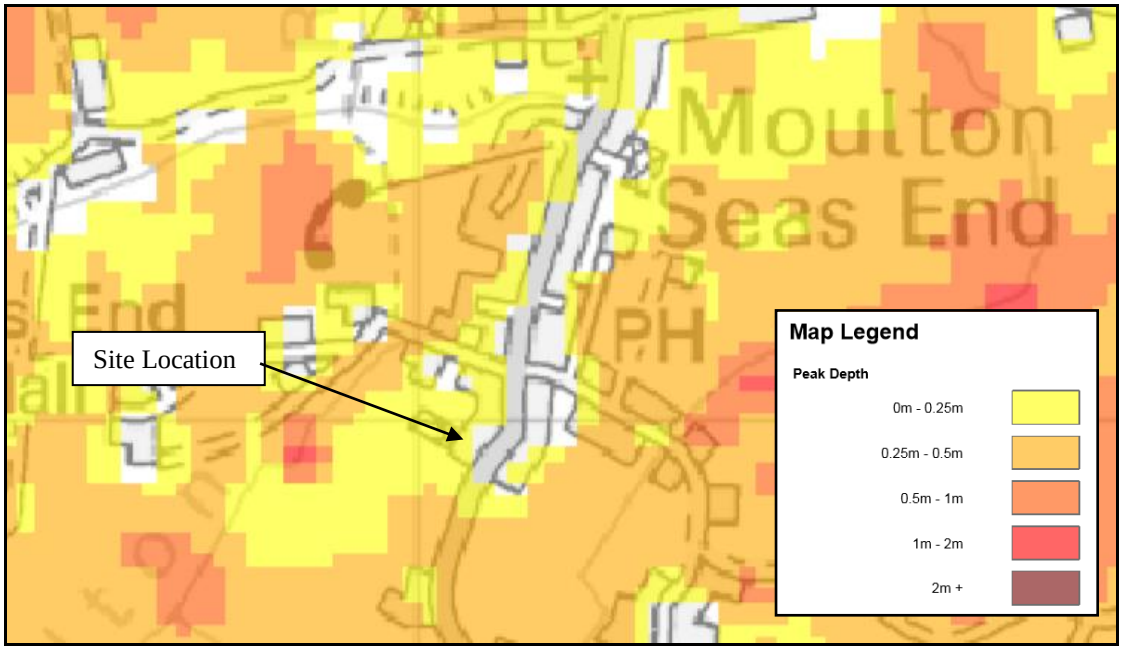


Figure 3 – SFRA 2115 Residual Peak Depth Map during the 1% fluvial and 0.5% tidal Annual Probability Event

The proposed development includes single storey dwellings and therefore the finished floor levels need to consider the 0.1% annual probability (1 in 1000 chance each year) event in 2115. The South East Lincolnshire SFRA includes 0.1% annual probability (1 in 1000 chance each year) maps for specific locations but theses do not cover the site. Through a comparison of flood depths during the 1% and 0.1% annual probability events for 2115 for the areas that the maps cover it can be estimated that the flood depths are 0.1m higher for the more extreme event. A peak flood depth of up to 0.35m could therefore be anticipated during the 0.1% annual probability (1 in 1000 chance each year) event in 2115.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Lords Sluice Outfall 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. The maps show that the site is at risk of flooding up to a depth of 0.25m during the 1% annual probability event. A peak flood depth of 0.35m has been estimated for the 0.1% annual probability event.

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

The site has a low 'actual risk' of flooding. Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwellings is 0.35m above site levels and there is flood resilient construction to a height 0.3m above finished floor level.

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 provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding. The occupiers of the dwellings should register with the Floodline Direct Warnings Service to receive any future flood warnings.

During an exceedance event it is anticipated that sufficient time would be available to take precautionary actions to limit the potential impact of flooding.

Should there be a failure of Lords Sluice Outfall 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 utilising temporary pumping equipment.

It is recommended that surface water run-off is discharged to soakaways to BRE365 design requirements and therefore water from the site will not affect any adjoining properties or increase the flood risk elsewhere.

6.0 CONCLUSIONS AND RECOMMENDATIONS

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

- The proposed development is in a defended floodplain. It is in the floodplain of the River Welland tidal defences and protected 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 located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the South Holland IDB Watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

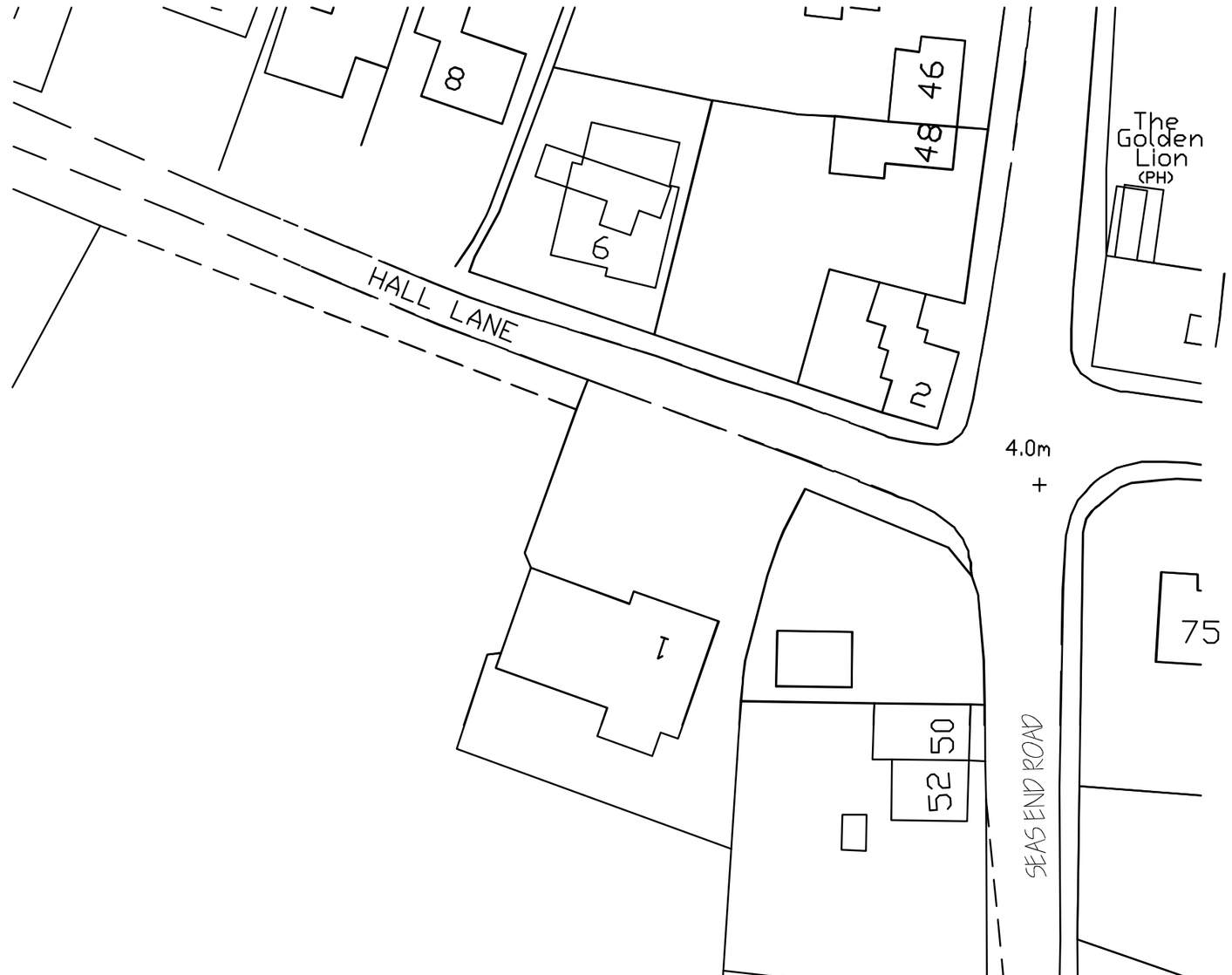
- It is recommended that the finished floor levels are 0.35m above site levels and there is 0.3m of flood resilient construction above finished floor level.

- Surface water run-off from the development should be discharged to soakaways to BRE365 design requirements so that adjoining land and properties are not affected.

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

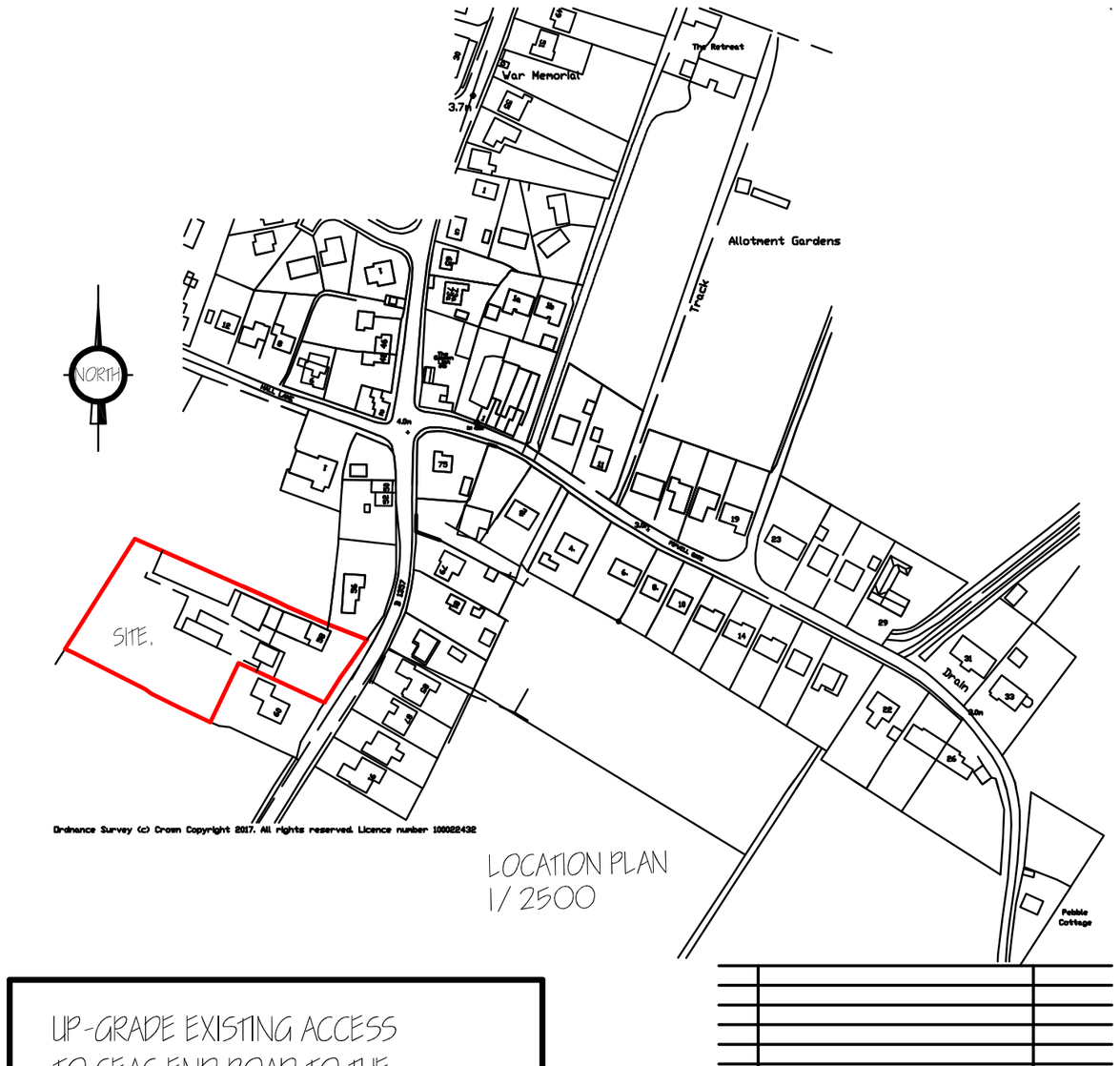
ATTACHMENT 1

LOCATION AND SITE LAYOUT PLANS
(Dwg 3148-17-02)



SITE PLAN
1/500

SITE AREA - 0.48 Hectares.



LOCATION PLAN
1/2500

UP-GRADE EXISTING ACCESS TO SEAS END ROAD TO THE REQUIREMENTS & SPECIFICATION OF LINC'S C C, HIGHWAYS DEPARTMENT.

INDICATIVE DWELLINGS SCHEDULE :-

PLOT 1 - 2 BEDROOM BUNGALOW & DETACHED SINGLE GARAGE.
PLOT 2 - 3 BEDROOM BUNGALOW & DETACHED DOUBLE GARAGE.
PLOT 3 - 3 BEDROOM HOUSE & DETACHED DOUBLE GARAGE.
PLOT 4 - 4 BEDROOM HOUSE & DETACHED DOUBLE GARAGE.
PLOT 5 - 3 BEDROOM BUNGALOW & ATTACHED DOUBLE GARAGE.
PLOT 6 - EXISTING HOUSE - 'CASSINI LODGE'.

ref:	revision	date

G. R. MERCHANT GRM
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Project
RESIDENTIAL DEVELOPMENT
ADJ: CASSINI LODGE, 58 SEAS END ROAD,
MOULTON SEAS END,
LINCS, PE12 6LD.

Client
MR & MRS P WHITING.

Drawing
LOCATION & SITE LAYOUT PLANS - PROPOSED.

Job Ref.	Drawing No.
3148-17.	02.
Date	**Drawn**
APR' 17.	HLD / GRM.

Scales
AS INDICATED.

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All materials to be new unless otherwise stated and all components and materials etc, to be used fitted and installed etc, in strict accordance with manufacturers instruction and relevant code of practice, Materials shall conform to appropriate British standard specification or BBA certificate or European code equivalent, The Employer / Client shall ensure that the selected contractor is conversant with and adopts all measures necessary to achieve compliance with Health and Safety legislation for Building sites and Work places, The Employer / Client is advised that should the works need to comply with the Construction Design and Management Regulations an independant Planning Supervisor will be required, The works shall comprise of all that is shown on the drawing and details, Work that may not specifically shown but may be reasonably inferred as necessary to carry out the works shall be deemed to be included.