

**FLOOD RISK ASSESSMENT
FOR AGRICULTURAL DEVELOPMENT AT
THE BIRCHES, CUCKOO ROAD, STOWBRIDGE**

FINAL REPORT

ECL0517-2/TRUNDLEY DESIGN SERVICES

DATE JULY 2023

ELLINGHAM CONSULTING LTD

Email: tim@ellinghamconsulting.co.uk

CONTENTS

1.0 INTRODUCTION

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 Site Location
- 2.2 Existing Site
- 2.3 Proposed Development
- 2.4 Local Development Documents
- 2.5 Available Flood Risk Information

3.0 FLOOD RISK VULNERABILITY

- 3.1 The Sequential and Exception Test
- 3.2 Vulnerability Classification
- 3.3 Application of the Sequential Test

4.0 SITE SPECIFIC FLOOD RISK

- 4.1 Local Flood Assets
- 4.2 Sources of Flooding
- 4.3 Probability of Flooding
- 4.4 Historic Flooding
- 4.5 Climate Change
- 4.6 Residual Risk

5.0 FLOOD RISK MITIGATION

- 5.1 Summary of Risks
- 5.2 Mitigation Measures

6.0 CONCLUSIONS

ATTACHMENT 1 – Existing Site and Location Plan (Dwg 23-P26-PL001)

– Proposed Plans and Elevation (Dwg 23-P26-PL002)

DISCLAIMER

This document has been prepared solely as a Flood Risk Assessment in support of a planning application for a proposed development at Cuckoo Road, Stowbridge. "Ellingham Consulting Ltd" accepts no responsibility or liability whatsoever for any use made of this document other than by the client "Mr C Nottingham" for the purposes it was originally commissioned and prepared. All comments and opinions made are based upon information available to "Ellingham Consulting Ltd" during the necessary investigative process, and the conclusions and recommendations could, therefore, differ in the event of material subsequently being found erroneous, incomplete, or misleading. "Ellingham Consulting Ltd" therefore, accepts no liability should this prove to be the case.

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 C Nottingham in respect of a development that consists of 2 containers and a lean to at The Birches, Cuckoo Road, Stowbridge.

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 at The Birches, 21 Cuckoo Road, Stowbridge, PE34 3NY. The National Grid Reference of the site is 55851/30475.

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 south eastern side of Cuckoo Road close to the junction with Dexter Road. The site consists of agricultural land and an access from Cuckoo Road. There is a dwelling to the north west of the site and agricultural buildings to the north east. The area of the proposed development is approximately 0.05 hectares.

Environment Agency LiDAR data shows that ground levels in the area of the proposed development are between -2.0m OD and -2.2m OD. Cuckoo Road at the entrance to the site is at a level of -1.1m OD.

The site is in the Downham and Stow Bardolph Internal Drainage Board's (IDB) district. Surface water at the site naturally drains through soakaway and hence to the IDB drain system. There is a riparian drain 50m south west of the site and the nearest IDB watercourse is 200m south 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 two containers and a lean to roof spanning between the containers. Details of the proposed development is 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 Available Flood Risk Information

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.

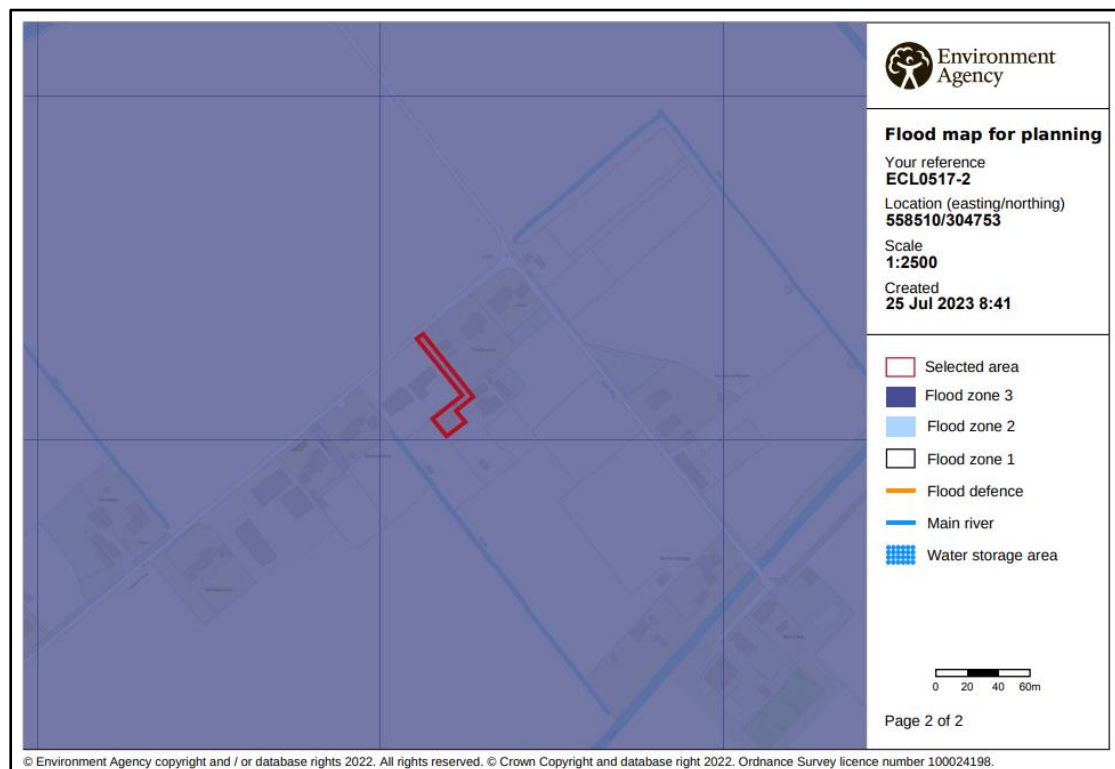


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a 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 within an area at risk of reservoir flooding when there is also flooding from rivers.

Barroway Drove and Stowbridge are not settlements that are considered within the King's Lynn and West Norfolk Borough Council Level 2 SFRA. As such the Level 1 SFRA has been used which shows that:

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

The 2015 Tidal Hazard Mapping merged model extents provided by the Environment Agency have 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.

Large parts of the King's Lynn and West Norfolk Borough Council district between the River Nene and River Great Ouse, to the north and east of Wisbech, lie in Flood Zone 3. As such the opportunities to undertake the development at an alternative site in Flood Zone 1 or 2 are limited.

The SFRA confirms that the site is not at risk during a 1% annual probability (1 in 100 chance each year) fluvial or a 0.5% annual probability (1 in 200 chance each year) tidal event including an allowance for climate change. The 'actual risk' of flooding at the site is therefore very low. The development is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.5km from the River Great Ouse. The site is protected by the Great Ouse tidal defences. The River Great Ouse 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 periodically.

There is an extensive local drainage network managed by the Downham and Stow Bardolph IDB. The nearest Board drain is located approximately 200m south east of the site. The site, and surrounding land, drains by gravity to the Stow Bardolph Pumping Station and outfalls to the River Great Ouse.

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.

The site is 4.0km from the Middle Level Main Drain, an embanked channel which flows to St German Pumping Station to discharge to the tidal River Great Ouse. The Middle Level Main Drain and St Germans Pumping Station are the responsibility of the Middle Level Commissioners.

The site is 6.5km from the Ouse Washes, a washlands providing flood storage to manage flood risk. The Middle Level Barrier Bank that protects the site is inspected and maintained in accordance with the standards of the Reservoirs Act.

Current maintenance standards of the Downham and Stow Bardolph IDB's, the Middle Level Commissioners and the Environment Agency's defences are generally good.

4.2 Sources of Flooding

A summary of the sources of flooding is provided in Table 1.

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.
Fluvial Flooding	The risk is assessed in Section 4.3 and Section 4.5.
Tidal Flooding	The risk is assessed in Section 4.3, Section 4.5, and Section 4.6.
Reservoir Flooding	The risk of flooding from the Ouse Washes is assessed in Section 4.6.
Groundwater Flooding	Based upon the SFRA maps and the local drainage network the risk is low.

Table 1 – Sources of Flooding

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. Failure of Stow Bardolph Pumping Station would lead to an increased level of risk in 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 Downham and Stow Bardolph IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

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).

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.

In summary the existing systems and defences are appropriate for the design life of the development (i.e., 100 years).

4.6 Residual Risk

The SFRA indicates that the site is at risk of flooding during a breach. The Environment Agency Hazard Mapping indicates the maximum flood depths in the event of a combined breach.

The 2015 Tidal Hazard Mapping merged model extents provided by the Environment Agency have also been used to estimate the flood level. At four locations the tidal hazard mapping model depth and LiDAR ground level have been used to estimate the flood level.

The analysis shows that a conservative estimate of the maximum breach level during the life of the development is -0.2m OD. Based upon the ground levels at the site this is a depth up to 2m.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Stow Bardolph Pumping Station could lead to an increased 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 defence systems. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development the site is not at risk during the 0.5% annual probability (1 in 200 chance each year) event.

There is a residual risk to the site should there be a breach of the Environment Agency tidal defences. The peak flood level that could occur at the site due to combined breaches is -0.2m OD, a depth of up to 2.0m at the site.

The proposed development increases the impermeable area so there will be an increased volume of surface water. This 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 eventual user of the development is 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 user of the development should register to receive flood warnings.

Failure of Stow Bardolph Pumping Station may occur due to long term 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

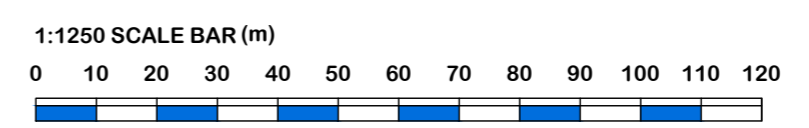
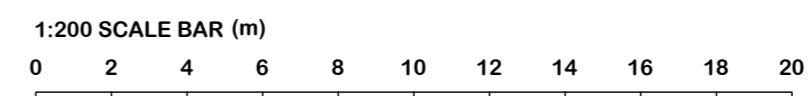
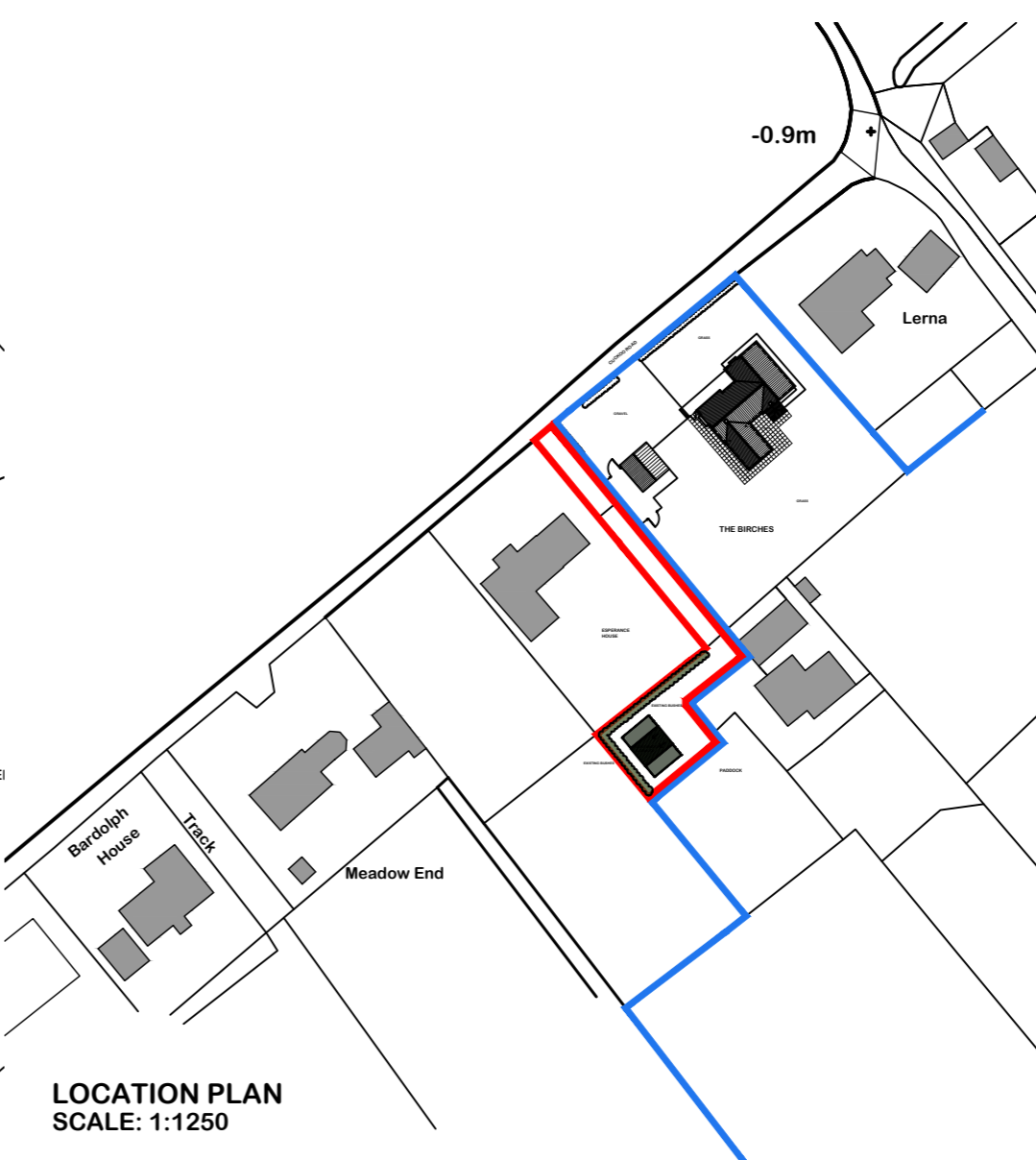
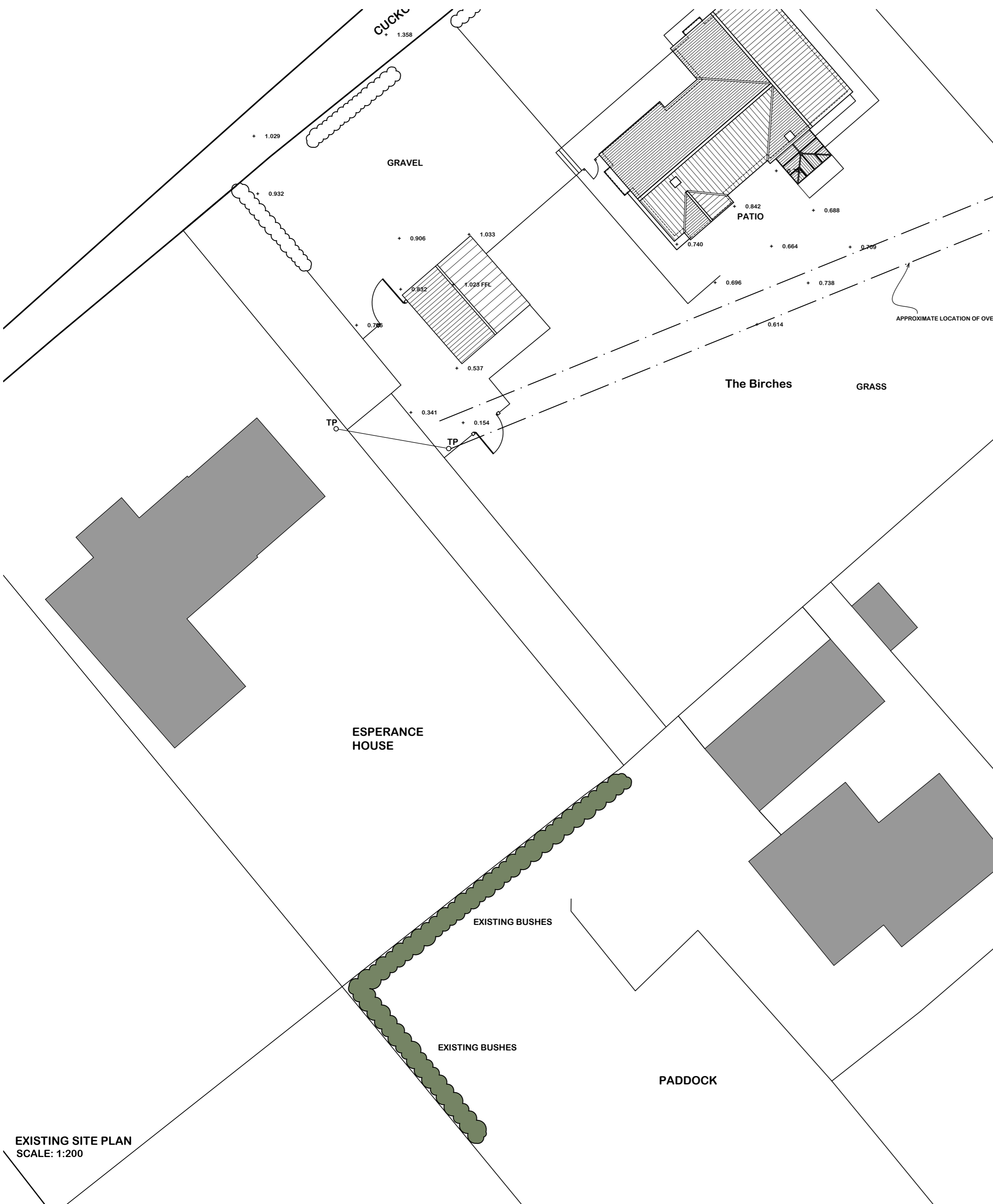
As a result of this assessment, the following conclusions have been reached.

- The proposed development consists of two containers and a lean to roof spanning between the containers at Cuckoo Road, Stowbridge.
- 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 defended Flood Zone 3. The benefits from defences on the Great Ouse Tidal River which provide protection against the 0.5% annual probability (1 in 200 chance each year) event including climate change.
- During a breach of the tidal defences the site is at risk with depths up to 2m.
- There are no specific recommendations associated with the agricultural building to reduce the risk of flooding to the development.
- The development passes the Sequential Test and is therefore suitable for the proposed location.

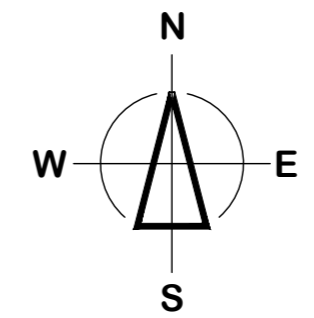
ATTACHMENT 1

**EXISTING SITE AND LOCATION PLAN
(Dwg 23-P26-PL001)**

**PROPOSED PLANS AND ELEVATIONS
(Dwg 23-P26-PL002)**



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



EXISTING SITE PLAN
SCALE: 1:200

LOCATION PLAN
SCALE: 1:1250

Notes:

This document is the property of David Trundle Design Services Ltd and may not be reissued, loaned or copied in part or in whole without written permission © 2023

All dimensions are in millimetres unless stated otherwise.

It is recommended that information is not scaled off this drawing.

This drawing should be read in conjunction with all other relevant information, specifications & schedules.

If this drawing is received electronically it is the recipients responsibility to print the document at the correct scale.

All dimensions to be checked on site prior to commencing work and any discrepancies to be advised immediately.

CONSTRUCTION (Design & Management) REGULATIONS 2015: David Trundle Design Services Ltd are employed as 'Designer' and will provide information to those responsible for the 'Principal Designer' and to the client.

David Trundle Design Services Ltd are responsible for the 'Architectural' design of the elements included on this drawing only.

Architectural design has been carried out with due consideration for the safety during construction, occupation and maintenance of the finished structure.

The works contain no extraordinary hazards or risks that are not present during routine construction operations that would not readily be apparent to a competent contractor.

This information should be included as part or commencement of the Health and safety file for the project.

no	date	amendment description
-	-	-

Revisions

Drawing Status: **PLANNING**

Salgate Barn
Islington Road
Tilney All Saints
King's Lynn
Norfolk
PE34 4RY

Tel: 01553 617700
Fax: 01553 617874

www.trundle.com Email: enquiries@trundle.com

Project Title:
**CLIVE NOTTINGHAM
THE BIRCHES, CUCKOO ROAD
STOW BRIDGE, KINGS LYNN
NORFOLK
PE34 3NY**

PROPOSED LEAN TO AND 2 NO. CONTAINERS

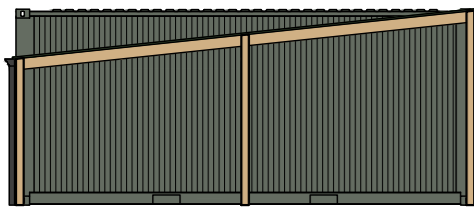
Drawing Title:
EXISTING SITE AND LOCATION PLANS

Scale: AS STATED @ A2 Date: JULY 2023 Drawn: BE

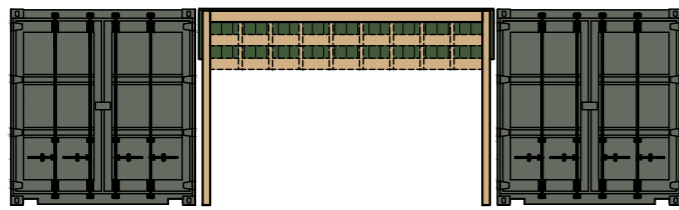
Drawing Number: **23-P26-PL001** Revision:

Checked by: Date:

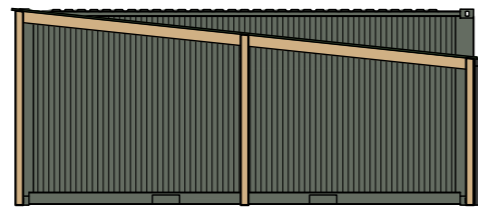
If this drawing is unsigned in the check box then the drawing is an unauthorised issue and should not be used for any purposes



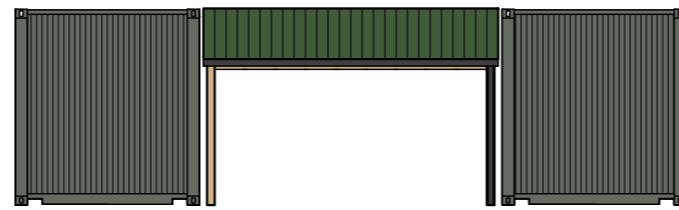
PROPOSED SIDE ELEVATION
SCALE: 1:100



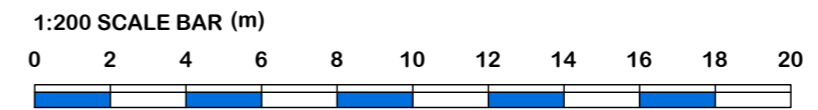
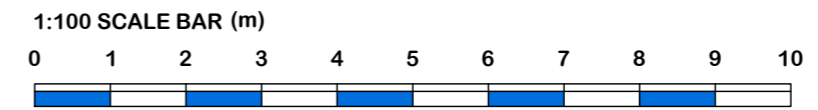
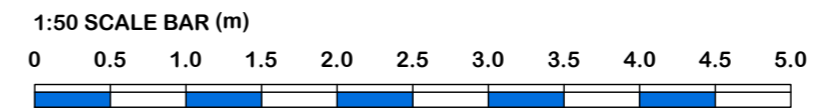
PROPOSED FRONT ELEVATION
SCALE: 1:100



PROPOSED SIDE ELEVATION
SCALE: 1:100



PROPOSED REAR ELEVATION
SCALE: 1:100



Notes:

This document is the property of David Trundle Design Services Ltd and may not be reissued, loaned or copied in part or in whole without written permission © 2023

All dimensions are in millimetres unless stated otherwise.

It is recommended that information is not scaled off this drawing.

This drawing should be read in conjunction with all other relevant information, specifications & schedules.

If this drawing is received electronically it is the recipients responsibility to print the document at the correct scale.

All dimensions to be checked on site prior to commencing work and any discrepancies to be advised immediately.

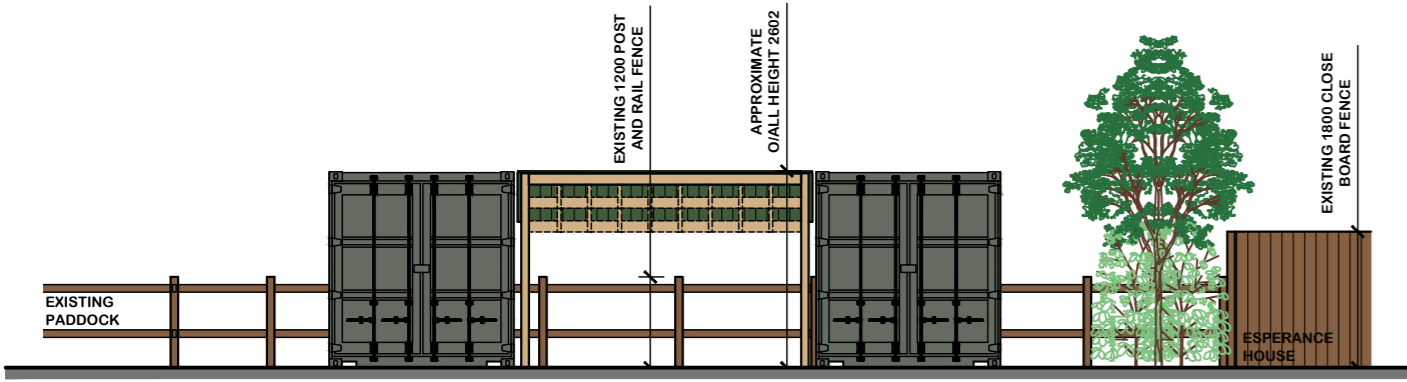
CONSTRUCTION (Design & Management) REGULATIONS 2015: David Trundle Design Services Ltd are employed as 'Designer' and will provide information to those responsible for the 'Principal Designer' and to the client.

David Trundle Design Services Ltd are responsible for the 'Architectural' design of the elements included on this drawing only.

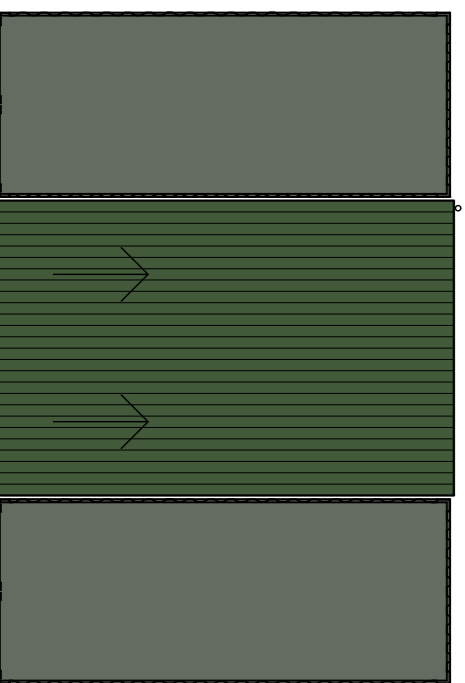
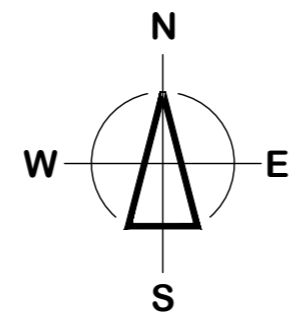
Architectural design has been carried out with due consideration for the safety during construction, occupation and maintenance of the finished structure.

The works contain no extraordinary hazards or risks that are not present during routine construction operations that would not readily be apparent to a competent contractor.

This information should be included as part or commencement of the Health and safety file for the project.



PROPOSED ELEVATION A-A
SCALE: 1:100



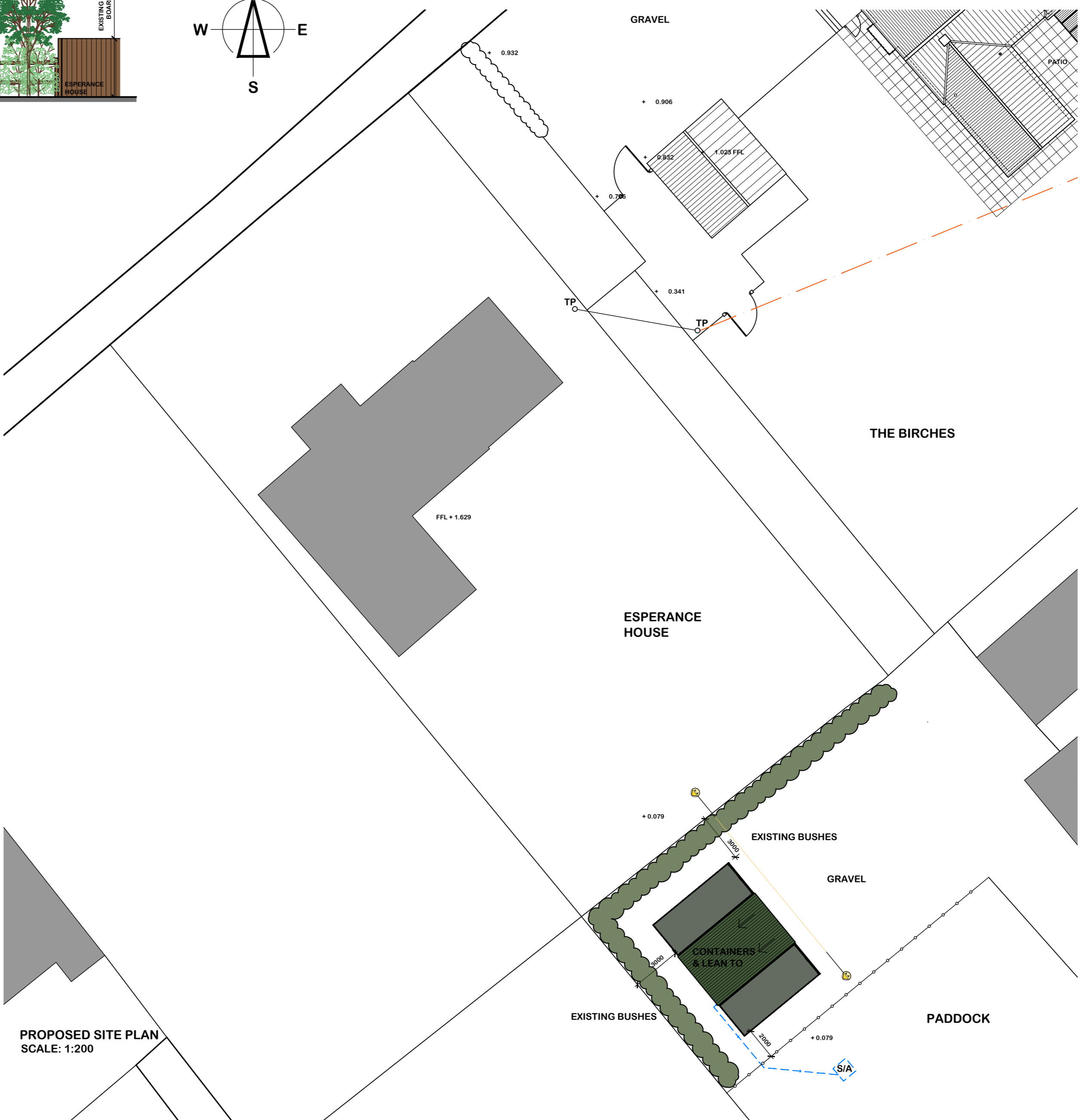
ROOF PLAN
SCALE: 1:100

Finishes Legend

- TIMBER POST & FRAME
- CORRUGATED ROOF SHEET
- CORRUGATED METAL CONTAINER
- EXISTING BUSHES / TREES
- EXISTING FENCES

SITE LEGEND

- EXISTING HEDGE
- 1.2M POST AND RAIL FENCE PROPOSED
- PROPOSED INDICATIVE SURFACE WATER DRAINAGE



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

no	date	amendment description
-	-	-

Revisions

Drawing Status: **PLANNING**

trundle
DESIGN SERVICES

Salgate Barn
Islington Road
Tilney All Saints
King's Lynn
Norfolk
PE34 4RY
Tel: 01553 617700
Fax: 01553 617874
www.trundle.com Email: enquiries@trundle.com

Project Title:
**CLIVE NOTTINGHAM
THE BIRCHES, CUCKOO ROAD
STOW BRIDGE, KINGS LYNN
NORFOLK
PE34 3NY**

PROPOSED LEAN TO AND 2 NO. CONTAINERS

Drawing Title:
**PROPOSED PLANS, ELEVATIONS
AND SITE PLAN**

Scale: AS STATED @ A2 Date: JULY 2023 Drawn: BE

Drawing Number: **23-P26-PL002** Revision:

Checked by: Date:

PROPOSED FLOOR PLAN
SCALE: 1:50

PROPOSED SITE PLAN
SCALE: 1:200

If this drawing is unsigned in the check box then the drawing is an unauthorised issue and should not be used for any purposes