FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
GREENDYKE, TYDD ST MARY

FINAL REPORT

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ECL0100/ SWANN EDWARDS ARCHITECTURE LTD

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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 Town in respect of a development that consists of one dwelling at Greendyke, Tydd St Mary.

A planning application for the proposed development is to be submitted by Swann Edwards Architecture Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Greendyke, Tydd St Mary, Wisbech, Cambridgeshire, PE13 5QX. The National Grid Reference of the site is 54368/31947.

The location of the site is shown in Figure 1.

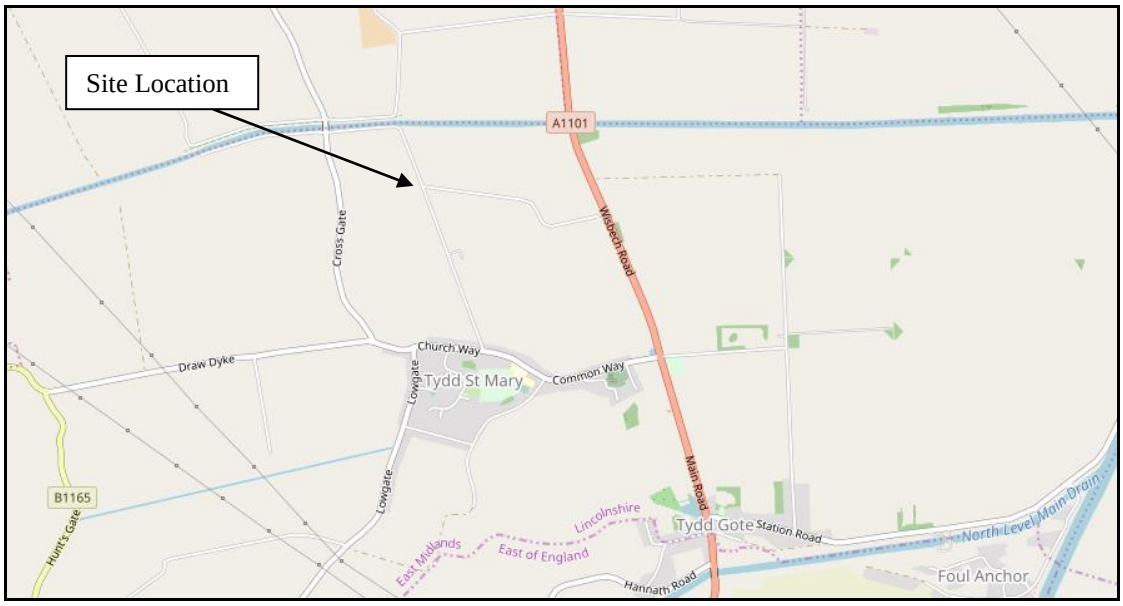


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

Details of the existing site are shown in Attachment 1. The plan shows the existing barn at the site. The barn is brick built, single storey and currently used for storage. The site is accessed from Greendyke close to the junction with Gypsy Lane. The area of development is approximately 0.02 hectares.

Environment Agency LIDAR information shows that the site is varies between +3.7m OD (typical on the eastern side of the barn) and +2.8m OD. The carriageway level of Greendyke at the entrance to the site is approximately +4.1m OD. Spot levels taken to a local datum are shown in Attachment 1. These confirm that on the eastern side of the barn ground levels are approximately 0.5m below carriageway level with other parts of the site up to 1.1m below carriage way level.

The site is in the South Holland Internal Drainage Board (IDB) District. The site and the surrounding land are within the Free Discharge catchment and drains to the South Holland Main Drain and discharge to the tidal River Nene at the Sutton Bridge Outfall Sluice.

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

2.3 Proposed Development

The proposed development consists of the conversion of the barn to form one new dwelling. The dwelling will be single storey and use the existing access.

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 2, an area with a medium probability of flooding, of the Environment Agency Flood Maps for Planning as shown in Figure 2.

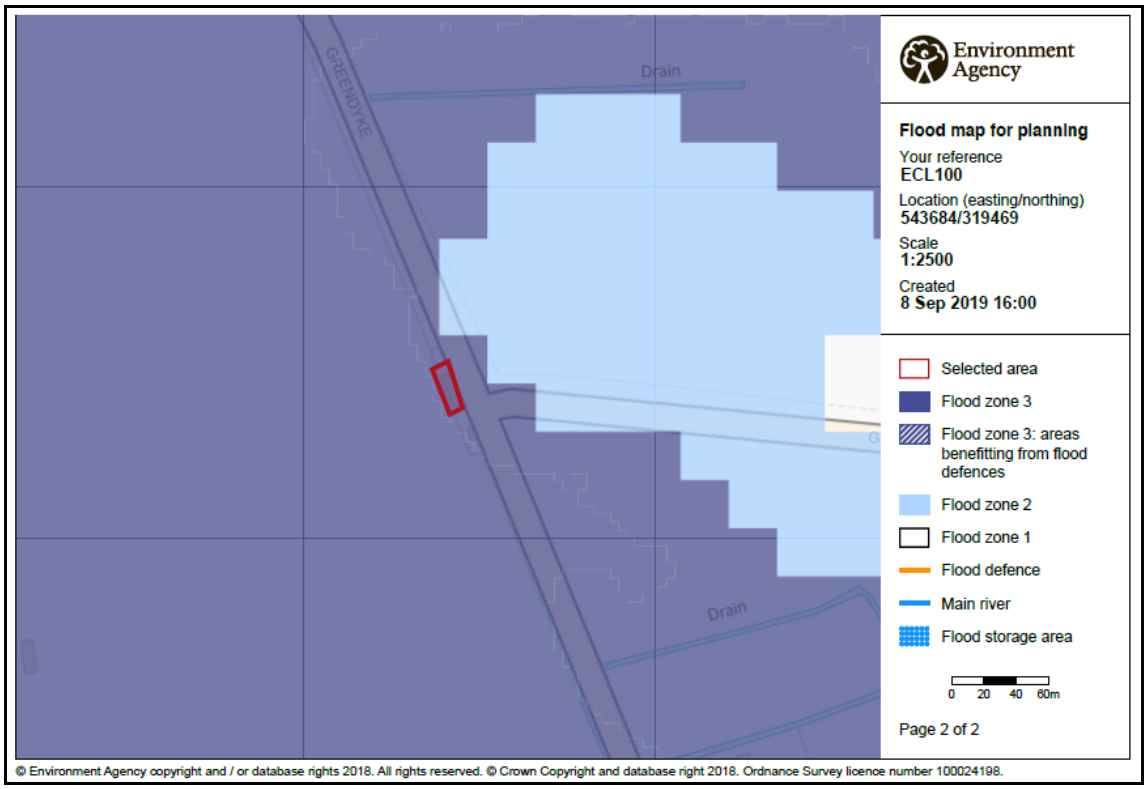


Figure 2 – Environment Agency Flood Map for Planning

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%);
- the site is not within an area at risk of surface water flooding; 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 in the 'Danger for Some' area	Part of the site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The peak flood depth is between 0.25m and 0.5m	The peak flood depth is between 0.5m and 1.0m.

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 and Exception Test

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

The Planning Practice Guidance (PPG) on Flood Risk and Coastal Change states that if the development is a change of use it is not necessary to complete the Sequential Test. The principles of the Sequential Test have been considered below.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such it is not possible to undertake the development at an alternative site with a lower flood risk. At this location it is not possible to position the development on higher ground within the proposed site. The River Nene and River Welland have defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event. Therefore the 'actual risk' of flooding at the site is low 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 and the provision of rural housing is a benefit.

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 site is 3.4 km west of the tidal River Nene. The site is protected by the River Nene tidal defences between Wisbech and Sutton Bridge. The River Nene is 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 every 5 years.

There is an extensive local drainage network managed by South Holland IDB. There is an IDB Ordinary Watercourse approximately 250m to the south of the site to the west of Greendyke. The site and the surrounding land are within the Free Discharge catchment and drain to the South Holland Main Drain and discharge to the tidal River Nene at the Sutton Bridge Outfall Sluice. The site is approximately 300m south of the South Holland Main Drain.

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 South Holland IDB drainage system;
- an event in the local drainage network greater that exceeds the standard of protection;
- failure of Sutton Bridge Outfall Sluice; and
- overtopping and/or breaching of the tidal River Nene.

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 benefits from defences on the River Nene that provide protection during a 0.5% annual probability (1 in 200 chance each year) tidal event and a 1% annual probability (1 in 100 chance each year) fluvial event.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

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 flood levels. The River Nene tidal defences have been designed to include an allowance for climate change. In summary the existing systems and defences are appropriate for the design life of the development (i.e. 100 years).

4.6 Residual Risk

There is a residual risk of flooding at the site should a breach occur. The South East Lincolnshire SFRA includes maps demonstrating the residual peak depth in 2116. When climate change allowances are applied to the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 100 chance each year) tidal event the peak depth at the site from direct overtopping together with breach failure is up to 1.0m. It is noted that during this scenario the Greendyke carriageway adjacent to the development is above the flood level. An extract from this map is shown in Figure 3 below.

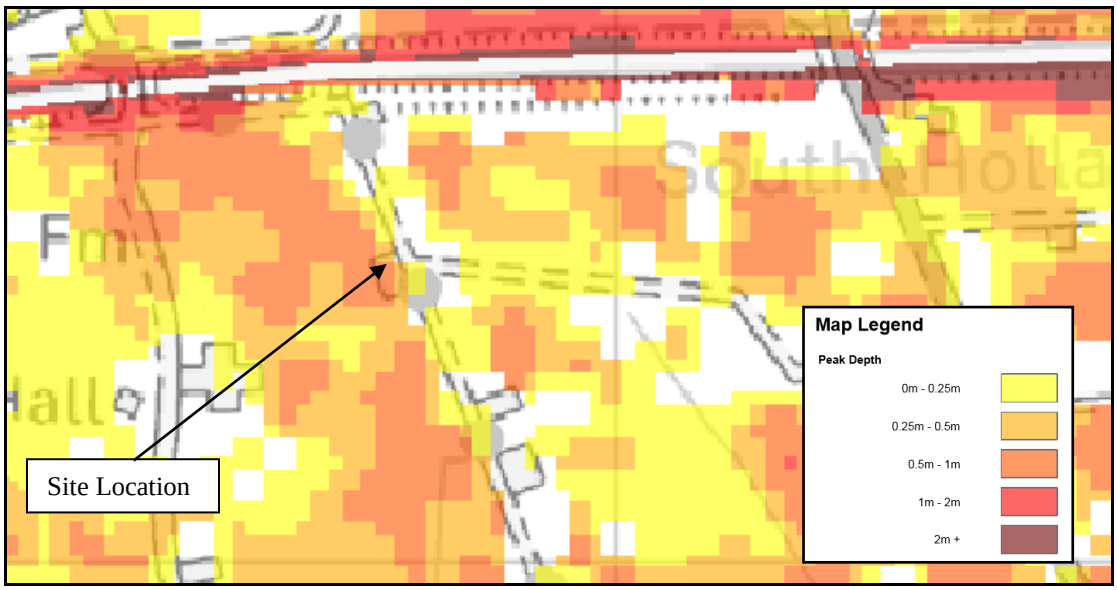


Figure 3 – SFRA 2116 Residual Peak Depth Map

5.0 FLOOD RISK MITIGATION AND RESIDUAL RISKS

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of 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 1% annual probability (1 in 100 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.

The SFRA considers the residual risk associated with overtopping and a breach in the defences in 2116. The maps show that the peak flood depth at the site is 1.0m. If during extreme events, levels of floodwater rose to such an extent that the site was affected, the situation would not be sudden.

Any increase in impermeable area associated with the development will be minimal so there is no potential that flood risk will be increased elsewhere due to surface water.

5.2 Mitigation Measures

The site has a low 'actual risk' of flooding. The residual peak depth maps show that the Greendyke carriageway at the access to the site is above the flood level. Based upon the information available during the preparation of this flood risk assessment, in order to mitigate against the remote risk of flooding it is recommended that the floor level of the dwelling is at the carriageway level of Greendyke at the access to the property. Furthermore, it is recommended that there is 0.3m of flood resilient construction above finished floor level.

The developer should ensure that the eventual occupier of the dwelling is 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 occupier of the dwelling should register with the Floodline Direct Warnings Service to receive any future flood warnings.

Should there be a failure of 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 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 tidal River Nene and protected during the 0.5% annual probability (1 in 200 chance each year) tidal event. During the design life of the development, including an allowance for climate change, it is not anticipated that there would be flooding at the site.

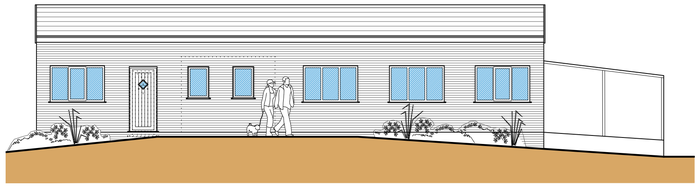
- The site is located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the South Holland IDB high priority watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

- There is a residual risk to the site associated with a breach of the tidal defences. To mitigate this risk, it is recommended that the floor level is at the carriageway level of Greendyke at the access to the property 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

PLAN, ELEVATIONS, SECTION, SITE PLAN AND LOCATION PLAN (Dwg SE-1259 PP1000)



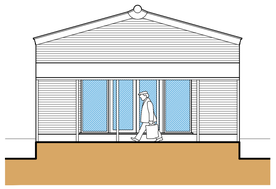
Front Elevation

Scale: 1:100

0 1 2 3 4 metres

Side Elevation

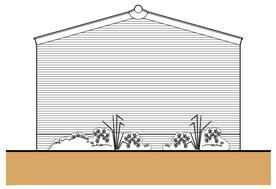
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0 1 2 3 4 metres

Side Elevation

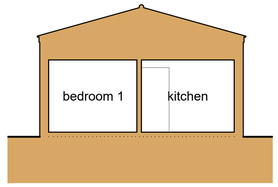
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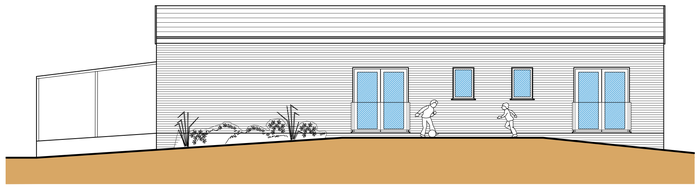
0 1 2 3 4 metres

Section A-A

Scale: 1:100



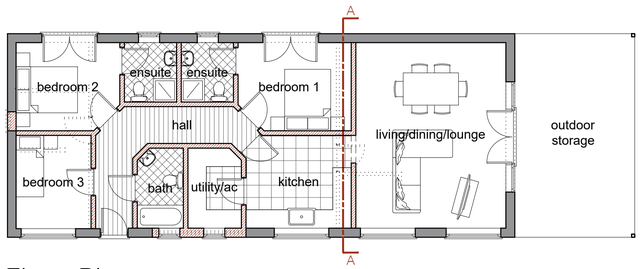
0 1 2 3 4 metres



Rear Elevation

Scale: 1:100

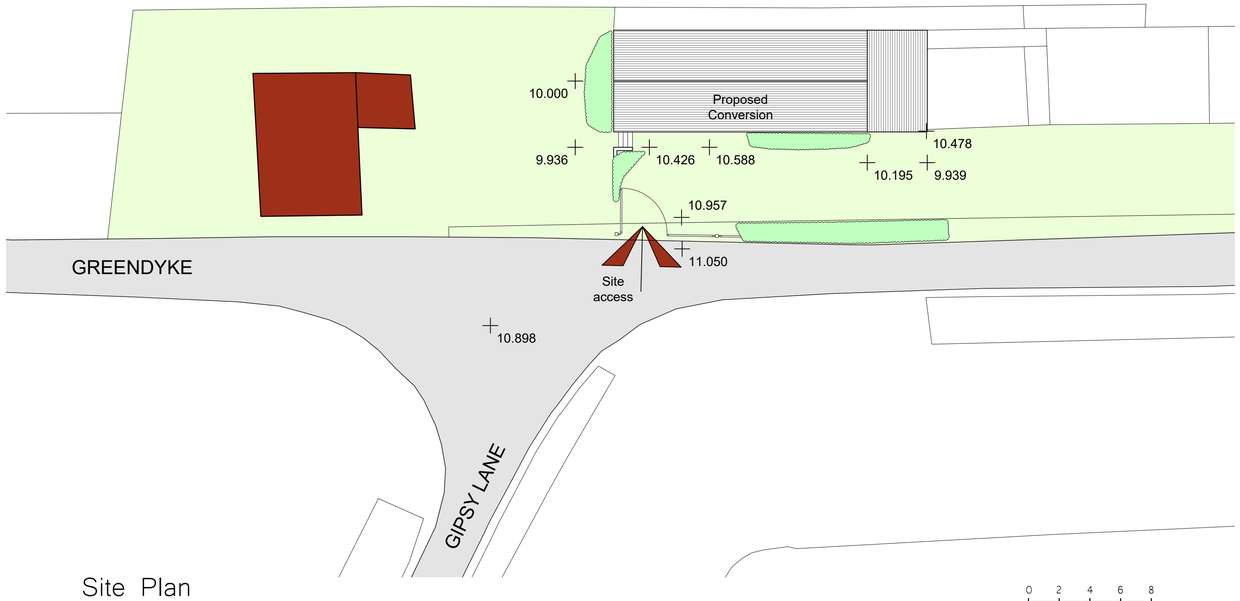
0 1 2 3 4 metres



Floor Plan

Scale: 1:100

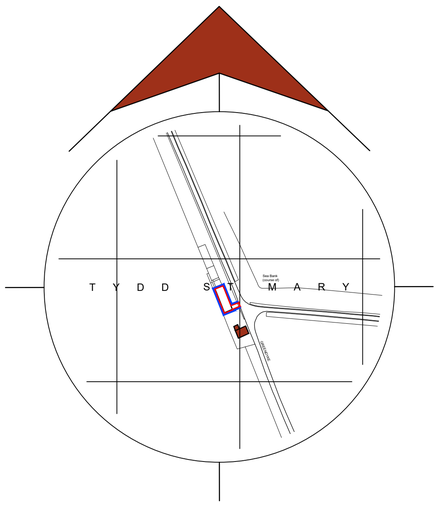
0 1 2 3 4 metres



Site Plan

Scale: 1:200

0 2 4 6 8 metres



Location Plan

Scale: 1:2500

0 20 40 60 80 metres

FLOOR PLAN KEY

- Existing walls
- Proposed walls
- Structures to be demolished

General Notes

1. This drawing shall not be scaled, figured dimensions only to be used.
2. All dimensions are shown in 'mm' unless otherwise stated.
3. The contractor, sub-contractors and suppliers must verify all dimensions on site prior to the commencement of any work.
4. This drawing is to be read in conjunction with all relevant engineers and specialist sub-contractors drawings and specifications.
5. Any discrepancies are to be brought to the designers attention.

CONSTRUCTION DESIGN & MANAGEMENT REGULATIONS 2015

The following information must be read in conjunction with the project Risk register. This drawing highlights significant design related Health & Safety Risks present during Construction phase, and Residual Risks which remain post completion. Other Health & Safety Risks associated with Construction Activities may be present, and must be identified by the Principal Contractor prior to works commencing. Design Risks relating to specialist design items must be identified by the relevant specialist designers/ consultants ad issued to the Principal Designer.

SITE PLAN KEY

- Surveyed buildings
- Un-surveyed OS buildings
- Existing vegetation
- Existing site levels (10.195 + 9.939)
- Site access

ELEVATION KEY

- Joinery
- Brickwork
- Roof tiles
- Structures to be demolished

Status

FOR APPROVAL

SWANN EDWARDS ARCHITECTURE

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Job Title: Proposed Barn Conversion Greendyke, Tydd St Mary, Wisbech, Cambs For: Mr and Mrs Town

Drawing Title: Planning Drawing Plan, Elevations, Section, Site Plan and Location Plan

Date	Drawn by
August 2019	M.N.
	Checked by G.E.
Job No. SE-1259	Sheet Size A1
Dwg No. PP1000	Revision

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