

**FLOOD RISK ASSESSMENT  
FOR INDUSTRIAL DEVELOPMENT AT  
WEST HOLME NURSERY, WALPOLE CROSS KEYS**

**FINAL REPORT**

**ECL0143-2/TRUNDLEY DESIGN SERVICES LTD**

**DATE FEBRUARY 2021**

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(Dwg 21-L09-PL001)**

## **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 JKN Engineering in respect of a development that consists of a single storey side extension to an existing storage unit at West Holme Nursery, Walpole Cross Keys.

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

## 2.0 SITE LOCATION AND DESCRIPTION

### 2.1 Site Location

The site is situated at West Holme Nursery, 65 Station Road, Walpole Cross Keys, PE34 4HB. The National Grid Reference of the site is 55190/31948.

The location of the site is shown in Figure 1.

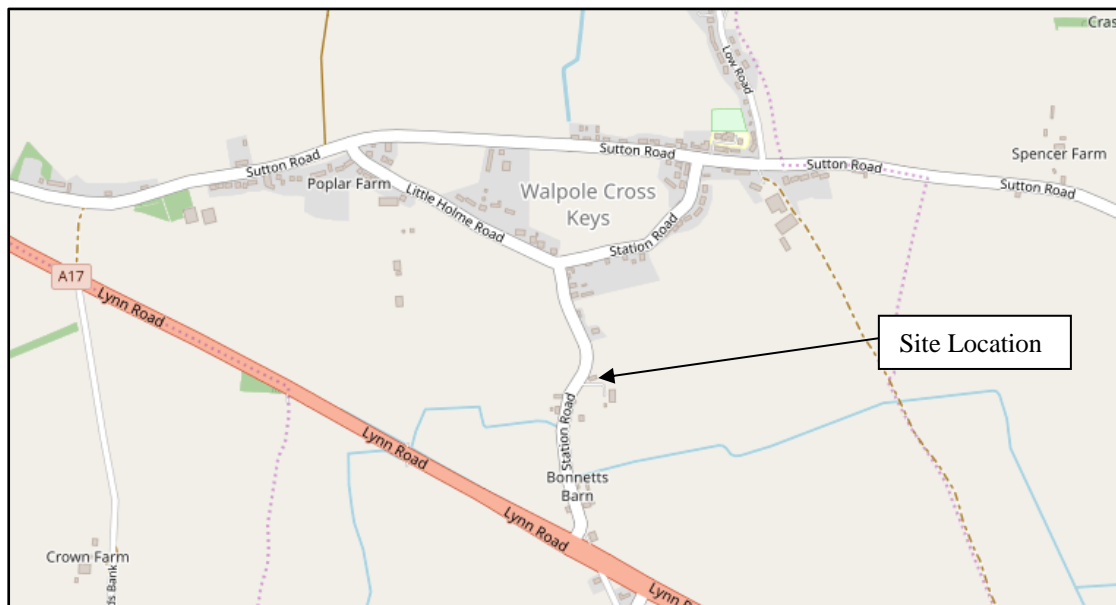


Figure 1 – Location Plan (© OpenStreetMap contributors)

### 2.2 Existing Site

Details of the site are shown in Attachment 1. The site is within a horticultural nursery on the eastern side of Station Road. The site comprises the access, an existing store, and a greenhouse. The area of development is approximately 0.10 hectares.

A topographic survey of the site has been undertaken and spot levels are included in Attachment 1. The site is at a level of +2.8m OD.

The site is in the King's Lynn Internal Drainage Board's (IDB) area. Surface water at the site drains naturally through soakaway and hence to the IDB drain system. The site, and surrounding land, is part of the Reeds Drain catchment which drains by gravity to Smeeth Lode which outfalls to the River Great Ouse via the Islington Pumping Station.

The online British Geological Survey maps indicate that the site is likely to be underlain by the 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 a single storey side extension to an existing storage unit. As part of the development a greenhouse will be removed. The proposed site plan is shown 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

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

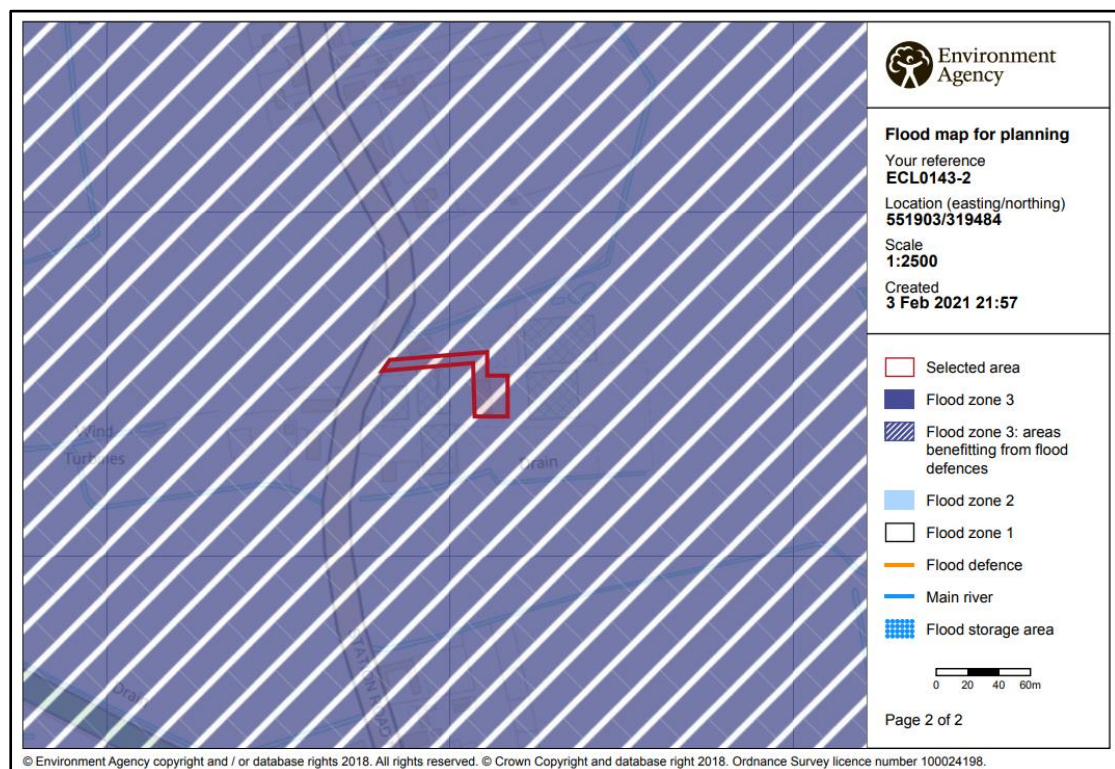


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a 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.

Walpole Cross Keys is not one of the settlements 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 defended 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 allowance for climate change;
- the site is not susceptible 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 Tidal Hazard Mapping produced by the Environment Agency has 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 general industry 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 defended Flood Zone 3 and the development is 'Less Vulnerable' therefore the development is appropriate, and 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**

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

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. Walpole Cross Keys is entirely within defended Flood Zone 3, an area that benefits from flood defences. The River Nene and River Great Ouse have defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event including climate. The site therefore has a low probability of flooding and is considered to pass the sequential test.

## 4.0 SITE SPECIFIC FLOOD RISK

### 4.1 Local Flood Assets

The site is 3.9km from the River Nene and 9.0km from the River Great Ouse. The site is protected by tidal defences on both the River Nene and 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 every 5 years. The main element of the strategy is a programme for protecting the riverbanks from erosion.

There is an extensive local drainage network managed by King's Lynn IDB. Surface water at the site drains naturally through soakaway and hence to the IDB drainage system. A riparian drain is located immediately north of the site. There is an IDB Main Drain located 130m south west of the site. The site and surrounding land are part of the Reeds Drain catchment which drains by gravity to Smeeth Lode and outfalls to the River Great Ouse via the Islington Pumping Station. The Islington Pumping Station is maintained and operated by the Middle Level Commissioners.

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

- local blockages to the IDB main drain system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of the Islington Pumping Station; and
- overtopping and/or breaching of the River Nene tidal defence.

### 4.3 Probability of Flooding

The probability of flooding associated with blockages in the King's Lynn IDB drainage system is low due to the maintenance standards 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). This standard of protection is also provided by Islington Pumping Station.

The site benefits from defences on the River Nene that provide protection during an event with a 0.5% annual probability (1 in 200 chance each year). The River Nene tidal defences between Sutton Bridge and Wisbech were improved after the 1978 tidal surge event to a level of 7.00m AOD. The highest recorded tide level in the River Nene is 6.10m 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 Nene.

The SFRA shows that the site is not at risk during the 0.5% annual probability (1 in 200 chance each year) tidal with climate change event. In summary the site is not at risk for the design life of the development (i.e. 100 years).

#### 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. This shows that +3.7m OD is a reasonable estimate of the maximum flood level at the site during a breach. This is 0.9m above typically ground levels in the vicinity of the proposed development.

## 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 Islington Pumping Station would increase the level of risk at the site.

Due to the standards of the defences the probability of the site flooding from any Environment Agency system is less than 1% annual probability (1 in 100 chance each year) for a fluvial event and less than 0.5% annual probability (1 in 200 chance each year) for a tidal event. 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 1% annual probability (1 in 100 chance each year) fluvial event or 0.5% annual probability (1 in 200 chance each year) tidal event.

There is a residual risk associated with a breach of the tidal defences. In the event of multiple breaches, the estimated flood level is +3.7m OD, 0.9m above site levels.

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 development forms an extension to an existing store and therefore the proposed floor levels will match existing. Based upon the information available during the preparation of this flood risk assessment, it is recommended that there is flood resilient construction to a level of +3.7m OD.

The developer should ensure that the eventual user of the unit 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.

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

Failure of Islington 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 utilising temporary pumping equipment. The Board of King's Lynn IDB has resolved to carry out

replacement of the Islington Pumping Station to provide protection during the 1% annual probability (1 in 100 chance each year) with climate change event.

Policy 6 of the Walpole Cross Keys Parish Council Neighbourhood Plan states that all development proposals will be expected to contribute towards effectively managing flood risk in the Neighbourhood Plan area. 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.

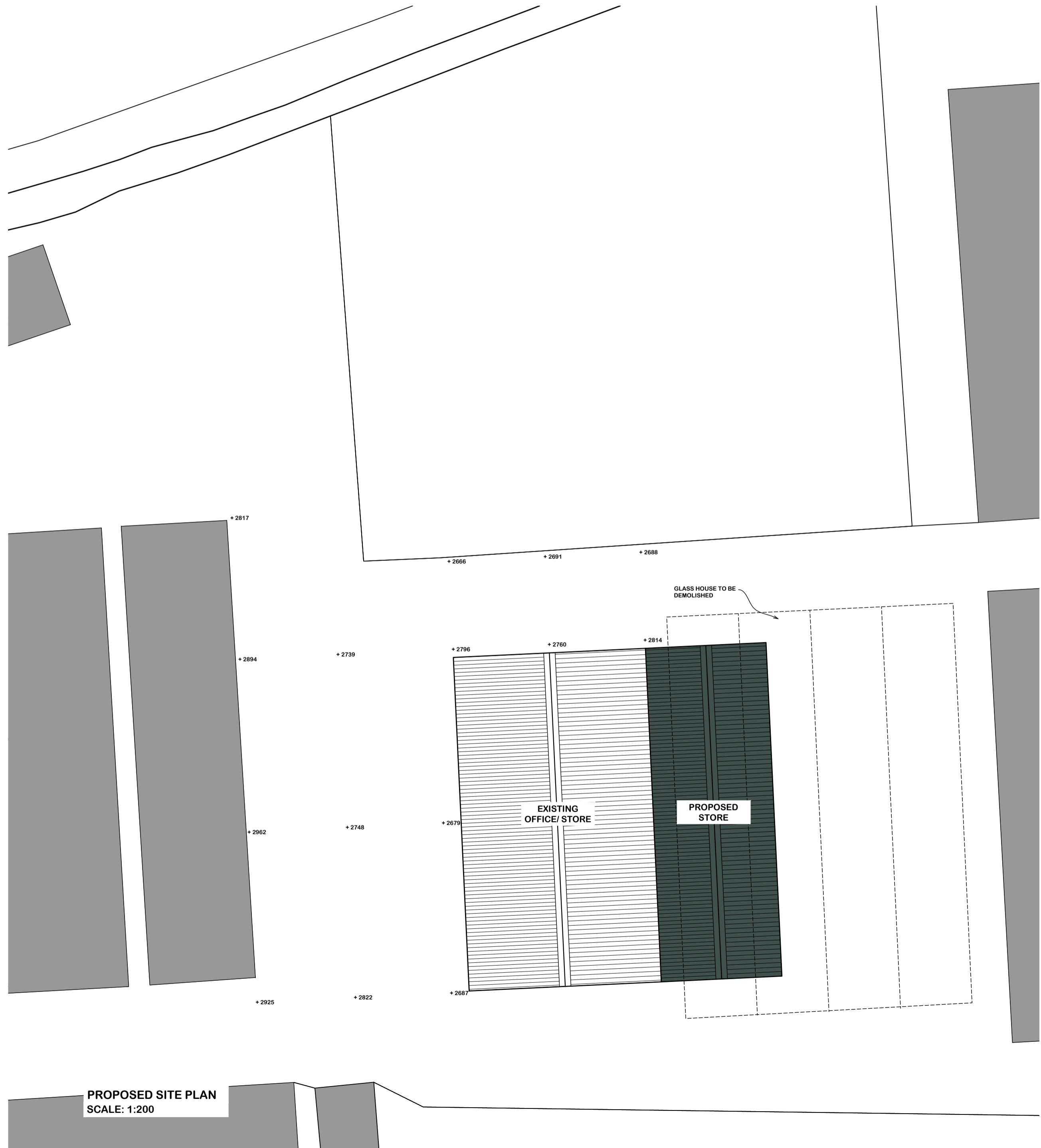
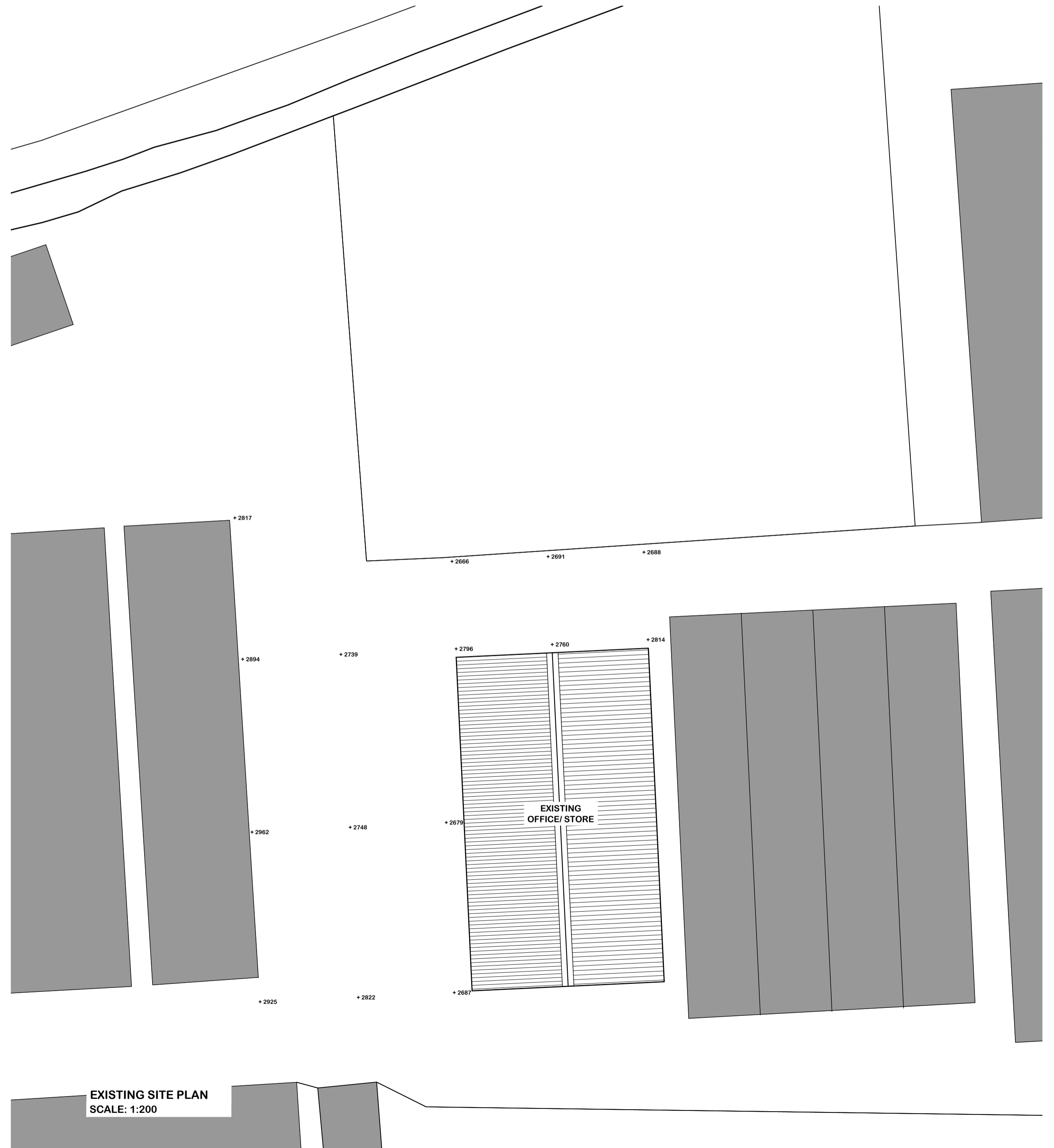
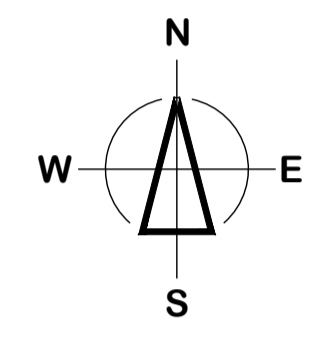
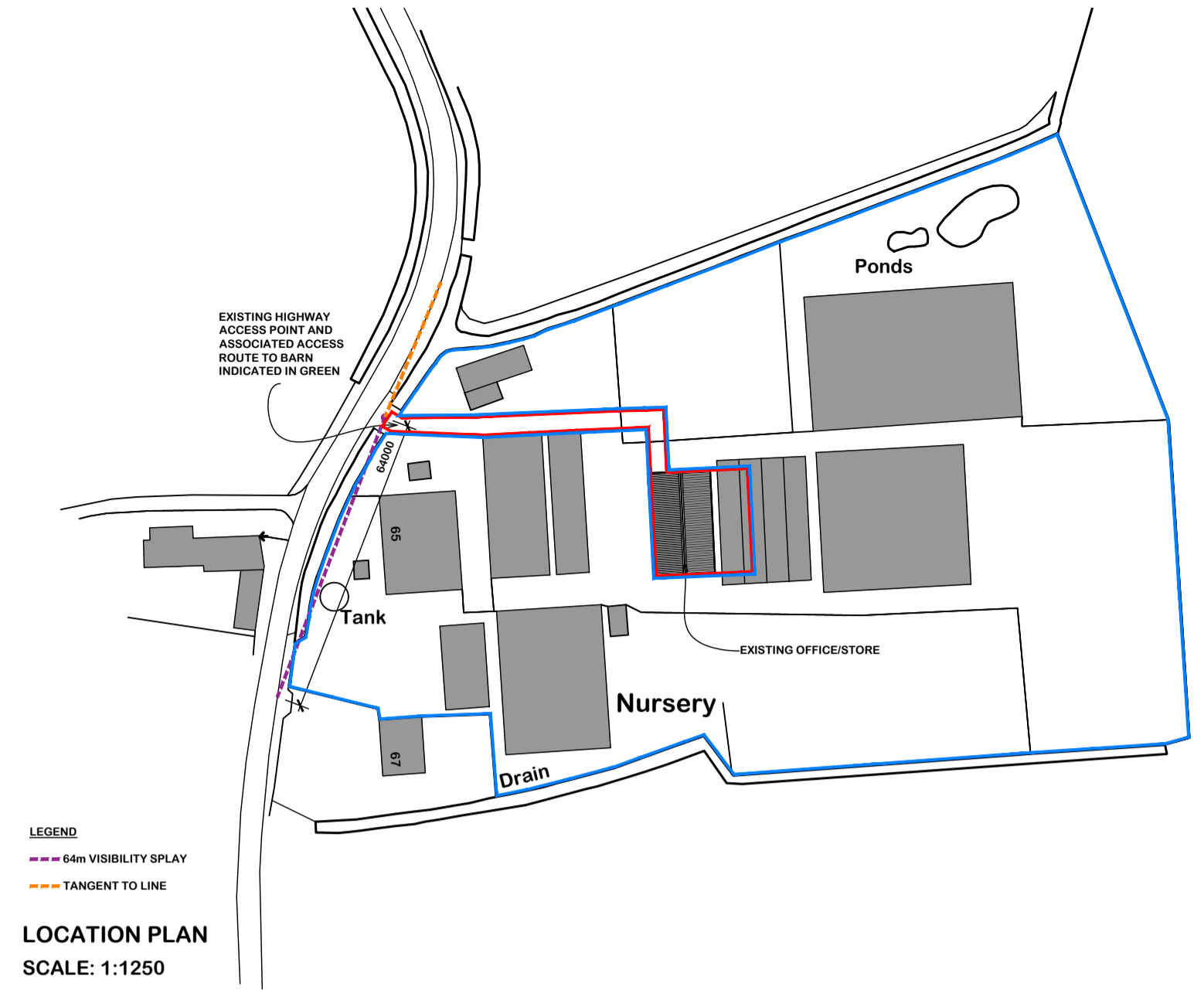
## 6.0 CONCLUSIONS AND RECOMMENDATIONS

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

- The proposed development consists of a single storey side extension to an existing storage unit at West Holme Nursery, Walpole Cross Keys.
- The proposed development is in Flood Zone 3. The site benefits from defences on the tidal River Nene and River Great Ouse which provide protection during the 0.5% annual probability (1 in 200 chance each year) event including climate change. The site is at risk during a breach with depths up to 0.9m.
- 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 exceed 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).
- It is recommended that there is flood resilient construction to a level of +3.7m OD.
- The development passes the Sequential Test and is therefore suitable for the proposed location.

**ATTACHMENT 1**

**EXISTING AND PROPOSED SITE & LOCATION PLAN  
(Dwg 21-L09-PL001)**



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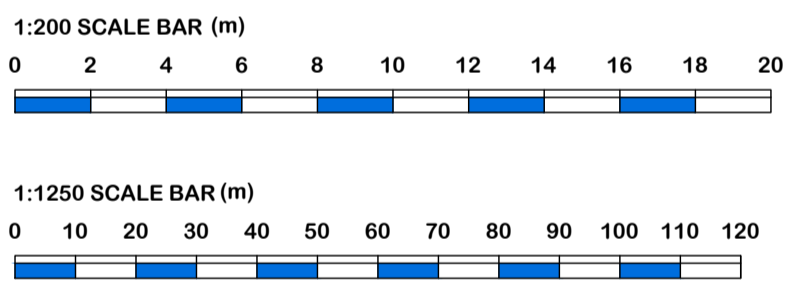
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**\* NB: ALL PROPOSED SITE AND FLOOR LEVELS TO MATCH EXISTING LEVEL HEIGHTS. ALL LEVELS ABOVE GROUND LEVEL WILL MATCH EXISTING.**



no	date	amendment description

Revisions

Drawing Status: **PLANNING**

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Project Title:  
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WEST HOLME NURSERY  
65 STATION ROAD  
WALPOLE CROSS KEYS, KINGS LYNN  
PE34 4HB**

**PROPOSED SINGLE STOREY SIDE EXTENSION**

Drawing Title:  
**EXISTING & PROPOSED SITE PLAN  
& LOCATION PLAN**

Scale: AS STATED @ A1 Date: JANUARY 2021 Drawn: NM

Drawing Number:  
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