

**FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
SCHOOL ROAD, TILNEY ALL SAINTS**

FINAL REPORT

ECL0807/CBFA

DATE JULY 2022

ELLINGHAM CONSULTING LTD

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DISCLAIMER

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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 Calvert Brain & Fraulo Architectural Ltd in respect of a development that consists of one dwelling at School Road, Tilney All Saints.

A planning application for the proposed development is to be submitted by Calvert Brain & Fraulo Architectural Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is situated at 7 School Road, Tilney All Saints, Kings Lynn, PE34 4RS. The National Grid Reference of the site is 55615/31689.

The location of the site is shown in Figure 1.

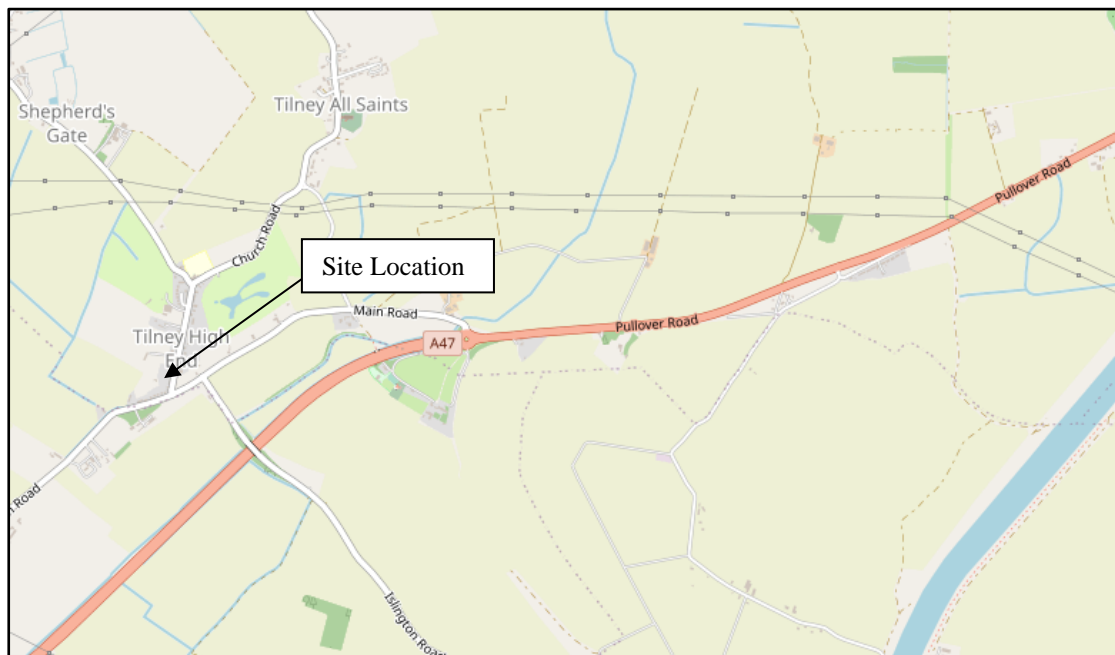


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the western side of School Road. The site consists of a residential dwelling which is at the northern end of a terrace. The area of the proposed development is approximately 0.04 hectares.

A topographic survey has been undertaken and spot levels at the site are shown in Attachment 1. Ground levels within the area of the proposed dwelling are typically +2.6m OD. School Road adjacent to the site is at a level of +3.0m 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 western corner of the site. The nearest IDB Watercourse is 400m west 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 one dwelling. The dwelling will have two storeys. Details of the proposed development are shown in Attachment 2.

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

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 that benefits from flood defences.

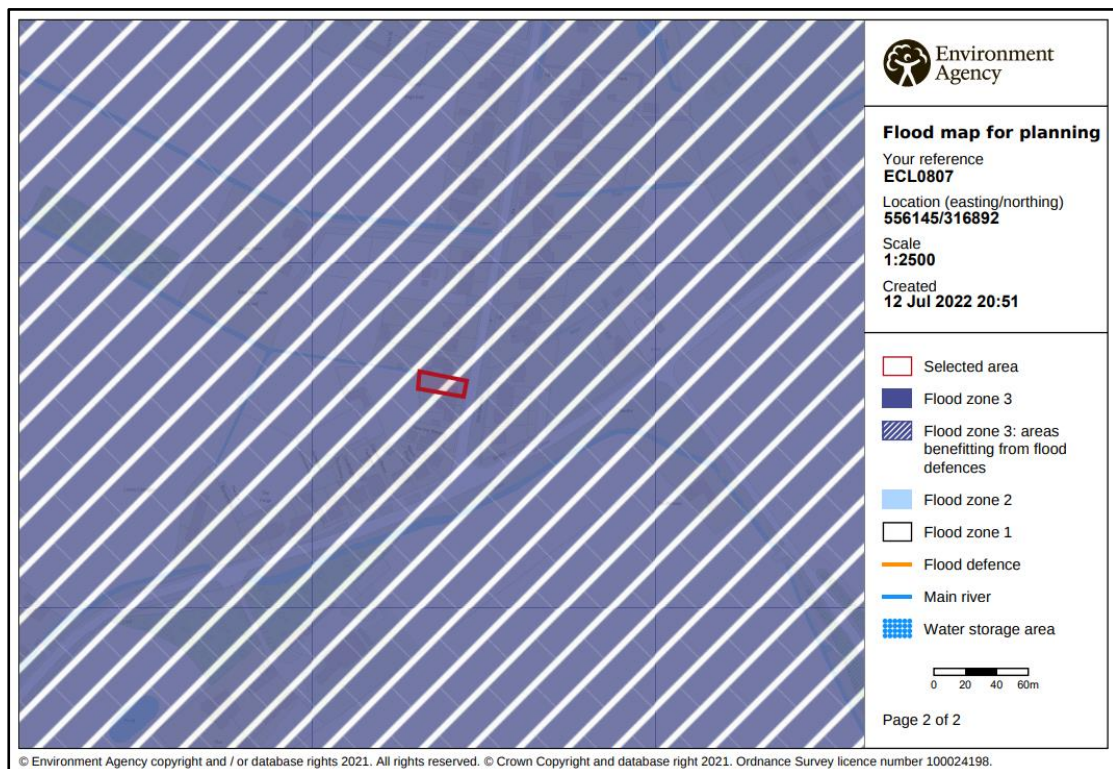


Figure 2 – Environment Agency Flood Map for Planning

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 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 Test and Exception 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 lie in Flood Zone 3. 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 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. 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.

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 Core Strategy defines the housing distribution for new dwellings across the Borough. Rural Villages, which include Tilney All Saints, have a target of at least 1,280 new dwellings over the period from 2011 to 2026. 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 2km 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 400m west of the site. The site, and surrounding land, is part of the Reeds Drain catchment which drains by gravity to Smeeths Lode which outfalls to the River Great Ouse via the Islington Pumping Station. The Islington Pumping Station is maintained and operated by King's Lynn IDB.

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 Islington Pumping Station; 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.

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 King's Lynn 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). 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.

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 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. At four locations within the site the tidal hazard mapping model estimated depth and LiDAR ground level have been used to estimate the flood level.

Point	Easting	Northing	Ground Level	Depth	Water Level
1	556130	316905	+2.46m OD	0.50m	+2.94m OD
2	556115	316885	+2.66m OD	0.29m	+2.95m OD
3	556120	316890	+2.64m OD	0.32m	+2.96m OD
4	556145	316890	+2.61m OD	0.35m	+2.96m OD

Table 1 –Flood Water Level during a breach

The approximate locations of Points 1 to 4 are shown in Figure 3.

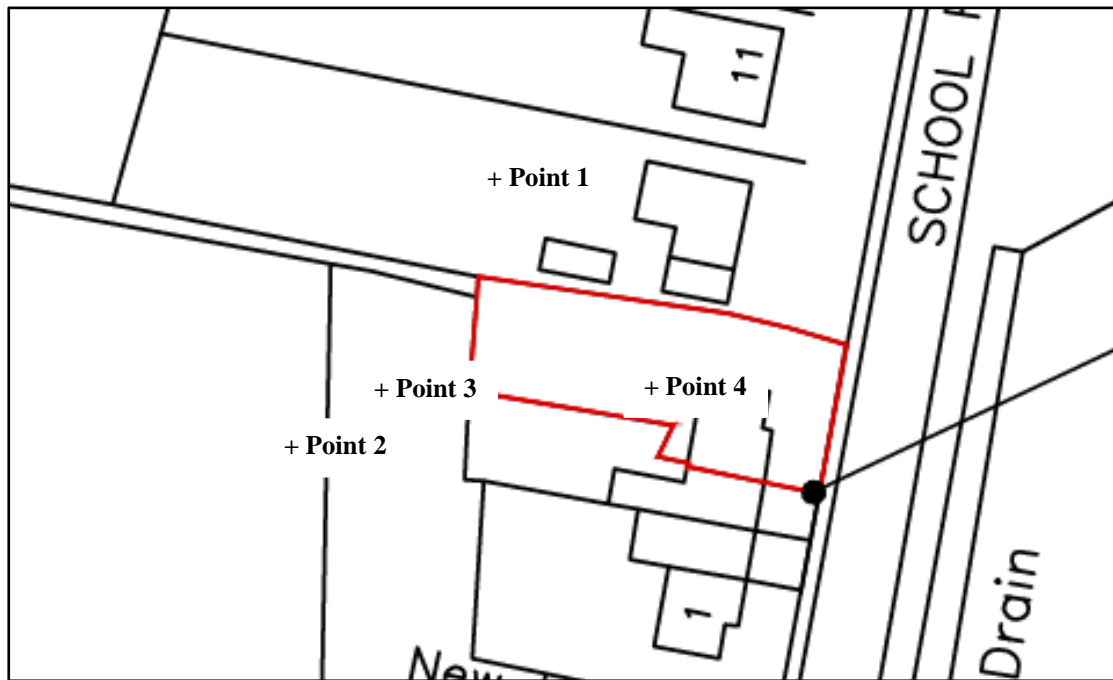


Figure 3 –Locations Used to Estimate Flood Water Level During a Breach

Based upon the assessment undertaken a conservative estimate of the breach level is +3.0m OD. This is a flood depth of approximately 0.4m in the area of the proposed dwelling.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Islington Pumping Station 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 in the area of the proposed dwelling is up to 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

To mitigate against the risk of flooding it is recommended that the finished floor level of the dwelling is not less than +3.0m OD. It is recommended that there is 0.3m of flood resilient construction above finished floor level.

The risks during an exceedance event are lowered because the dwellings will have two storeys with the sleeping accommodation on the first floor.

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 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 occupier of the dwelling should register to receive flood warnings.

The site is 2km 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. In the event of a flood, safe egress from the site would be to Tilney All Saints and then in a westerly direction towards Wisbech.

Failure of Islington Pumping Station 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. The Board of King's Lynn IDB has recently completed the replacement of

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

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.

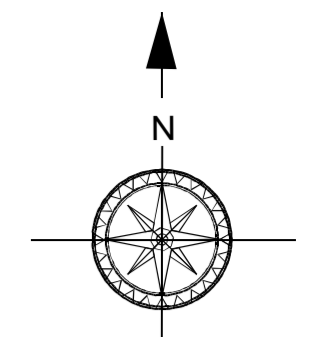
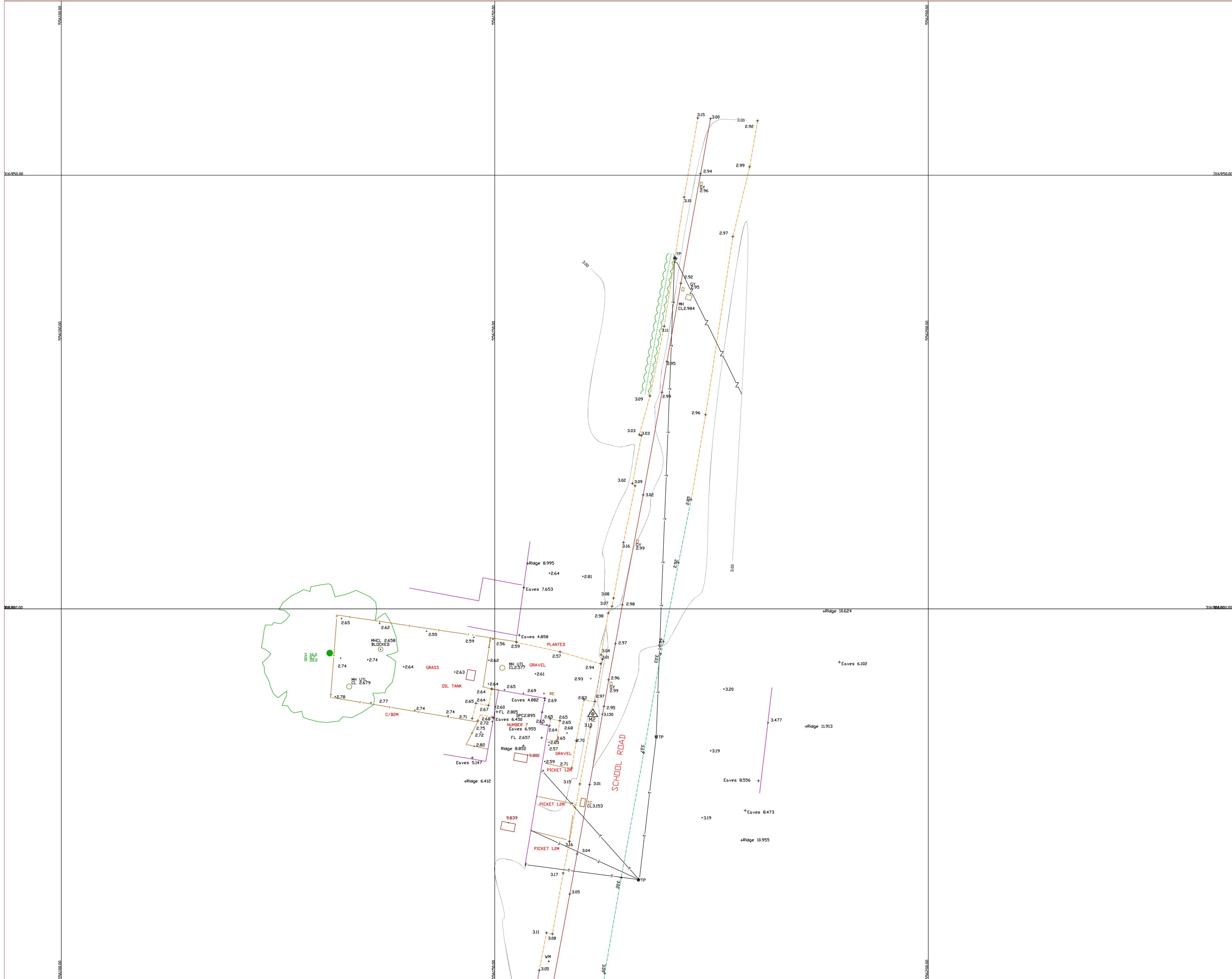
6.0 CONCLUSIONS

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

- The proposed development consists of one 2 storey residential dwelling at 7 School Road, Tilney All Saints.
- 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 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 at risk during a breach with a depth of flooding of 0.4m in the area of the proposed dwelling.
- It is recommended that the finished floor level of the dwellings is not less than +3.0m OD and there is 0.3m of flood resilient construction above finished floor levels.
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location

ATTACHMENT 1

**TOPOGRAPHICAL SURVEY
(DWG ALS9437/200/01)**



Grid North
 SURVEY TO ORDNANCE SURVEY
 GPS DATUM AND GRID.
 OSGB36(02) TRANSLATED FROM
 ETRS89 USING OSGM02 AND
 OSTN02 MODELS

Co-Ordinates

M1	554572.990	313374.645	1.827
M2	554580.928	313384.000	1.943

NOTE:- ALL KERB LEVELS ARE CHANNEL LEVELS

FENCE TYPES

BW	Barric Wire	CP	Chestnut Paling	PIS	Palisade
CB	Close Boarded	IR	Iron Railing	PW	Post & Wire
CI	Corrugated Iron	IW	Interweaves		
CL	Chainlink	PR	Post & Rail		

LEGEND

AV	Air Valve	MH	Manhole		Banking
BO	Bollard	MK	Marker		Hedge
BH	Borehole	NP	Street Name Plate		Tree
CB	Cable Box	OH	Overhead		Bush
CH	Chimney	OSSM	Ordinance Bench		Gate
CL	Cover Level	p	Mark		O/H Electric
CCNC	Concrete	PM	Post Or Pillar		O/H Telecom
CTV	Cable Television	PM	Parking Meter		Control Station
DK	Drop Kerb	RE	Rodding Eye		
DP	Down Pipe	RE	Road Sign		
DR	Drain	SAP	Safing		
ELC	Electricity	SC	Stop Cock		
EP	Electricity Pole	SL	Slump Level		
ER	Earth Rod	ST	Stop Tap		
FB	Flower Bed	SV	Stop Valve		
FH	Fire Hydrant	TAR	Tarmac		
FP	Flag Pole	TCB	Telephone Call Box		
GY	Gas Valve	TL	Traffic Light		
GP	Gas Post	TP	Telegraph Pole		
GV	Gas Valve	TV	Television Pole		
IC	Inspection Cover	UTL	Utility		
IL	Invert Level	VP	Vent Pipe		
JB	Junction Box	WM	Water Level		
KO	Kerb Outlet	WM	Water Meter		
LB	Letter Box	WO	Wash Out		
LP	Lamp Post				

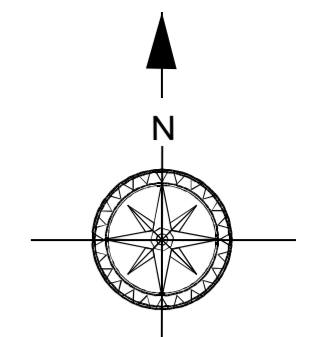
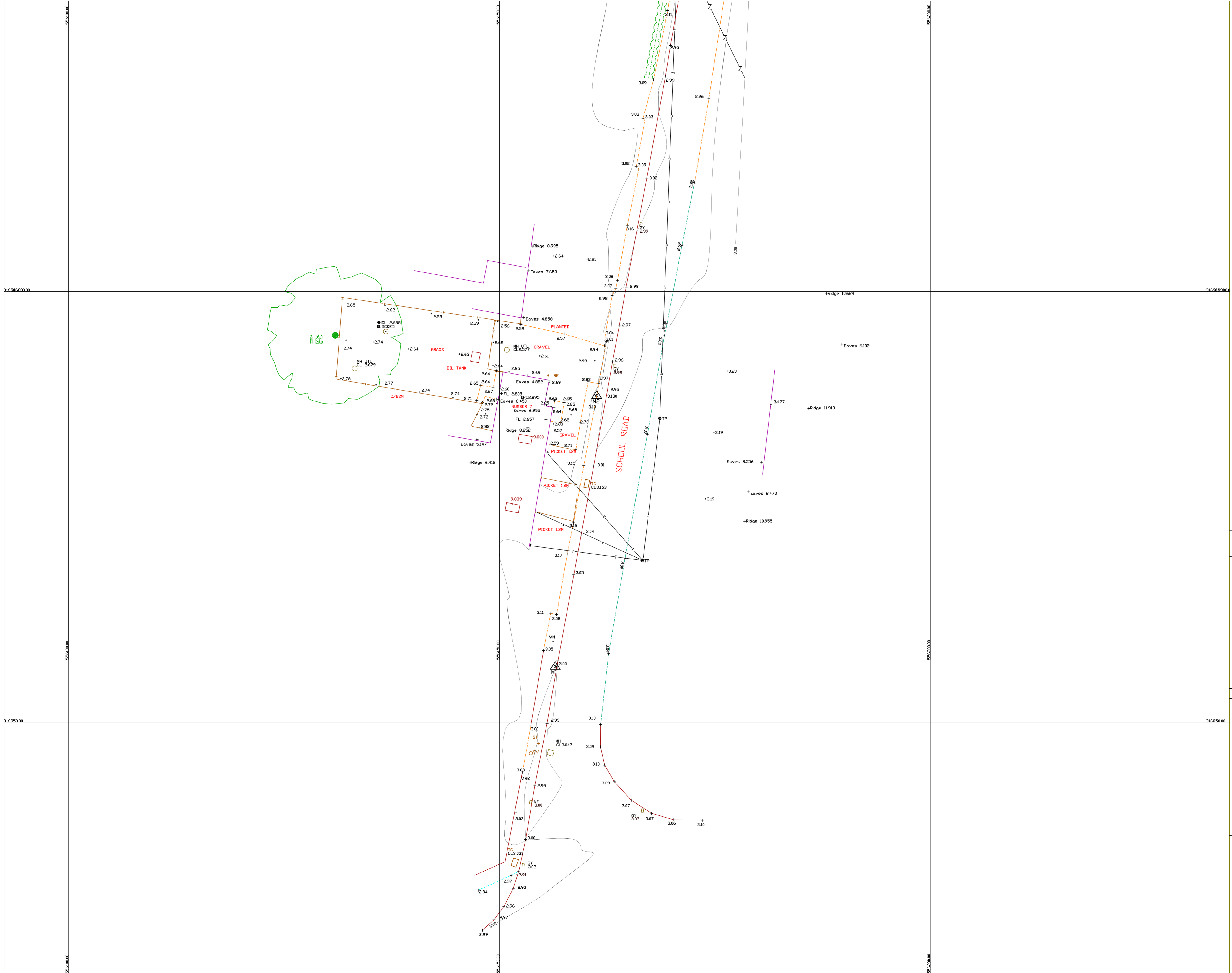
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Date: May 2022
 Scale:- 1:200
 Drawing Number: ALS9437/200/01
 Topographical
 Client: CBF
 Project: Tilney All Saints
 7 School Road

Surveyed By:-

Anglia Land Surveys
 Norfolk Office: 30 Gardyn Croft Taverham Norwich NR8 6UZ
 Suffolk Office: 143 Denmark Road Ltd Beccles Suffolk NR34 9DW

Tel: (01603) 749600
 e-mail: mail@als-surveys.com
 Website: www.als-surveys.com



Grid North
 SURVEY TO ORDINANCE SURVEY
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CI	Corrugated Iron	IW	Interweaves
CL	Chainlink	PR	Post & Rail
AV	Air Valve	MH	Manhole
BD	Ballard	MK	Marker
BH	Borehole	NP	Street Name Plate
CB	Cable Box	OH	Overhead
CHY	Chimney	OSM	Ordinance Bench
CL	Cover Level	Mark	Mark
CONC	Concrete	p	Post Or Pillar
CTV	Cable Television	PM	Parking Meter
DK	Drop Kerb	RE	Rodding Eye
DP	Down Pipe	RS	Road Sign
DR	Drain	SAP	Sapping
ELC	Electricity	SC	Slip Cock
EP	Electricity Pole	SL	Slump Level
ER	Earth Rod	ST	Stop Tap
FB	Flower Bed	SV	Sluice Valve
FH	Fire Hydrant	TAR	Tarmac
FP	Flag Pole	TCB	Telephone Call Box
GY	Guill	TL	Traffic Lights
GP	Gas Post	TP	Telegraph Pole
GV	Gas Valve	TV	Television Box
IC	Inspection Cover	UV	Under Valve
IL	Invert Level	VP	Vent Pipe
JB	Junction Box	WL	Water Level
KO	Kerb Outlet	WM	Water Meter
LB	Letter Box	WO	Wash Out
LP	Lamp Post		

Drawn by:- MK Surveyed by:- MK Checked by:- JT

Date: May 2022
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 Topographical
 Client: CBF
 Project: Tilney All Saints
 7 School Road

Surveyed By:-

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 Suffolk Office: 143 Denmark Road Beccles Suffolk NR34 9DW

Tel: (01603) 749600
 e-mail: mail@als-surveys.com
 Website: www.als-surveys.com

ATTACHMENT 2

**PROPOSED FLOOR PLANS AND ELEVATIONS WITH
LOCATION PLAN AND SITE PLAN
(DWG 220928/10/02)**

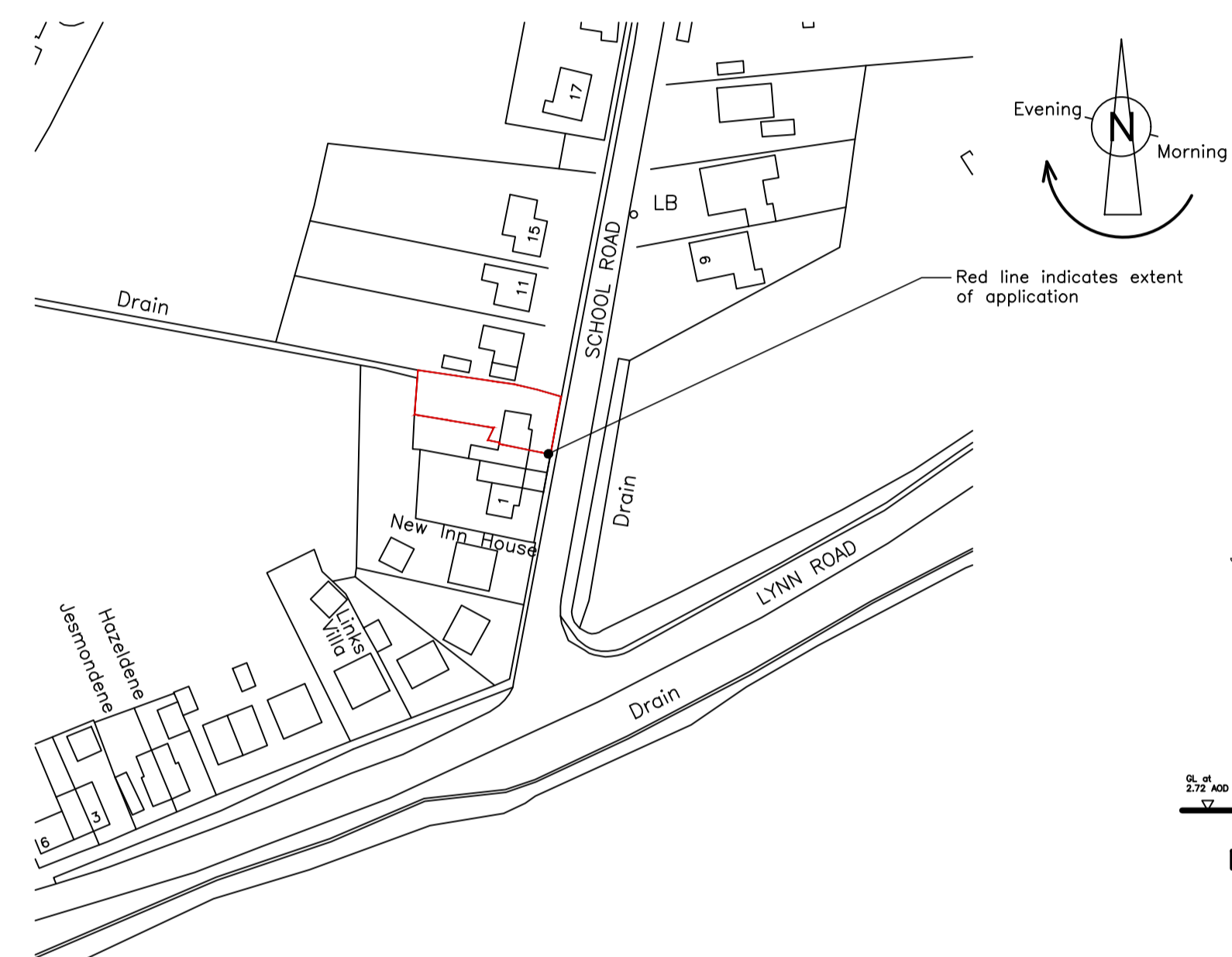


FRONT ELEVATION - 1:100
SOUTH

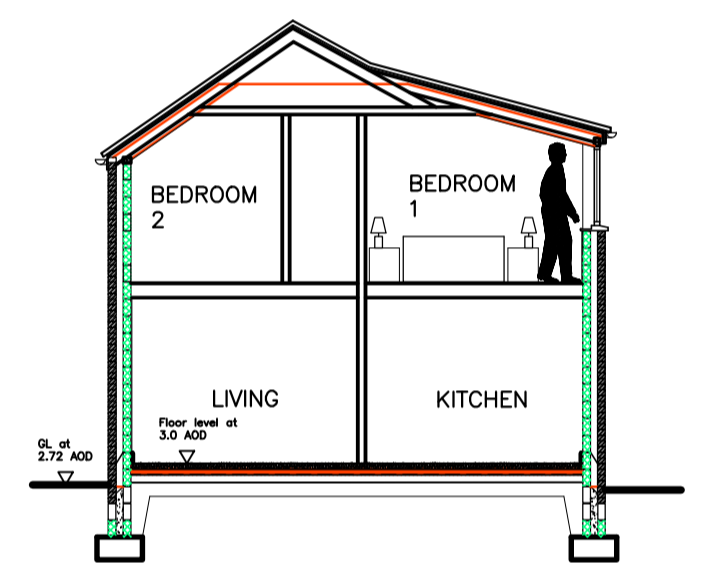
SIDE ELEVATION - 1:100
WEST

REAR ELEVATION - 1:100
NORTH

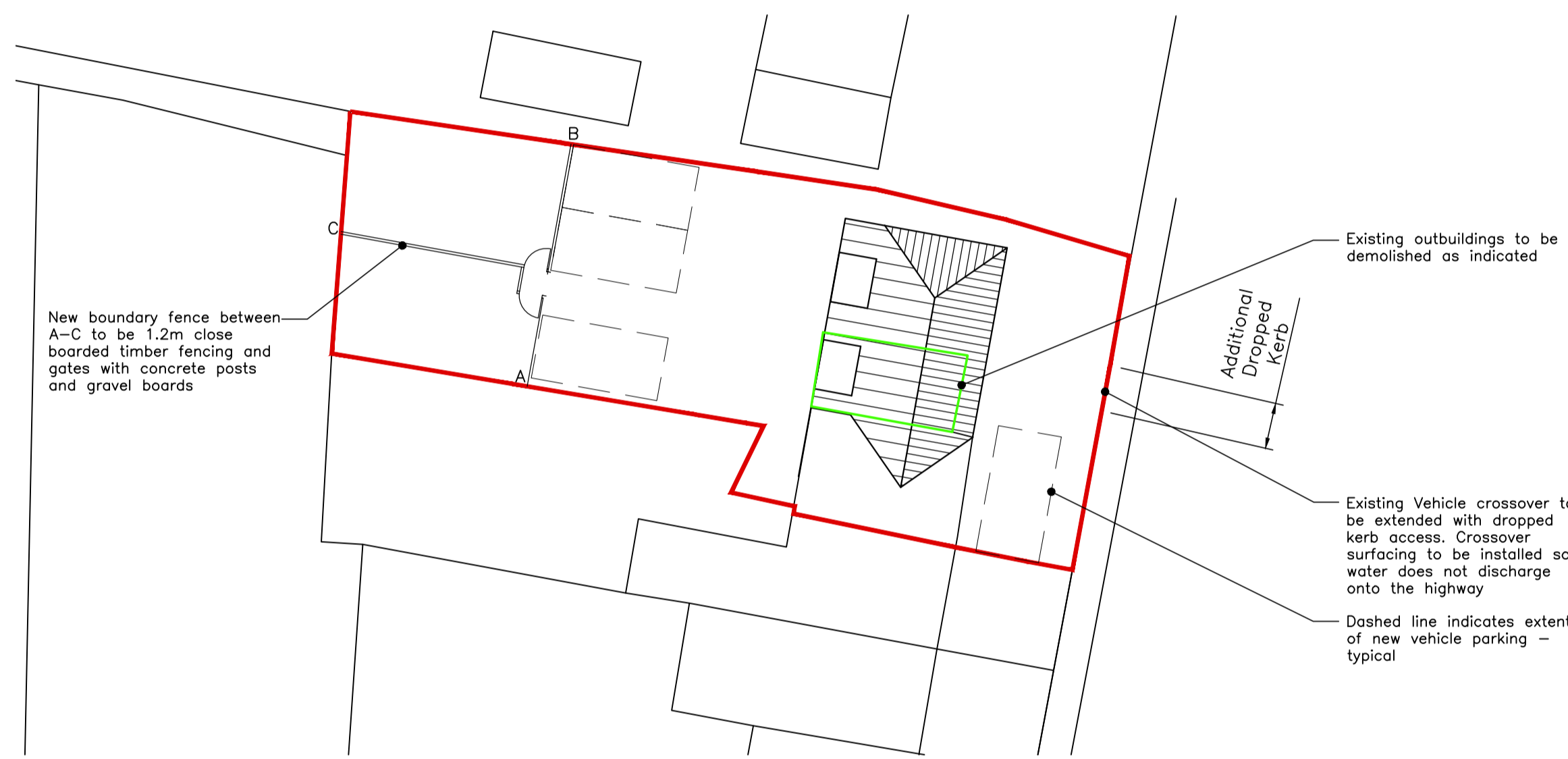
FRONT ELEVATION - 1:100
STREET SCENE



LOCATION PLAN - 1:1250



SECTION A 220928 / 02
1:50



BLOCK PLAN - 1:200

NOTES

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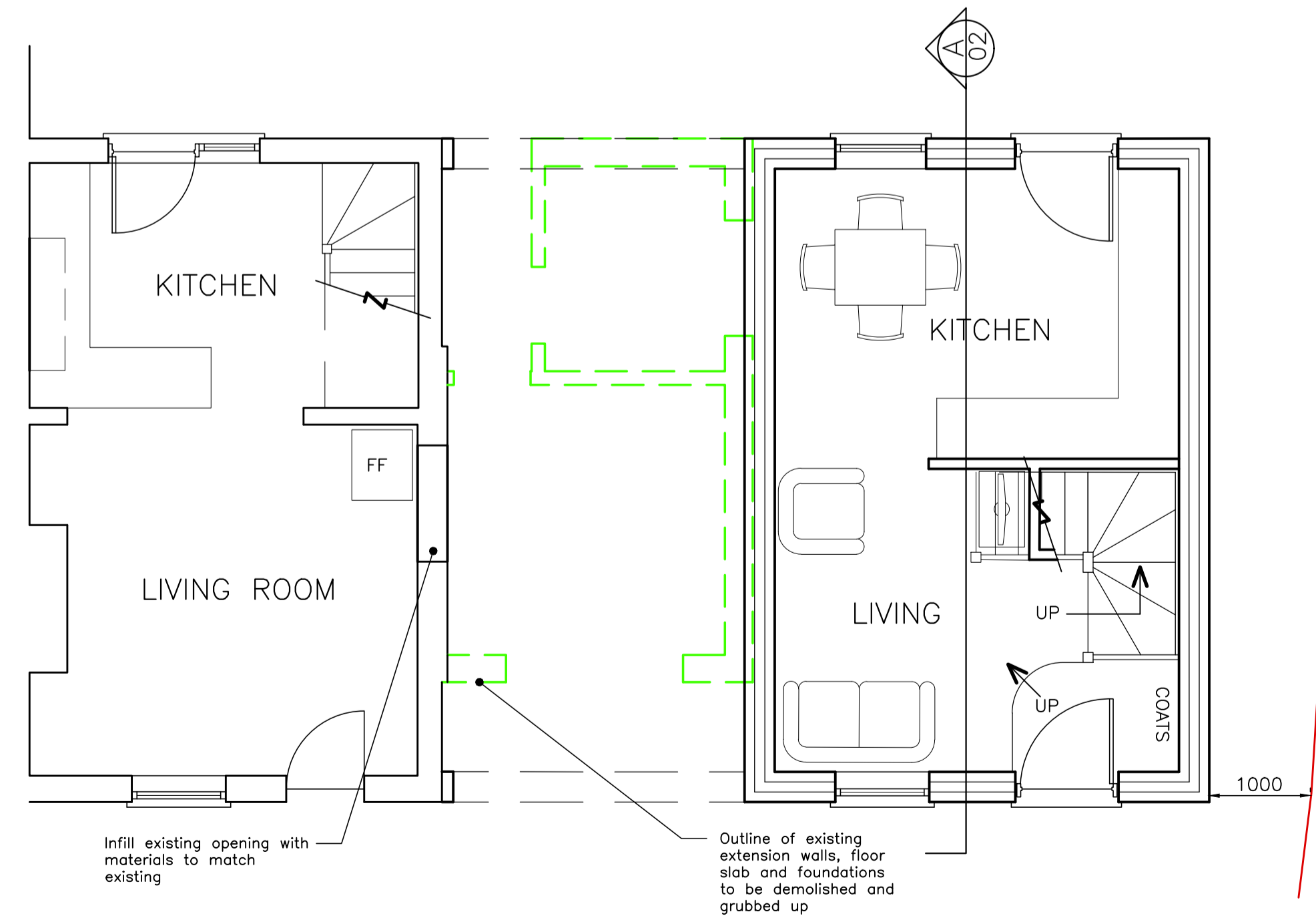
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CLIENT
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ARCHDALE HOUSE, 14 BACK LANE
WEST WINCH, KING'S LYNN,
NORFOLK, PE33

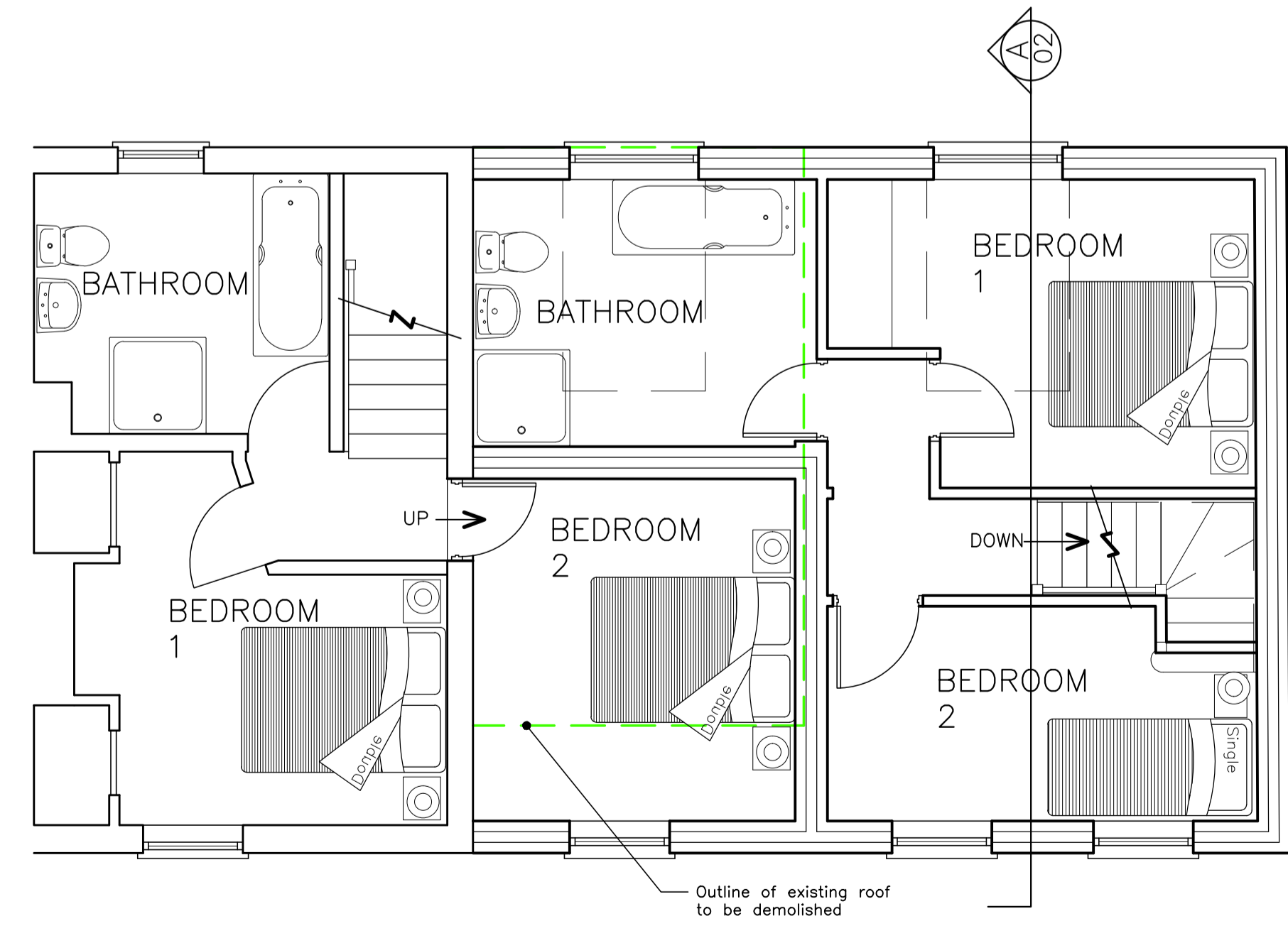
PROJECT
NEW SEMIDETACHED DWELLING
7 SCHOOL ROAD, TILNEY ST LAWRENCE,
KING'S LYNN,
NORFOLK, PE34 4RS

DRAWING TITLE
**PROPOSED FLOOR PLANS AND ELEVATIONS
WITH LOCATION PLAN AND SITE PLAN**

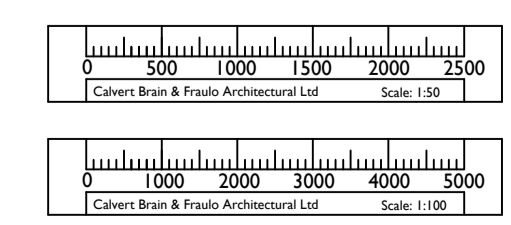
- SCHEME
- BUILDING REGS
- WORKING DRAWING
- PLANNING
- TENDER ISSUE
- ISSUED ON COMPLETION



GROUND FLOOR LAYOUT PLAN - 1:50



FIRST FLOOR LAYOUT PLAN - 1:50



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BRAIN &
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220928 / 10 / 02

REV.
-