

FLOOD RISK ASSESSMENT

**PROPOSED CHANGE OF USE AN AGRICULTURAL
BARN TO RESIDENTIAL USE
PANTON HOUSE BARN
HEDGEFIELD HURN
SPALDING
PE11 4JE**



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FLOOD RISK ASSESSMENT FOR A CHANGE OF USE OF AN AGRICULTURAL BARN TO RESIDENTIAL USE, PANTON HOUSE, HEDGEFIELD HURN, SPALDING PE11 4JE.

INTRODUCTION

The Government has placed increasing priority on the need to take full account of the risks 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 (NPPF) March 2012, which identify how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications.

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Local Plans should apply 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 of the impacts of climate change.

The Environment Agency's flood maps show areas that are at risk, from fluvial and tidal flooding. These maps show the limits of the flood plain of the area which could be affected by flood events, over topping or breaching of flood defences. They are based on the approximate extent of floods with a 1% annual probability of exceedance (1 in 100-year flood) for rivers and 0.5% annual probability of exceedance (1 in 200-year flood) for coastal areas under present expectations or the highest known flood. However, they do not take into account of the presence of defences or the likelihood that flood return intervals will be reduced by climate change.

This Flood Risk Assessment has been prepared in support of the planning application and considers the risk of flooding from fluvial and tidal sources. It also considers the risks of localised flooding due to inadequate Foul and Surface Water Sewers, Failure of Reservoirs, Water Main pipe bursts, Sewer Blockages, Pump Failures or High Ground Water Table etc.

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APPLICATION SITE

Panton House is located at Hedgefield Hurn, Spalding, PE11 4JE, within the administrative area of South Holland District Council. The National Grid Reference is TF 22090 29618. **Plan 1**

Panton House is a Grade II Listed Building (ID: 198163), dating back to circa 1830. To the rear and within the curtilage of the main house there is a range of farm buildings, some of which has been consumed by later more modern structures. Somewhat unusually, the original barn lies effectively 'cocooned' inside a later barn that has been constructed around it.

Full Planning Permission and Listed Building consent is being sought to remove the unattractive later additions to the barn complex and the conversion and extension of the remaining historic barn. A lightweight glazed link will connect a subservient two storey extension to the original barn to provide a 4-bedroom 2-storey dwelling. **Plan 2.**

The Site would be classed as Non Major Development applying the National Planning Policy Guidance (NPPG) as the site is to be developed for less than 10 dwellings.

The National Planning Policy Framework Technical Guidance NPPF 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 partly within Flood Zone 2 'Medium Probability' and partly in Flood Zone 3a "High Probability" as detailed on the Environment Agency's Flood Zone Maps without defences, and as defined in Table 1 of NPPF. **Map1**

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

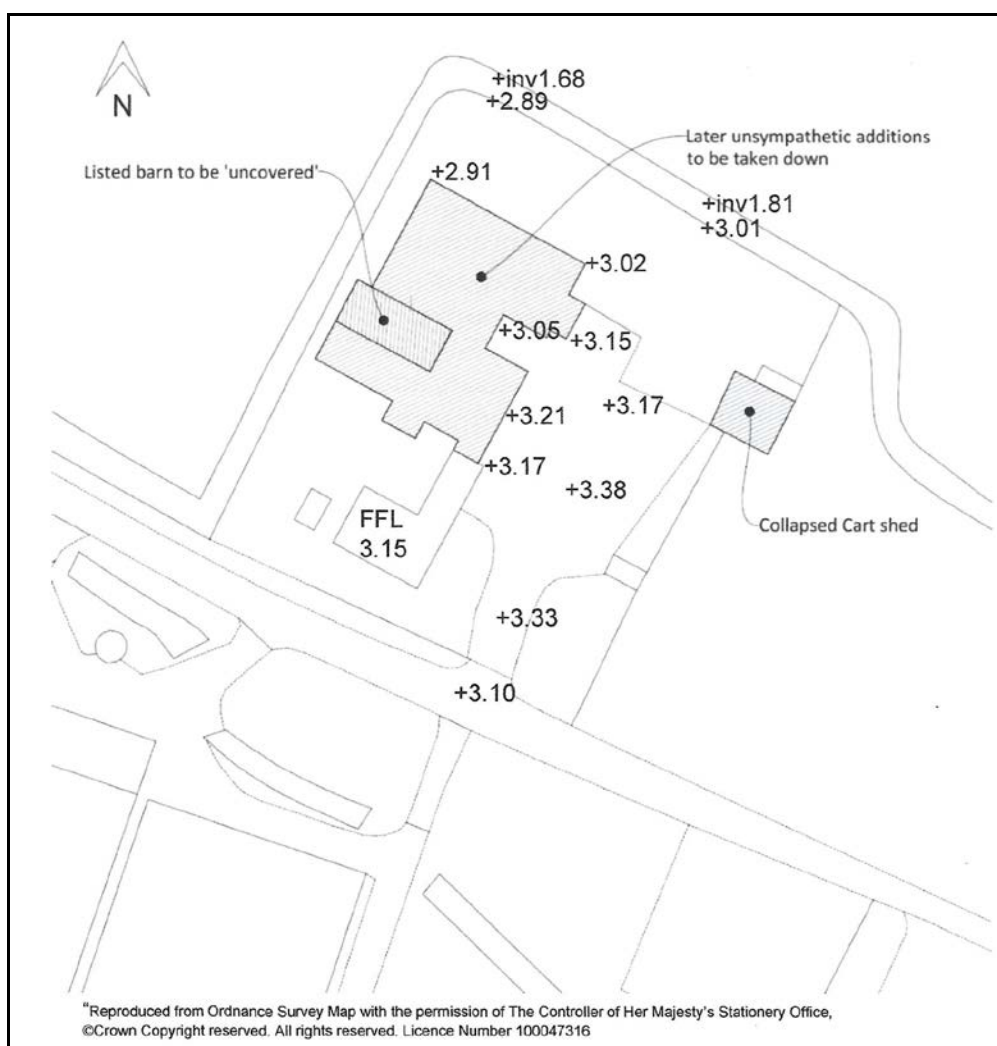
Zone 2 - medium probability Definition This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year. Appropriate uses Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are <i>only</i> appropriate in this zone if the Exception Test is passed. Flood risk assessment requirements All development proposals in this zone should be accompanied by a flood risk assessment. Policy aims In this zone, 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 systems.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPF the existing use is classified as “Less Vulnerable” and the proposed residential use is classified as “More Vulnerable”, with Table 1 of NPPF stating that such uses are appropriate in flood zone 2 and also in flood zone 3a subject to the Exception Test.

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 waste⁶. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan.</i>⁷

From the topographical survey the land levels around the barn average 3.00mODN, and the road level on Mill Lane at the site entrance at 3.10mODN. It is proposed that the ground floor level for the building be raised to 300m to 3.30mODN.



The Environment Agency recommended that for residential development the finished floor level should be informed by the predicted flood depth maps. For depths of between 0 – 0.25m the ground floor should be 300mm above the ground level in accordance with Standing Advice.

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 have been identified as:

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

The Flood Zone Maps identify river catchments over 3 sq. km. These maps are a theoretical estimate of areas that could be inundated should no defence exist. In practice current standards of protection would result in flood envelopes substantially less than shown by these maps. The maps make no allowance for local, site specific features.

The flood zone maps show that the site of the proposed development is considered at risk from flooding. These maps indicate that the area would be flooded without flood defences, which are in place, (with an annual probability of more than 0.5% i.e. return frequency of less than 1 in 200 years for tidal flooding or more than 1.33% return frequency of less than 1 in 100 years for fluvial flooding). **Map 1**

The National Flood Risk Assessment Map shows that the site is at a 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

The fluvial defences protecting this site consist of earth embankments. They are in good condition and provide protection against a flood event with a 1% chance of occurring in any year (1 in 100). The Environment Agency inspect these defences regularly to ensure that any potential defects are identified early.

The River Glen is 3.0Km to the south-east of the site and the River Welland 5.5Km south-east of the Site.

With the main rivers in question having adequate flood defences protecting the site and due to the site's location and distance to the flooding source it is doubtful if flood waters following a breach to the defences would reach the site, if it did it would be low. This is confirmed when examination of the South Holland

District Council SFRA Residual Peak Depth and Velocity District - Year 2115 1 % Fluvial / 0.5% Tidal Event Probability maps, which show that the site is not affected.

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

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

It was found that the actual risk from primary sources of flooding (taken as being rivers and the sea) was assessed as being the product of:

- Medium probability (assigned because the standards of the primary defences are variable) and
- Low consequence (assigned because of the District's generally rural nature and because any urban flooding is likely to be shallow with minimal impact).

The findings reflect the considerable protection afforded to the area by coastal and tidal & fluvial flood defences and by the extensive well organised system of lowland IDB fluvial drainage.

The computer modelling used in the SFRA to produce the Hazard, depth and velocity maps simulated the spread of flood waters over the land and allowed for the presence of locally raised features such as road embankments etc.

The potential flooding consequences shown on this map relate to flooding from the sea, main rivers and Internal Drainage Board systems taking into account the presence of current flood risk management measures such as flood defences.

The consequences designated as being an Actual Risk arise from direct overtopping of defences, where this would occur, together with assumed breach failure of some defences. Breach failure has been assumed to occur in places where the freeboard between peak sea or river water level and the defence crest level is less than the minimum desirable for structural security of the defence.

From the Residual Peak Depth District - Year 2115 1% Fluvial / 0.5% Tidal Event Probability map from the update of strategic flood risk assessment for South Holland District Council have been used in this assessment. The map shows that the site is not affected from flooding. **Map 3**

The Environment Agency requires that developments for residential purposes should be informed by the

flood depths arising from the 2115 0.5% breach scenario. For areas where flood depths are 0 – 0.25m deep the finished floor level FFL should be raised a minimum of 300mm above existing ground level.

Welland & Deepings 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.

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 into the drain on the northern boundary. The property is also raised 300mm above the general ground level. 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. There are no sewers in the vicinity of the site.
- 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. There are no known sources within the vicinity of the site.

RESIDUAL RISKS

There is always a possibility of a flood in excess of that allowed for which might conceivably cause some flooding to the properties. However, such an event would have a very low probability and the risk of flooding to the property would be extremely small. It is therefore considered that the residual risks associated with flooding are not significant.

SEQUENTIAL APPROACH

When applying the sequential approach for flood risk in accordance NPPF the site of the barn would fall into Flood Zone 3 (High Probability) as the site is shown to be within the fluvial flood plain 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 outside the 0.1% floodplain (with a chance of flooding of less than 0.1% chance in any given year);
- Flood Zone 2 is land that falls between the 1 in 100-year extent and the 1 in 1000-year extent (a chance of flooding between 1% and 0.1% in any given year);
- Flood Zone 3a is land which falls within the 1 in 100-year flood extent (has a 1% chance of a flood occurring in any given year).

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPF, the proposed development for residential use is classified as, “More Vulnerable” with Table 1 of NPPF stating that such uses are appropriate in this zone (as summarised in Table 3 NPPF).

Flood Zone	Shading	Risk	Flood Risk Probability
1	Clear	Low	Less than 0.1% (1 in 1000 yrs)
2	Light blue	Medium	Rivers: between 1% (1 in 100 yrs) and 0.1% (1 in 1000 yrs) Sea: between 0.5% (1 in 200 yrs) and 0.1% (1 in 1000 yrs)
3	Dark Blue	High	Rivers: greater than 1% (1 in 100 yrs) Sea: greater than 0.5% (1 in 200 yrs)

TABLE 3: Flood risk vulnerability and flood zones ‘compatibility’

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

NPPF Guidance Paragraphs 100 - 104 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.

Within Flood Zones 2 & 3, generally “more vulnerable” developments such as residential are discouraged, however, due to this being a change of use to an existing property, the Sequential Test and Exception Test are not applicable as moving the existing building is not an option. As set out in the National Planning Policy Framework (para.104) and associated Technical Guidance (para.10), change of use should not be subject to the sequential and exception tests but will still need to meet the requirements of a site specific flood risk assessment.

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.

The site is located within the Anglian River Basin, for sites within Flood Zone 3a and for “More vulnerable” land uses the Higher Central and Upper End 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 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
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%
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 1990 baseline)					
Area of England) (Use River Basin maps	1990 to 2025	2026 to 2050	2051 to 2080	2081 to 2115	Cumulative Rise 1990 to 2115 (m)
East, Midlands, London, South East	4 (140mm)	8.5 (212.5mm)	12 (360mm)	15 (525mm)	1.24m

The site is shown not to be affected from flooding on the Residual Peak Depth District - Year 2115 1% Fluvial / 0.5% Tidal Event Probability map, from the update of Strategic Flood Risk Assessment for South Holland District Council.

INFRASTRUCTURE

Construction on any undeveloped area has the potential to increase the rates and volumes of surface water

run-off, due to the replacement of pervious land with impervious surfaces. In this case the areal footprint of the buildings, access tracks and other infrastructure is unchanged therefore the surface water will discharge to the existing outfalls.

Foul Water

Due to the remoteness of the site and no public sewers close by, the foul sewage from the proposed dwelling will be discharged into a 5-person package treatment unit.

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 actually entering a building.
- **Flood-resilient works:** - these reduce the amount of damage caused by water entering the building.

The proposed property 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 to be constructed with a solid concrete floor with no voids beneath and no low level wall vents. However, if a beam type floor is to be used, provision should be incorporated for draining the under floor void.
- The ground floor level for the dwelling is to be raised 300mm to 3.30mODN.
- Fix plasterboard horizontally to the ground floor areas for ease of renewal.
- Avoid the use of absorbent cavity insulation to the ground floor level.
- Treated and sealed timber skirting and architraves.
- Arrange for all service circuits to be routed at high level where practical socket outlets, boilers etc. to be a minimum of 0.5m above the raised upper ground floor level.
- As this site is in an area that is capable of receiving flood warnings from the Environment Agency Floodline Warning Direct system. It is recommended that the property Owner contact the Environment Agency's Floodline on **0845 988 1188** to register the property to receive advance warning of flooding by telephone, mobile, fax, SMS text, email or pager. The Environment Agency aim to issue a 'severe flood warning' approximately 2 hours before existing defences are overtopped.

CONCLUSION

- o The site for the proposed change of use is shown to lie within both Flood Zone 3a (High Probability) and Flood Zone 2 (Medium Probability) without defences on the Agency's flood maps. There are no local site specific risks that would adversely affect this categorisation.
- o Following a breach to the defences, the Peak Residual Depth District - Year 2115 1% Fluvial / 0.5% Tidal Event Probability map included in the South Holland SFRA Update 2010 shows that the site is not subject to any flooding
- o The ground floor level for the existing barn change of use to residential, is to be raised 300mm to a level of 3.30mODN.
- o With the residential development being two storeys and all sleeping accommodation located at first floor, a safe haven is provided.
- o Applying the Flood Risk Vulnerability Classification in Table 2 of NPPF. The proposed use of the land and buildings for residential use falls within the 'More Vulnerable' uses of land shown in Table 2 Flood Risk Vulnerability Classification and buildings used for all purposes are appropriate in Flood Zone 3a subject to the Exception Test.
- o As set out in the National Planning Policy Framework (para.104) and associated Technical Guidance (para.10), change of use should not be subject to the sequential and exception tests but will still need to meet the requirements of a site specific flood risk assessment.
- o 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.

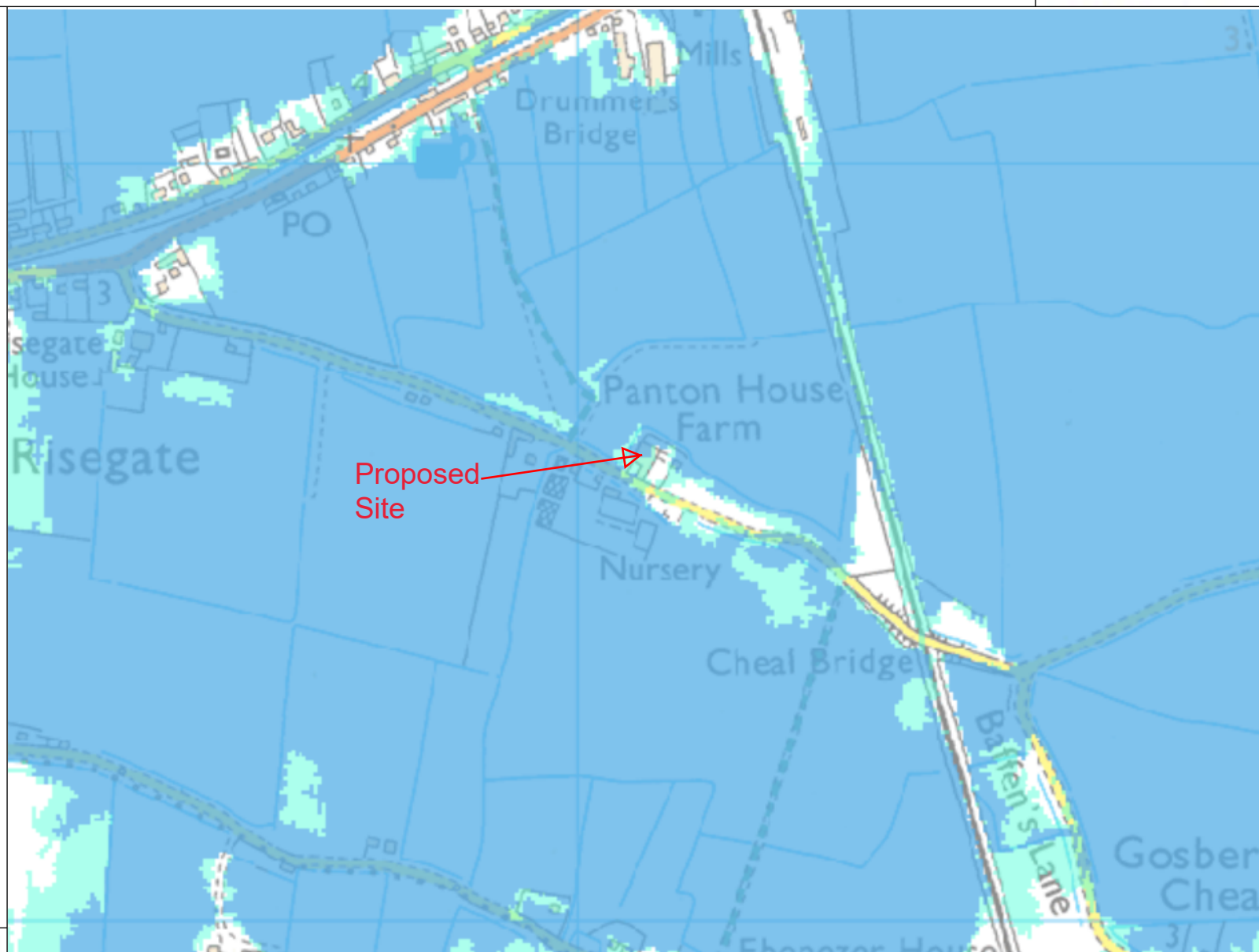
APPENDIX

- Map 1 Environment Agency Flood Plain Map.
- Map 2 NFRA Flood Map
- Map 3 SHDC Residual Peak Depth District - Year 2115 1% Fluvial / 0.5% Tidal Event Probability Map,
- Plan 1 Location Plan
- Plan 2 Proposed Layout Plan.
- Plan 3 Proposed Dwelling Elevations
- Plan 4 Proposed Dwelling Floor Plans

Flood Map centred on Panton House Hedgefield Hurn

Legend

- Flood Map - Defences
- Areas Benefiting from Flood Defences
- Flood Map - Flood Storage Areas
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2

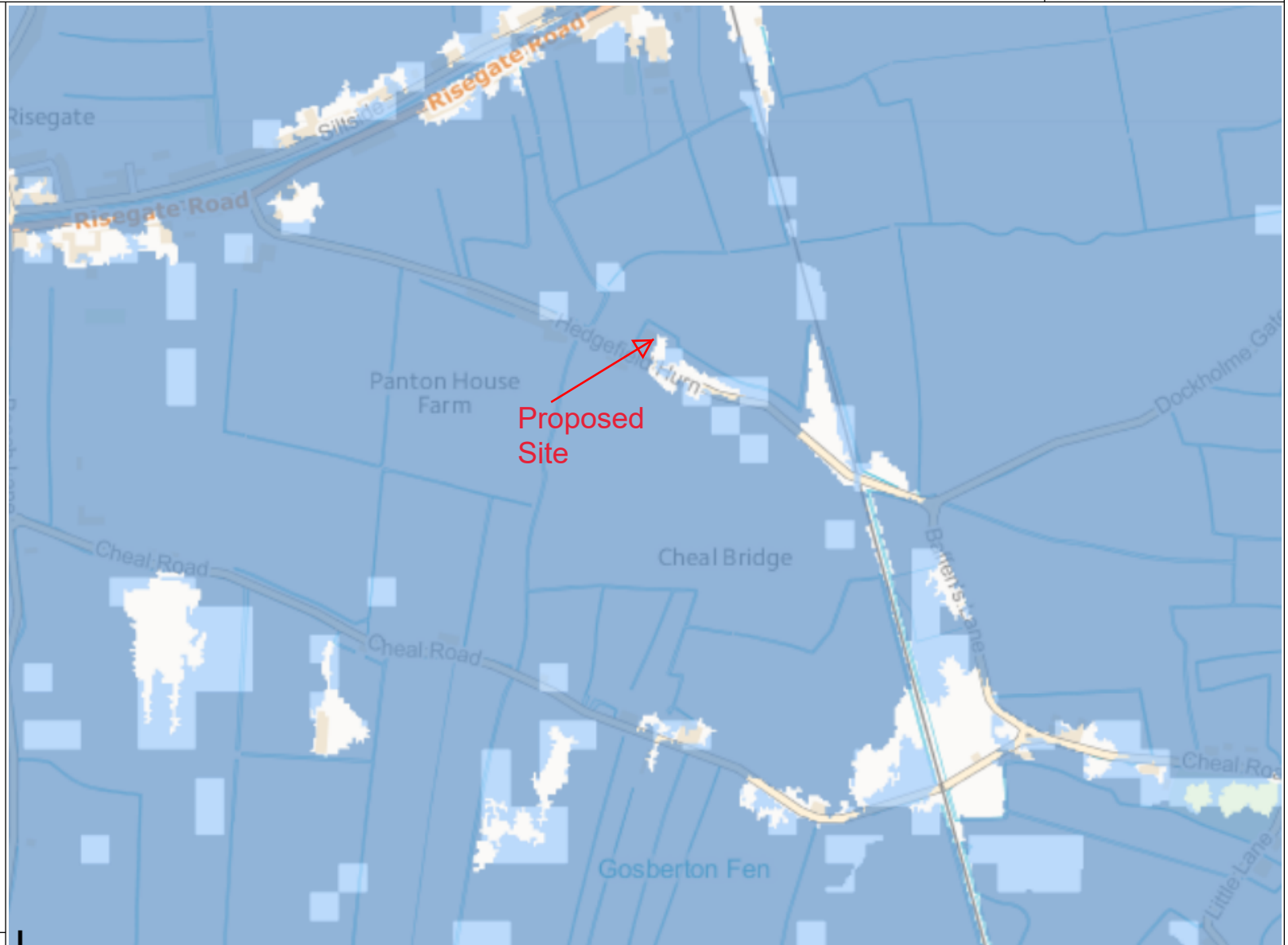
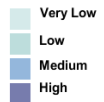


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Nafra FM centred on Panton House Hedgefield Hurn

Legend

National Flood Risk Assessment (NaFRA)



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Extract From South Holland District Council SFRA

UPDATE OF STRATEGIC
FLOOD RISK ASSESSMENT
Residual Peak Depth
Spalding - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

Legend

Peak Depth

0m - 0.5m



0.5m - 1m



1m - 1.5m



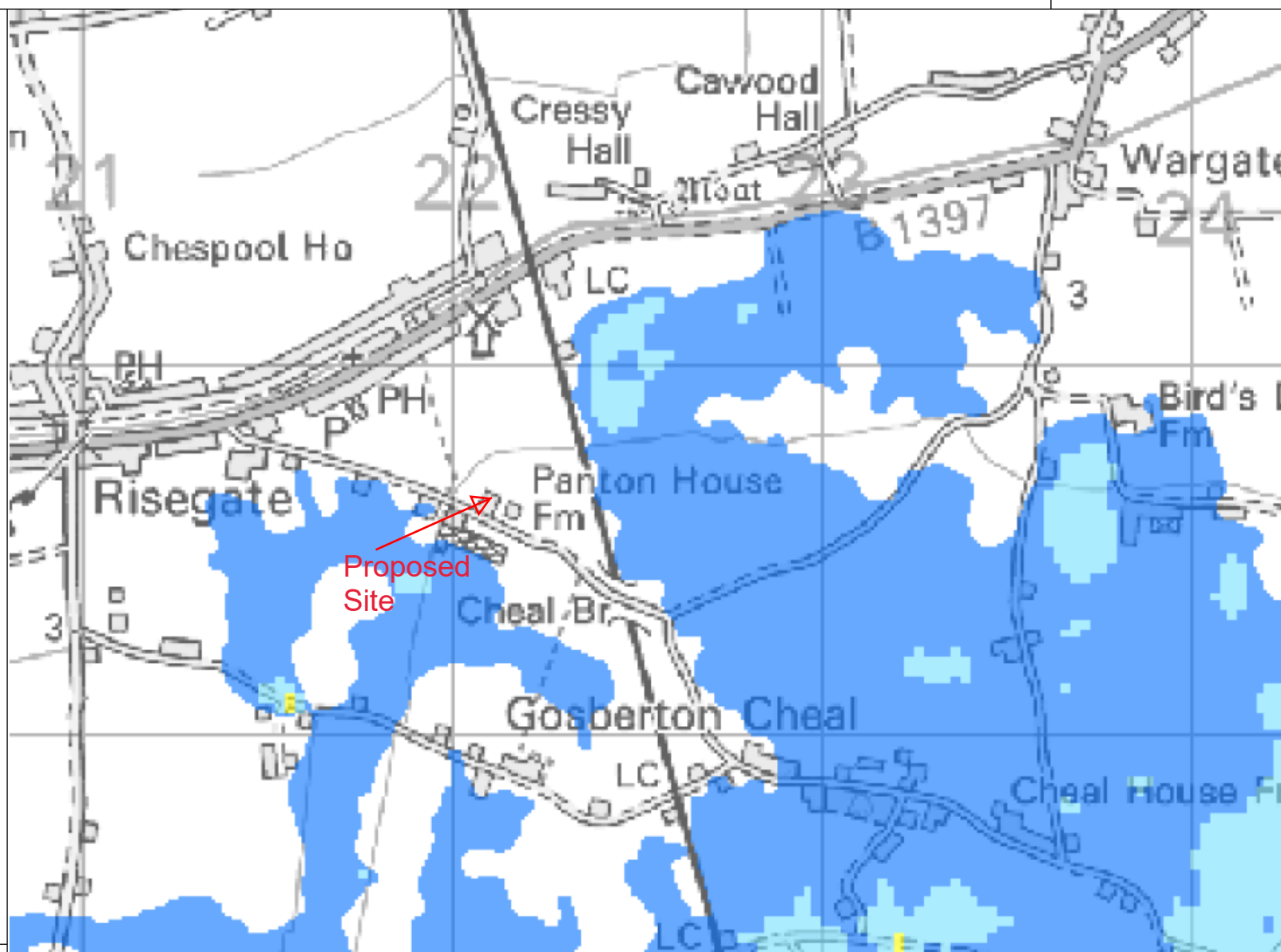
>1.5m



Functional Floodplain



South Holland District
Boundary



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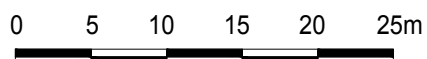
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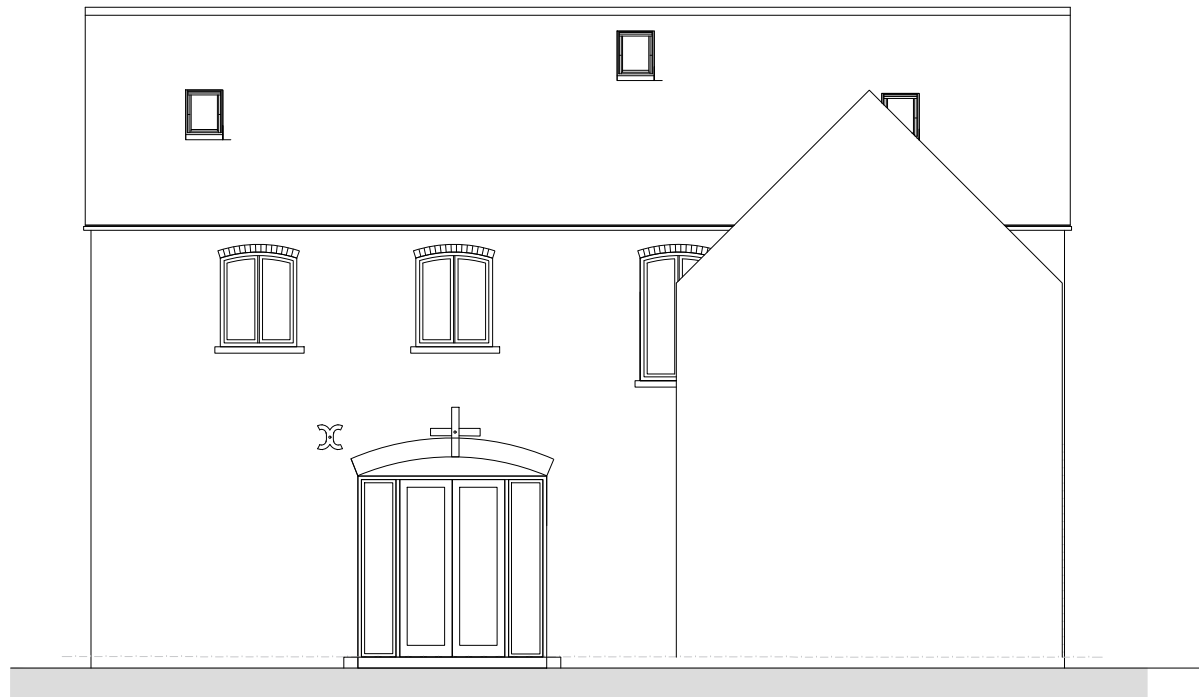
The design has been undertaken as far as possible to avoid risks to health and
safety or to reduce and control the effects of any unavoidable risks.

Any relevant information identifying risks which are not able to be eliminated
will be included within the project Health and Safety file.

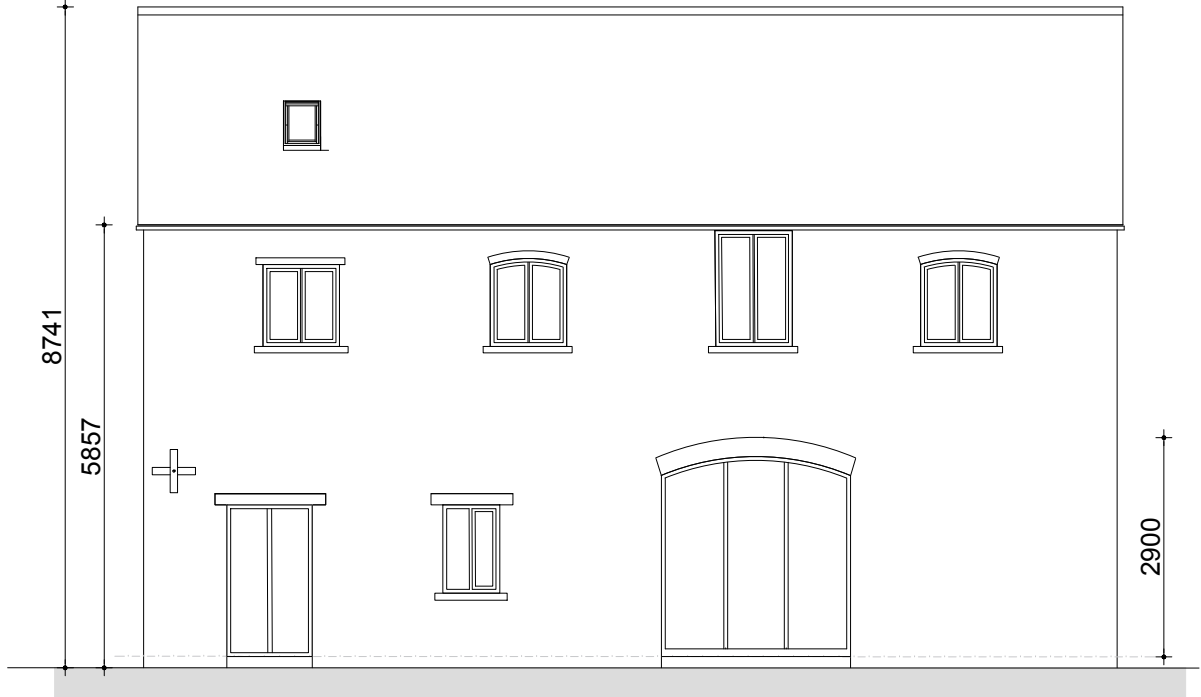


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Client: Stafford and Andrew Proctor			
Project: Pantan House Barns, Hedgefield Hum			
Drawing title: Site Layout			
Drawing No. 1182 - 01 - SL02	Rev.	Drawn RaC	
Scale 1:500 @ A4	Date 02/06/2016	Checked LMS	

All measurements should be checked against on site conditions and any discrepancies should be brought to the attention of the Robert Doughty Consultancy.



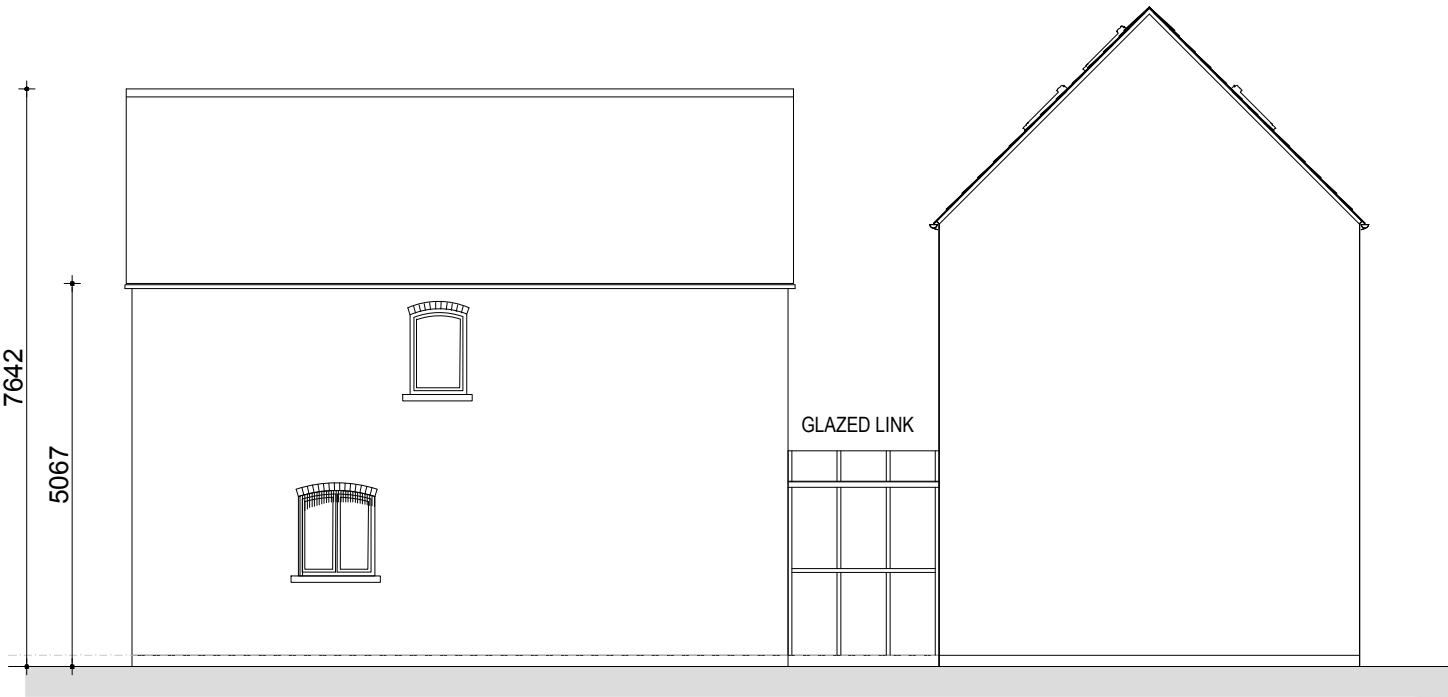
NORTH ELEVATION



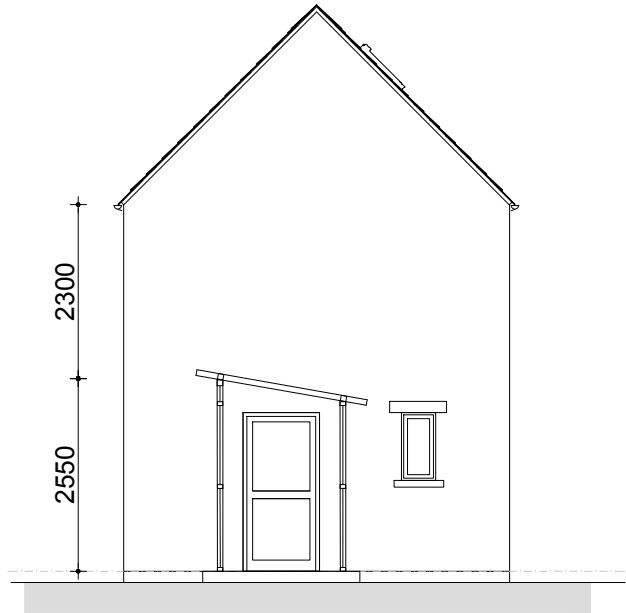
SOUTH ELEVATION



EAST ELEVATION



WEST ELEVATION



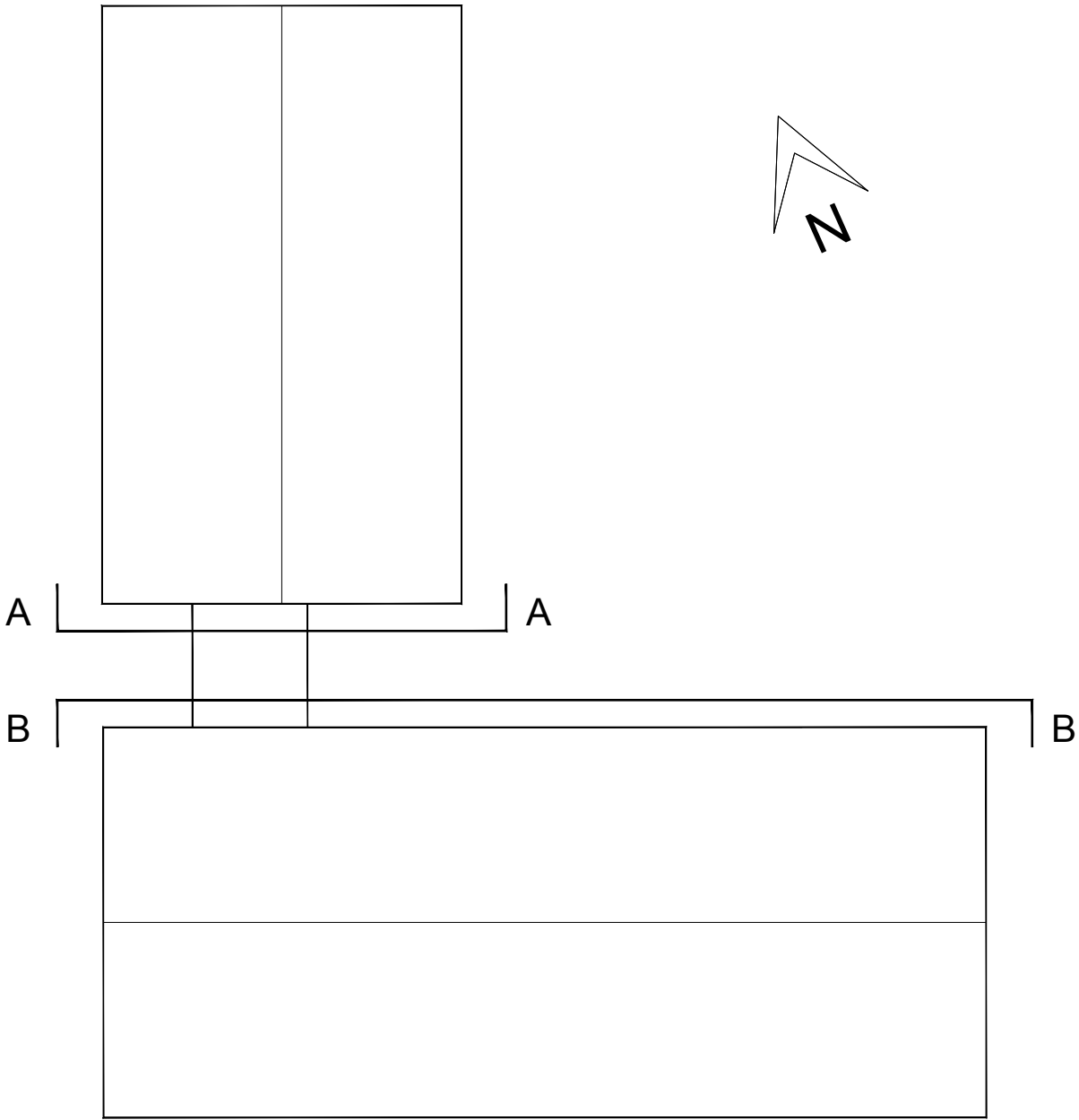
SECTION A-A



SECTION B-B

EXISTING LISTED BARN REFURBISHMENT:

- Roof: new slates on insulation on extg. exposed purlins and rafters
- Walls: brickwork repointed; dry lined with insulated boarding.
- Ground Floor: dig out existing, relay new ground bearing slab with insulation. (Subject to flood risk assessment)
- New first floor joists, boarding and ceiling.

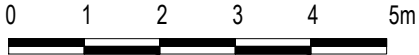


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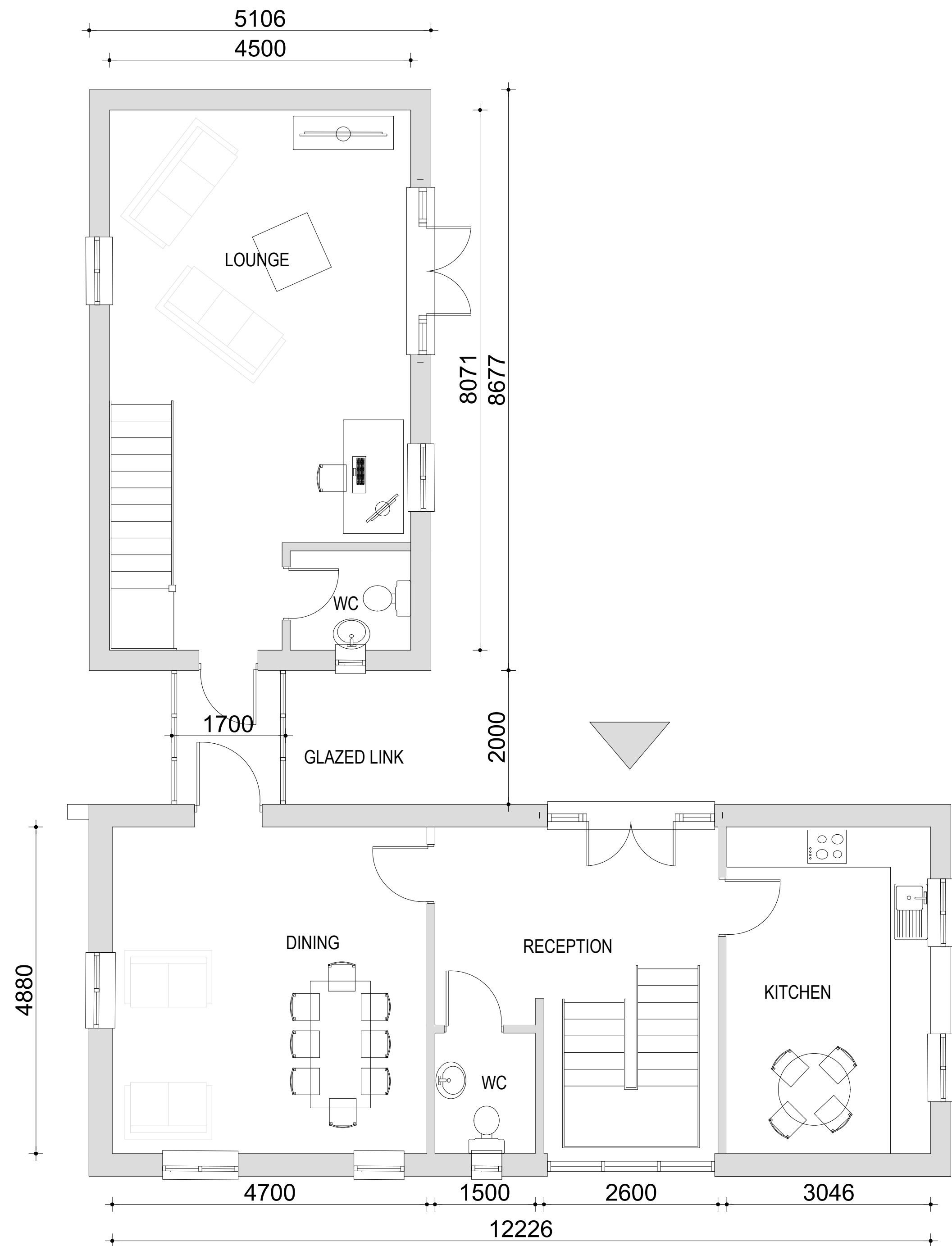
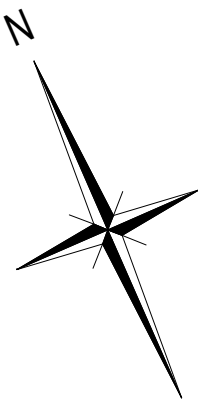
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Client: Stafford and Andrew Proctor			
Project: Proposed Barn Conversion, Panton House Barns, Hedgefield Hum			
Drawing title: Elevations			
Drawing No. 1182-1-SK02	Rev. -	Drawn RaC	
Scale 1:100 @ A2	Date 02/07/2016	Checked -	

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GROUND FLOOR PLAN



FIRST FLOOR PLAN

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-	-	-	-
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Client: Stafford and Andrew Proctor			
Project: Proposed Barn Conversion, Panton House Barns, Hedgefield Hurn			
Drawing title: Ground and First Floor Plans			
Drawing No. 1182 / 1 / SK01	Rev. -	Drawn RaC	
Scale 1 : 50 @ A1	Date 02/06/2016	Checked LMS	

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