FLOOD RISK ASSESSMENT
FOR AGRCULTURAL DEVELOPMENT AT
GREENS LANE, TILNEY ALL SAINTS

FINAL REPORT

ECL0616/TRUNDLEY DESIGN

DATE OCTOBER 2021

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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 Trundley Design Services in respect of a development that consists of a greenhouse and agricultural building at Greens Lane, Tilney All Saints.

A planning application for the proposed development is to be submitted by Trundley Design Services.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is situated at The Old barn, Greens Lane, Tilney All Saints, Kings Lynn, PE34 4RR. The National Grid Reference of the site is 55550/31833.

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 Greens Lane. The site consists of an area of grass and access and is part of the garden of The Old Barn. The area of the proposed development is 0.10 hectares.

Environment Agency LiDAR data shows that ground levels within the site vary between +2.7m OD and +2.9m OD. The access is at a level between +3.3m OD and +3.6m OD.

The site is in the King's Lynn Internal Drainage Board's (IDB) area. Surface water at the site would naturally drain through soakaway and hence to the IDB drain system. There is a riparian drain at the north eastern corner of the site. The nearest IDB Watercourse is 800m east of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by the Kimmeridge 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 a greenhouse and an agricultural building. Details of the proposed development are provided in Attachment 1

2.4 Local Development Documents

The King's Lynn and West Norfolk Borough Council Local Development Framework - Core Strategy is the adopted Local Plan for the district. Policy CS08 for Sustainable Development states the requirements for flood risk reduction.

The King's Lynn and West Norfolk Borough Council Level 1 Strategic Flood Risk Assessment (SFRA) was prepared in November 2018. The Level 2 SFRA was prepared in March 2019.

The Norfolk Lead Local Flood Authority (LLFA) Statutory Consultee Guidance Document has been drafted to support the development of Norfolk County Council's LLFA role as a statutory consultee to planning and to inform stakeholders in this process such as Local Planning Authorities (LPA's) and developers.

2.5 Flood Zones

As shown in Figure 2, the site is located within Flood Zone 3, an area with a high probability of flooding that benefits from flood defences, of the Environment Agency Flood Maps for Planning.

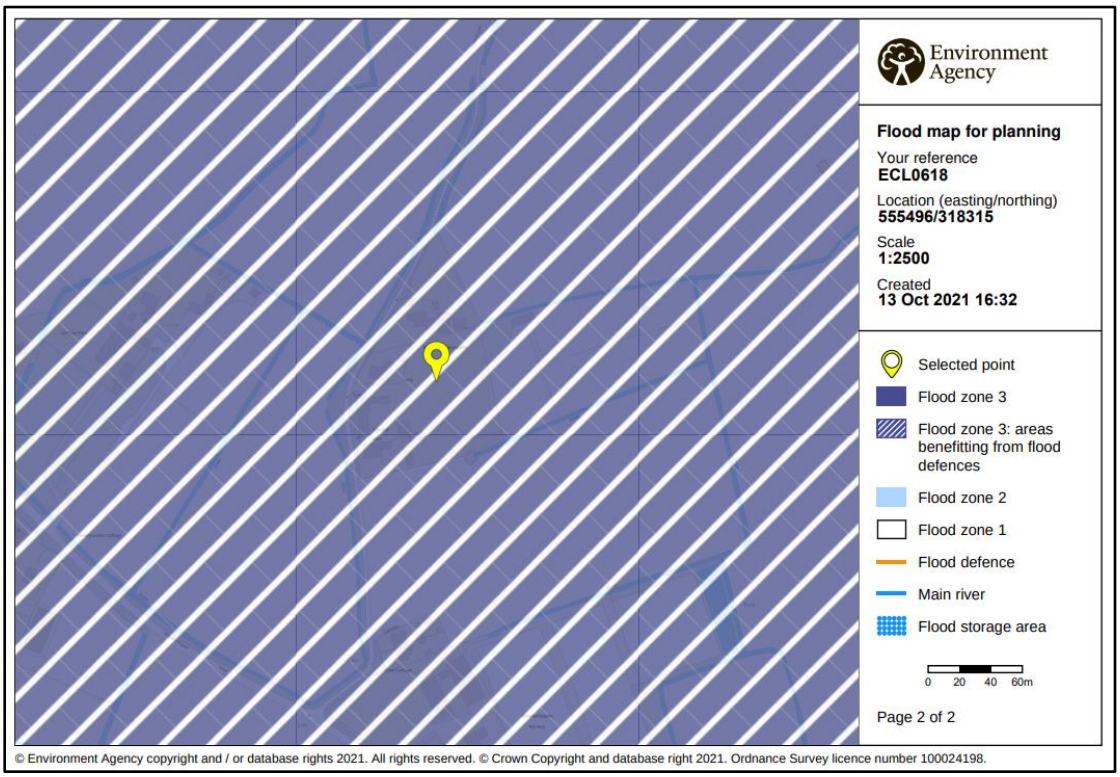


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has medium risk of flooding from rivers or the sea (annual probability between 1% and 3.3%);
- the site has a very low risk of surface water flooding (annual probability less than 0.1%); and
- the site is not within an area at risk of reservoir flooding.

The site is not within one of the settlements considered within the King's Lynn and West Norfolk Borough Council Level 2 SFRA. As such the Level 1 SFRA maps have been reviewed and they show that:

- the site is in Flood Zone 3;
- the site is not at risk during a 1% annual probability (1 in 100 chance each year) fluvial event including allowance for climate change;
- the site is not at risk during a 0.5% annual probability (1 in 200 chance each year) tidal event including allowance for climate change;
- the site is not at risk of surface water flooding during the 1% annual probability (1 in 100 chance each year) event including 40% allowance for climate change;
- the site is not in an area with susceptibility to groundwater flooding;
- the site is within an area at risk from a tidal breach; and
- the site is not within an area at risk from reservoir flooding.

The 2015 Tidal Hazard Mapping merged model extents provided by the Environment Agency have also been used to estimate the flood level during a breach.

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 agriculture and is classified as 'Less 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 'Less Vulnerable' therefore it is not 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

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.

The site is protected by the tidal defences on the River Great Ouse that were not considered during the preparation of the Environment Agency Flood Maps. The SFRA confirms that site is not at risk during the 1% annual probability (1 in 100 chance each year) fluvial event including an allowance for climate change and the 0.5% annual probability (1 in 200 chance each year) tidal event including an allowance for climate change. When the protection provided by flood defences are considered the 'actual risk' of flooding at the site is low. The development is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 4.3km from the River Great Ouse. The site is protected by tidal defences on the River Great Ouse. These 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 the King's Lynn IDB. The nearest IDB Watercourse is 800m east of the site. The site, and surrounding land, is part of the West Lynn catchment which drains by gravity to the West Lynn Drain 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 Board's assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the King's Lynn IDB's and the Environment Agency's defences are generally good.

4.2 Sources of Flooding

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

- local blockages to the IDB main drain system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of the West Lynn Drain Outfall Sluice; and
- overtopping and/or breaching of the River Great Ouse tidal defences.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the IDB's drainage system is low due to the maintenance standards already achieved and managed by the IDB.

The standard of drainage provided by King's Lynn IDB is assessed at 1% annual probability (1 in 100 chance each year) in line with their target standard of protection to residential properties. This exceeds 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 1% annual probability (1 in 100 chance each year) is lowered due to the King's Lynn IDB main drains incorporating freeboard. This provides storage during events greater than 1% annual probability (1 in 100 chance each year).

The site benefits from defences on the River Great Ouse that provide protection during an event with a 0.5% annual probability (1 in 200 chance each year). The River Great Ouse tidal defences were improved after the 1978 tidal surge event to a level of 6.30m AOD for hard defences and 7.00m AOD for soft defences. The highest recorded tide level in the River Great Ouse is 6.17m AOD and was recorded during the surge event of 5 December 2013.

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 in the River Great Ouse.

The SFRA maps show that the site is not at risk during the 0.5% annual probability (1 in 200 chance each year) tidal event with climate change. When this event is considered in the River Great Ouse it is likely to lead to some overtopping of the defences. However, the level of overtopping is such that it would not affect the site.

4.6 Residual Risk

There is a residual risk to the site if there was a breach of the tidal defences. The Environment Agency have undertaken Tidal Hazard Mapping to indicate the depth at the site during the 0.5% annual probability (1 in 200 chance each year) event with climate change with combined breaches of the River Great Ouse.

The 2015 Tidal Hazard Mapping merged model extents provided by the Environment Agency have been used to estimate the breach flood level. When breach depths and Environment Agency ground levels are considered a breach level of +3.1m OD can be estimated. This is a depth of between 0.2m and 0.4m at the site.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of the West Lynn Drain Outfall Sluice would increase the level of risk at the site.

The probability of the site flooding from the River Great Ouse 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 the River Great Ouse.

The site is at risk from combined breaches on the River Great Ouse during the 0.5% annual probability (1 in 200 chance each year) event in 2115. The estimated flood depth at the site is between 0.2m and 0.4m.

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

Considering the development is an agricultural building there are no specific mitigation measures proposed associated with the design.

The developer should ensure that the user of the building 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 user of the building should register with the Floodline Direct Warnings Service to receive any future flood warnings.

The site is 4.3km from the tidal defences and therefore should a breach occur it is anticipated that sufficient time would be available to take precautionary actions to limit the potential impact of flooding.

Failure of West Lynn Drain Outfall Sluice may occur due to mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such to put properties and land at risk of flooding, the IDB would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

It is recommended that surface water run-off is managed 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 this assessment, the following conclusions have been reached.

- The proposed development consists of a greenhouse and agricultural building at Greens Lane, Tilney All Saints.

- The proposed development is in Flood Zone 3. The site benefits from defences on the tidal River Great Ouse which provide protection against the 0.5% annual probability (1 in 200 chance each year) event including climate change.

- The site is located within an IDB catchment with a minimum standard of drainage of 1% annual probability (1 in 100 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the Board drains incorporating a significant freeboard. This provides storage during events greater than 1% annual probability (1 in 100 chance each year).

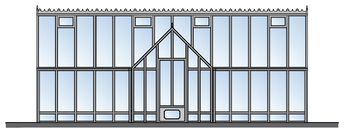
- The site is not at risk during a tidal breach.

- There are no specific recommendations associated with the proposed development to reduce the risk of flooding to the development.

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

ATTACHMENT 1

PROPOSED PLANS, ELEVATIONS & SITE PLAN (DWG 21-P42-PL002)



PROPOSED FRONT ELEVATION (GREENHOUSE)
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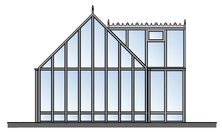

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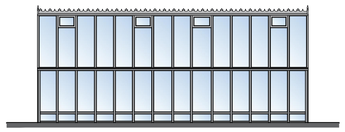

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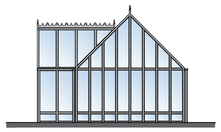

PROPOSED SIDE ELEVATION (GREENHOUSE)
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PROPOSED ROOF PLAN (GREENHOUSE)
SCALE: 1:100

1:50 SCALE BAR (m)
0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

1:100 SCALE BAR (m)
0 1 2 3 4 5 6 7 8 9 10

1:200 SCALE BAR (m)
0 2 4 6 8 10 12 14 16 18 20

*** NB: ALL PROPOSED SITE AND FLOOR LEVELS TO MATCH EXISTING LEVEL HEIGHTS. ALL LEVELS ABOVE GROUND LEVEL WILL MATCH EXISTING.**

Notes:

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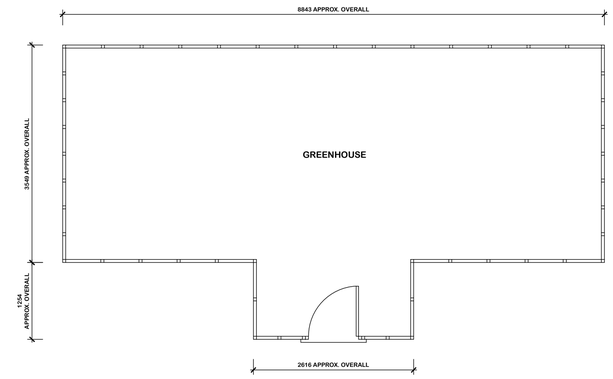

PROPOSED FLOOR PLAN - GREENHOUSE
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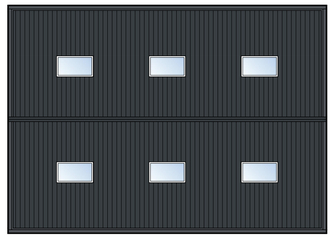

PROPOSED ROOF PLAN (AGRICULTURAL BUILDING)
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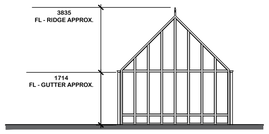

PROPOSED TYPICAL SECTION (GREENHOUSE)
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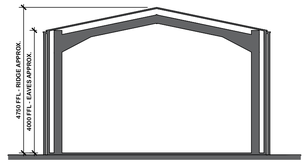
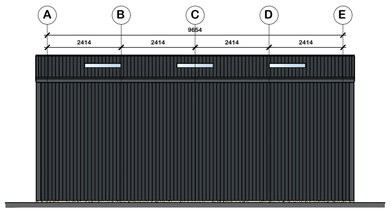


PROPOSED TYPICAL SECTION (AGRICULTURAL BUILDING)
SCALE: 1:100

ELEVATION FINISHES LEGEND

- 32mm PLASTISOL CLADDING. COLOUR : ANTHRACITE GREY
- PERSONNEL DOOR - MATERIAL TBC COLOUR : ANTHRACITE GREY
- UPVC RAIN WATER GOODS COLOUR : BLACK
- CONCRETE BASE
- ROLLER SHUTTER DOOR COLOUR : BROWN



PROPOSED FRONT ELEVATION - SOUTH (AGRICULTURAL BUILDING)
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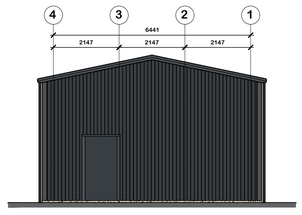

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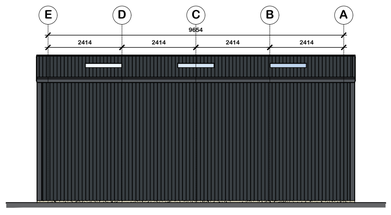

PROPOSED REAR ELEVATION - NORTH (AGRICULTURAL BUILDING)
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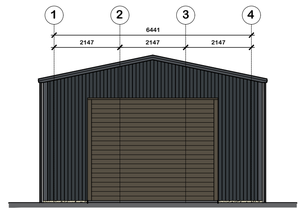

PROPOSED SIDE ELEVATION - WEST (AGRICULTURAL BUILDING)
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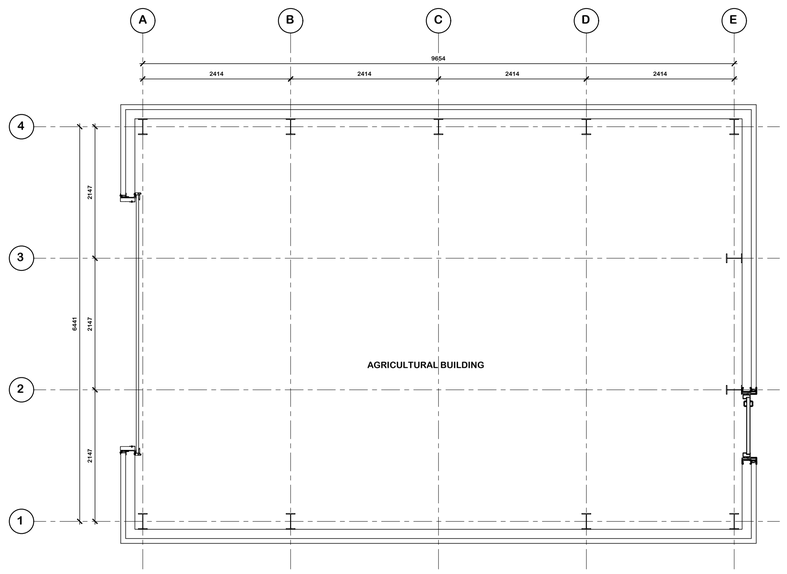

PROPOSED FLOOR PLAN - AGRICULTURAL BUILDING
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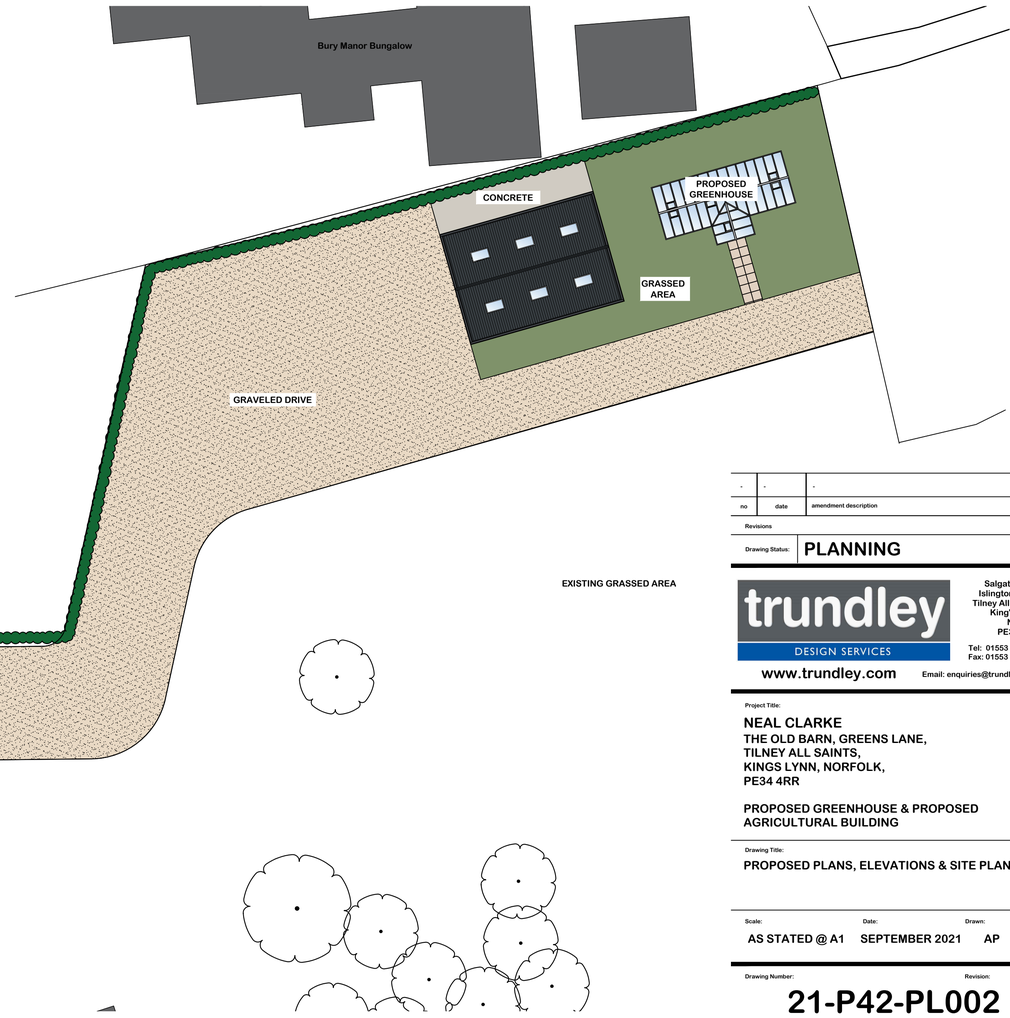

PROPOSED SITE PLAN
SCALE: 1:200

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no	date	amendment description
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Revisions

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PROPOSED GREENHOUSE & PROPOSED AGRICULTURAL BUILDING

Drawing Title:

PROPOSED PLANS, ELEVATIONS & SITE PLAN

Scale:	Date:	Drawn:
AS STATED @ A1	SEPTEMBER 2021	AP

Drawing Number: **21-P42-PL002** Revision:

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