

**50 CARDIFF ROAD
READING
RG1 8EP**

**READING BOROUGH COUNCIL
PLANNING APPLICATION 240581**

REAR EXTENSION

FLOOD RISK ASSESSMENT REPORT

Prepared for

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Prepared by

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19 August 2024

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FLOOD RISK ASSESSMENT REPORT

1. INTRODUCTION

- 1.1. Simon Jones-Parry, a chartered civil engineer, prepared this report for Mr S Date. It assesses flood risk associated with a proposed rear extension to the two storey terraced dwelling at 50 Cardiff Road, Reading, in support of Mr Date's planning application to Reading Borough Council for planning consent for the extension. Reading Borough Council's reference for the application is 240581.
- 1.2. The location of the 50 Cardiff Road is shown on published flood risk and geology drawing 50, copy appended. Details of the dwelling at 50 Cardiff are shown on planning application drawing 1150-01, copy appended. Details of the proposed extension and internal alterations to the ground floor are shown on application drawing 1150-05A, copy appended.
- 1.3. It is mandatory to include a flood risk assessment report in the planning application because Flood Map for Planning advises that 50 Cardiff Road is located in fluvial Flood Zone 2. Flood Zone 2 is the classification of land which either is recorded as having flooded or where computer modelling of flooding has predicted that flooding from a watercourse would occur at an average frequency between once every hundred years and once every thousand years. This frequency range also is described as 1% to 0.1% annual probability of exceedance, or AEP.
- 1.4. Drawing 50 also shows topographical contours at 0.2 m vertical intervals to Ordnance Survey Datum derived from the current Open Government LiDAR digital terrain model, published risk of flooding, and near surface geology as mapped by British Geological Survey.
- 1.5. Ground levels and floor levels at 50 Cardiff Road and mapped flood risk are described later in this report. Bedrock is Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated). Superficial deposits comprising sand and silt of the Langley Silt Member are mapped as overlying the clay.

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2. DEVELOPMENT PROPOSAL

- 2.1. The planning classification for the development is householder development. The planning application drawings show that the ground floor is to be extended by 24 square metres into the rear garden and the existing dining room and kitchen are to be reconfigured.
- 2.2. Currently the ground floor of 50 Cardiff Road is split level, with the floor level of the kitchen, at the rear of the property, set 150 mm lower than the other ground floor rooms. Mr Date proposes that extension and remodelled kitchen will have the same floor level as the rest of the house.
- 2.3. All new works will be built as flood damage resilient to a minimum height of 700 mm above ground floor level.

3. RELEVANT FLOOD RISK RELATED PLANNING POLICY REQUIREMENTS

- 3.1. National planning policy is set out in National Planning Policy Framework (NPPF), the latest version of which was published in September 2023. The on line Planning Practice Guidance (PPG) advises how NPPF policies should be implemented. Whereas the Framework requires that a flood risk assessment report for all development proposed in Flood Zone 2, it also advises that householder development, in common with any minor development, is exempt from the flood risk sequential test, which seeks to restrict development on land at risk of flooding. The flood risk assessment report must take into account the likely effects of climate change on flood risk in the lifetime of the development. Development must not increase the risk of flooding elsewhere. The most vulnerable parts of the development must be located in areas with the lowest risk of flooding. Development that is predicted to be subjected to flooding must be appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment. Development must incorporate sustainable drainage systems unless there is clear evidence that this is inappropriate. Any residual flood risk must be safely managed. Safe access and escape routes must be included where appropriate, as part of an agreed emergency plan.
- 3.2. PPG advises about minor developments, including householder development:

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“Minor developments are unlikely to raise significant flood risk issues unless:

- they would have an adverse effect on a watercourse, floodplain or its flood defences;*
- they would impede access to flood defence and management facilities; or*
- where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.*

“Even minor developments can affect flood risk within or beyond the property, particularly in areas susceptible to flooding. Applications for minor development involving extensions or additions should still meet the requirements to provide a site-specific flood risk assessment (as per footnote 55 of the National Planning Policy Framework). A pragmatic approach should be taken to the scope and level of detail of the assessment – a shorter, simpler assessment is likely to be sufficient in most such cases. As a minimum, the assessment needs to show that the development will be safe for its users for the intended lifetime of the development, without increasing flood risk elsewhere, and be sufficiently flood resistant and resilient to the level and nature of the flood risk.

“The Environment Agency’s [advice on flood risk assessment](#) is helpful for ensuring extensions or alterations are designed and constructed to conform to any flood protection already incorporated in the property, and include flood resilience measures in the design.”

3.3. Current Environment Agency advice on flood risk assessment for minor extensions is set out below:

“For all relevant minor extensions (see When to follow standing advice), you should follow the standing advice for:

- what to include in your FRA*
- floor levels*
- extra flood resistance and resilience measures*
- other permissions or consents*

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"What to include in your FRA

"Your FRA should be:

- appropriate to the scale, nature and location of the development*
- proportionate to the degree of flood risk*

"It should contain the information set out in the [site-specific flood risk assessment check-list](#).

"For all development covered by this standing advice, your FRA should include:

- your site address*
- a description of your development*
- the estimated flood level for your development, taking into account the impacts of climate change over its lifetime*
- details of the finished floor levels*
- details of your flood resistance and resilience plans*
- any supporting plans and drawings*
- any other information the relevant standing advice tells you to include*

"The estimated flood level is the depth of flooding anticipated on your development site.

"For a river flood, this is a 1 in 100 annual probability event plus an [allowance for climate change](#). For a tidal flood, this is a 1 in 200 annual probability event plus an [allowance for climate change](#).

"You may be able to get the estimated flood level and information about residual risks from the Environment Agency's [Flood Map for Planning](#). If not, you will need a flood risk specialist to calculate this for you.

"You should state all levels in your assessment in relation to Ordnance Datum (the height above average sea level). You may be able to get this information from the [Ordnance Survey](#). If not, you will need to get a land survey carried out by a qualified surveyor.

"Check with the LPA to see if your minor extension is in an area with increased flood risk because of multiple minor extensions. If it is, you need to include an assessment of the off-site flood risk.

"Check [table 2 of the planning practice guidance](#) if your proposed minor extension is in flood zone 3b (functional floodplain). It states that development should not be permitted in flood zone 3b if its [vulnerability classification](#) is:

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- ‘highly vulnerable’
- ‘more vulnerable’
- ‘less vulnerable’

“Floor levels

“We recommend floor levels are set at least 600 millimetres (mm) above the estimated flood level. You will also need to use flood resistant materials up to at least 600mm above the estimated flood level.

“You may be able to reduce this to 300mm if there is a high level of certainty about your estimated flood level. If there is a particularly high level of uncertainty it may need to be increased.

“Flood water can put pressure on buildings, causing structural issues. If your design aims to keep out a depth of more than 600mm of water, you should get advice from a structural engineer.

“If you cannot raise the floor levels in this way, you will also need to include extra flood resistance and resilience measures. These measures should protect the property to at least 600mm above the estimated flood level.

“Your plans also need to show how you are going to make sure the development is not flooded by surface water or groundwater.

“This could be by:

- *diverting water away from buildings but safely managing it within the site*
- *raising floor levels above the estimated flood depths of surface and groundwater flooding*

“Extra flood resistance and resilience measures

“Follow the guidance in this section where you cannot raise the finished floor levels to the required height. Your building design should:

- *prioritise excluding flood water where possible*
- *speed recovery in case water gets in*

“Make sure your flood resilience plans follow the guidance in the [Construction Industry Research and Information Association \(CIRIA\) Code of Practice for Property Flood Resilience](#).

2Standards are available for:

- *the installation and retrofit of resistance measures - [British Standard 851188-1:2019+A1:2021](#)*

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- *speeding the recovery of buildings after a flood* - [British Standard 85500:2015](#)
- *dealing with and preventing water from the surrounding ground entering below ground structures such as basements* - [British Standard 8102:2022](#)

Other permissions or consents

"You may need a separate permit or consent if the development or any associated works such as site preparation or construction:

- *is within 20 metres of a main river (including culverted main rivers), a flood defence or flow control structure*
- *directly affect a watercourse that is not a main river*
- *involve activity in the floodplain of a main river which could divert or obstruct floodwaters, damage any river control works or affect drainage, and potential impacts are not controlled by a planning permission*
- *are covered by regional flood defence and land drainage byelaws, where these are applicable*

"[Check if you need permission to do work on a river, flood defence or sea defence.](#)

Do this as soon as possible to make sure you can get the necessary permissions.

"You can check if your development activity and location are covered by regional flood defence and land drainage byelaws by referring to this [statutory guidance](#).

"If there is a watercourse (including culverted watercourses) on or next to your site, read [owning a watercourse](#) and [your watercourse: rights and roles](#). They will help you understand your responsibilities and the rules you need to follow. A culvert is an underground structure that water can flow through.

"Flood risk permits or consents are often needed as well as planning permission.

Getting planning permission does not guarantee you will also get a flood risk permit or consent."

- 3.4. Local planning policies are set out in the Reading Borough Local Plan adopted in 2019. Its policies on flood risk and drainage associated with minor development do not add to those of NPPF as amplified by PPG.

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4. DEVELOPMENT LIFETIME AND CLIMATE CHANGE ALLOWANCES

- 4.1. The development, being residential, is considered to have a nominal lifetime of 100 years for the purpose of estimating the effects of climate change on rainfall and river flow.
- 4.2. Relevant climate change effects are set out in on line government guidance based on river catchments. The catchment in which 50 Cardiff Road is located is that of the "Thames and South Chilterns". Guidance applicable to the development is to allow an extra 45% depth of rainfall and an extra 31% river flow compared to the 1981-2000 baseline. The latter figure reflects the Central Allowance for the 2080s era, use of the Central Allowance being advised for residential development that has a "more vulnerable" to flooding classification, which includes residential.

5. SOURCES OF FLOODING AND THEIR EFFECT ON 50 CARDIFF ROAD

- 5.1. Referring to drawing 50, 50 Cardiff Road is shown as liable to flooding in a 0.1% fluvial flood in today's climatic conditions. There are no defences present which would ameliorate such flooding. Fluvial flooding is the dominant form of flooding at 50 Cardiff Road.
- 5.2. The northern part of the garden of 50 Cardiff Road and the carriageway of the highway at 50 Cardiff Road are shown as liable to surface water flooding in a 0.1% AEP event in today's climatic conditions. The part of the garden of 50 Cardiff Road where the extension is proposed is shown as unaffected by such flooding.
- 5.3. If a major breach of one of the two water supply reservoirs at Farmoor were to occur, widespread and deep flooding of Cardiff Road could occur.
- 5.4. Low permeability of the near surface geology at 50 Cardiff Road makes it very unlikely that groundwater flooding would occur except at a low rate occurring simultaneously with other forms of flooding. The element of flood water derived from a ground water source would be indistinguishable from water from fluvial or pluvial sources, and would not lead to a significant increase in the depth of flooding experienced..

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5.5. Reservoir flooding is very unlikely to occur for two reasons. First, although the reservoirs are classified as “high risk”, the embankments retaining them are engineered and inspected to ensure that they would not fail. Second, the reservoirs are filled by a combination of pumping from the River Thames and direct rainfall, and therefore do not receive exceptional flood flows from upstream catchments.

5.6. A burst water main or overflowing sewer in Cardiff Road poses some risk to 50 Cardiff Road as its ground floor level is elevated less than 100 mm above the carriageway channel level of Cardiff Road.

6. PREDICTED FLOOD LEVELS, DEVELOPMENT LEVELS AND DEPTHS OF FLOODING

6.1. The following table sets out predicted fluvial flood levels at various return periods, distinguishing between the front and rear of 50 Cardiff Road, as flood levels will vary across the property. The highest flood levels are predicted on the Cardiff Road side.

6.2. The table lists relevant development and ground levels, and the depths of flooding predicted at those locations in each flood event assessed. Fluvial flood levels are taken from the 2019 Thames (Pangbourne to Sonning) model, which are identical to the data set described as “extent of the model as used by the EA”. All data is taken from the Product 5, 6 and 7 set issued by the Environment Agency on 30 July 2024.

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LiDAR ground levels, modelled flood levels, and depths of flooding

All levels in metres to Ordnance Datum, numbers in **bold** are supplied, those in *italics* are calculated

<u>Flood return period</u>		<u>100 year</u>	<u>100 + 25%CC</u>	<u>100 + 35%CC</u>	<u>100 + 70%CC</u>	<u>200 year</u>	<u>500 year</u>	<u>1,000 year</u>
<u>Front of property</u>								
Flood level		No data	38.777	38.799	39.042	38.703	38.788	38.852
					<u>Flood depths</u>			
Carriageway level	38.717	0.06	0.082	0.325	no flooding	0.071	0.135	
Footway level	38.806	no flooding	no flooding	0.236	no flooding	no flooding	0.046	
Well at front door	38.679	0.098	0.12	0.363	0.024	0.109	0.173	
Ground floor front	38.769	0.008	0.03	0.273	no flooding	0.019	0.083	
<u>Rear of property</u>								
Flood level		No data	38.721	38.782	39.028	38.572	38.749	38.841
					<u>Flood depths</u>			
Minimum garden level	38.509	0.212	0.273	0.519	0.063	0.24	0.332	
Existing kitchen floor	38.639	0.082	0.143	0.389	no flooding	0.11	0.202	
Proposed floor level	38.789	no flooding	no flooding	0.239	no flooding	no flooding	0.052	

6.3. It should be noted that the 2019 JBA model is not the most recent data set. In May 2021 Jacobs reported on its review of the 209 fluvial model, done as part of the on going Reading and Caversham Flood Alleviation Scheme project. Jacobs recommended some adjustments to the 2019 model. However the affect of the adjustments on flood levels at 50 Cardiff Road are negligible.

6.4. The design flood in terms of flood risk to the development is the 100 years plus 35% climate change event, as this is the predicted to be a 100 year flood at the end of the 100 year nominal lifetime of the development. In this flood the levels of the ground floor of 50 Cardiff Road, including its proposed extension, and at the footway outside the property also, will be similar to the predicted flood level. The rear garden would be flooded to a depth of 0.3 metres adjacent to the proposed extension. The path between the back of the footway

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and the front door would be flooded to a depth of about 0.13 metres.

- 6.5. There is a chance of a 1,000 year or greater flood occurring in the lifetime of the development. A 1,000 year fluvial flood occurring today would lead to a greater flood depth than the design flood event at the end of the development's lifetime. The 1,000 year event also will be subject to climate change increase with the passage of time, potentially flooding the ground floor to a depth of more than 100 mm.

7. FLOOD RISK AND ITS MITIGATION

- 7.1. It is a planning policy requirement in the circumstances of the predicted local flood levels being similar to or exceeding floor level that flood damage resilience to new construction is ensured by the design and construction of the proposed extension requirement. The measures should extend to at least 700 mm above proposed floor level to match the 600 mm above flood level minimum. Their details should comply with the advice given by the CIRIA publication and British Standard Codes of Practice cited by the PPG. Those details will be specified by the designer of the extension. The overall design of the extension as applied is capable of receiving appropriate resilience measures.
- 7.2. Addition of flood resistance, ie measures to keep flood water out of the interior of the building is not a planning policy requirement in this case. This is because although the proposed floor level does not attain the recommended freeboard above the design flood level, flood water could enter the ground floor of 50 Cardiff Road other than via the proposed extension. Therefore making the new construction flood resistant would be superfluous.
- 7.3. The extension will have a suspended ground floor ventilated to external air using airbricks set below floor level. This construction technique will address not displacing floodwater and thereby consequently avoid the development increasing flood risk to third parties. Realistically so enormous is the volume of the flood plain and so great is the flow in the river during extreme flood conditions that displacing the volume of the extension below design flood level would have a negligible adverse impact even if that volume were entirely solid. However allowing flood storage beneath the new floor addresses the potential cumulative impact of many similar developments displacing flood water, which could

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otherwise lead to a measurable adverse impact on third party flooding.

- 7.4. Because a) the likelihood of internal flooding occurring is so low, estimated at about 4 to 1 against in the next 100 years, and b) if flooding occurs 50 Cardiff Road will remain habitable, initiating and maintaining a flood plan would be an unnecessary burden. However it is recommended that Mr Date and his successors subscribe to the Environment Agency flood warning service, already available for 50 Cardiff Road, and keep a sufficient number of bricks or other suitable to hand with which to raise ground floor furniture should internal flooding threaten.

8. DRAINAGE

- 8.1. Sewage from the development will be discharged to Thames Water's foul sewerage system.
- 8.2. If the development is within three metres of a Thames Water sewer, the designer will apply to Thames Water for a building over sewer agreement.
- 8.3. Details of rainwater disposal from the development are not shown on the proposal design drawings and will be agreed later in compliance with planning policy.

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9. SUMMARY

9.1. Mr Date has applied for householder planning consent to construct a 24 square metre gross external plan area single storey extension at the rear of 50 Cardiff Road. The level of ground floor of the extension will be identical to that of the main part of the house. The floor level of the kitchen, which currently is 150 mm lower than the floor level of the main part of the house, will be raised to so it is same level as the rest of the ground floor.

9.2. There is long term risk of flooding to 50 Cardiff Road. The design flood level, which is that predicted for the 100 year fluvial flood with an extra 31% flow added for climate change, is very similar to the proposed ground floor level. Accordingly all new construction will be flood damage resilient to a level of at least 700 mm below floor level, and the extension floor will be suspended to generally comply with the no displacement of flood water policy. Excluding flood water from the interior of the extension is impracticable so is not proposed. Therefore Mr Date and his successors should anticipate that internal flooding will occur in the next 100 years, but the probability of this occurring is low.

9.3. Mr Date is encouraged to subscribe to the Environment Agency flood warning service.

10. CONCLUSION

10.1. This flood risk assessment supplies all information on flood risk to the development as required by national and local planning policy. Flood risk does not constrain the grant of planning consent to the development as proposed.

Final Flood
The Flood Hazard Rating is calculated using the following equation:
 $HFR = 0.4 + 0.6 \times (F + 1)$
where:
HFR = Flood Hazard Rating
F = Risk of Flooding
0 = no risk of flooding
1 = minor risk of flooding
2 = moderate risk of flooding
3 = major risk of flooding
4 = extreme risk of flooding
5 = very high risk of flooding

Table 3.1: Probable maximum flood (PMF) for different flood depths, velocities and return periods

Flood Depth (m)	Velocity (m/s)	Return Period (years)	PMF (m)
0.5	0.5	100	0.5
1.0	1.0	100	1.0
1.5	1.5	100	1.5
2.0	2.0	100	2.0
2.5	2.5	100	2.5
3.0	3.0	100	3.0
3.5	3.5	100	3.5
4.0	4.0	100	4.0
4.5	4.5	100	4.5
5.0	5.0	100	5.0

METHOD BY WHICH ENVIRONMENT AGENCY CALCULATES SW FLOOD HAZARD RATING

NB WHEREAS GUIDANCE FOR USE OF DEBRIS FACTORS IS AS SET OUT IN TABLE 3.1, THE RISK OF SURFACE WATER FLOODING MAP USES A DEBRIS FACTOR OF 0.5 FOR VELOCITIES NOT EXCEEDING 0.25 M/S, AND A FACTOR OF 1.0 FOR VELOCITIES EXCEEDING 0.25 M/S.



UNCLASSIFIED HAZARD: 0.1 TO 0.75
GENERALLY NEGLECTABLE DANGER

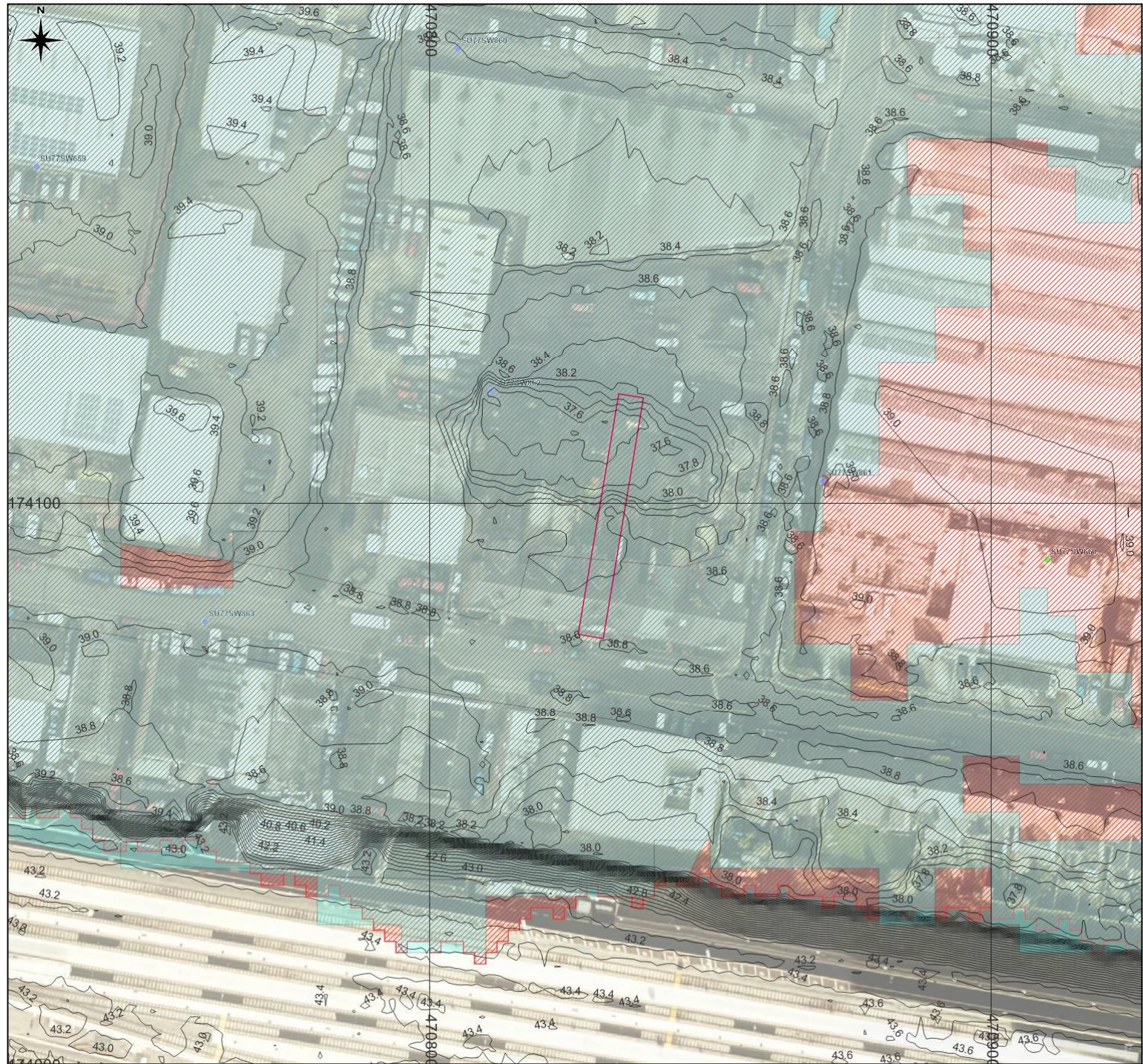
CLASS 1 HAZARD: 0.75 TO 1.25
DANGER FOR SOME

CLASS 2 HAZARD: 1.25 TO 2.00
DANGER FOR MOST

CLASS 3 HAZARD: > 2.00
DANGER FOR ALL

PUBLISHED RISK OF SURFACE
WATER FLOODING 0.1%AEP
HAZARD CLASSIFICATIONS AND
FLOOD EXTENTS

PLANNING RED LINE



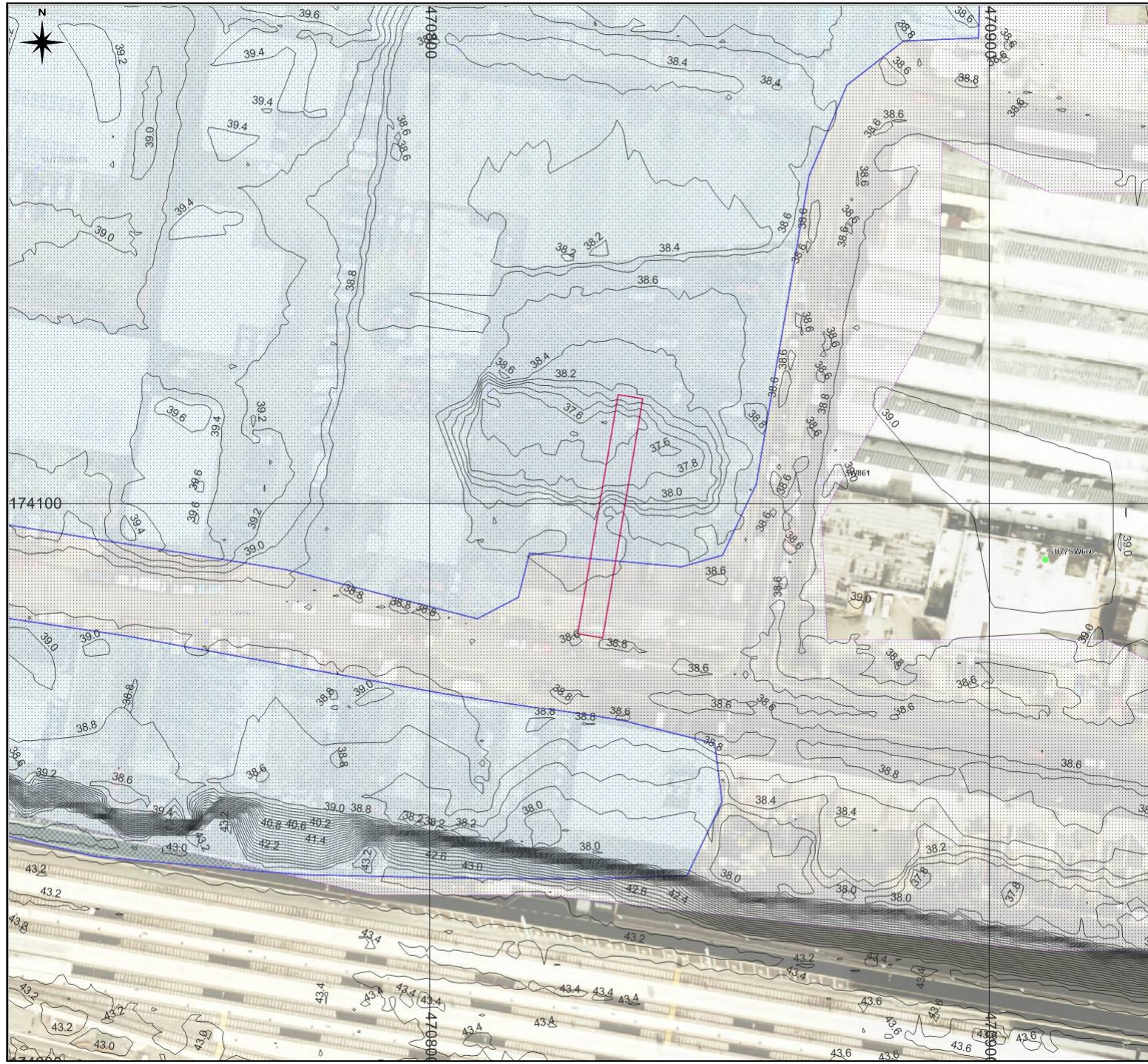
FLOOD ZONE 3 (100 YEAR FLOOD EXTENT)

FLOOD ZONE 2 (1,000 YEAR FLOOD EXTENT)

RESERVOIR FLOOD EXTENTS (WET DAY)

PUBLISHED FLOOD MAP FOR
PLANNING FLOOD ZONES
THERE IS NO FLOOD ZONE 3 AT THIS
LOCATION

PLANNING RED LINE

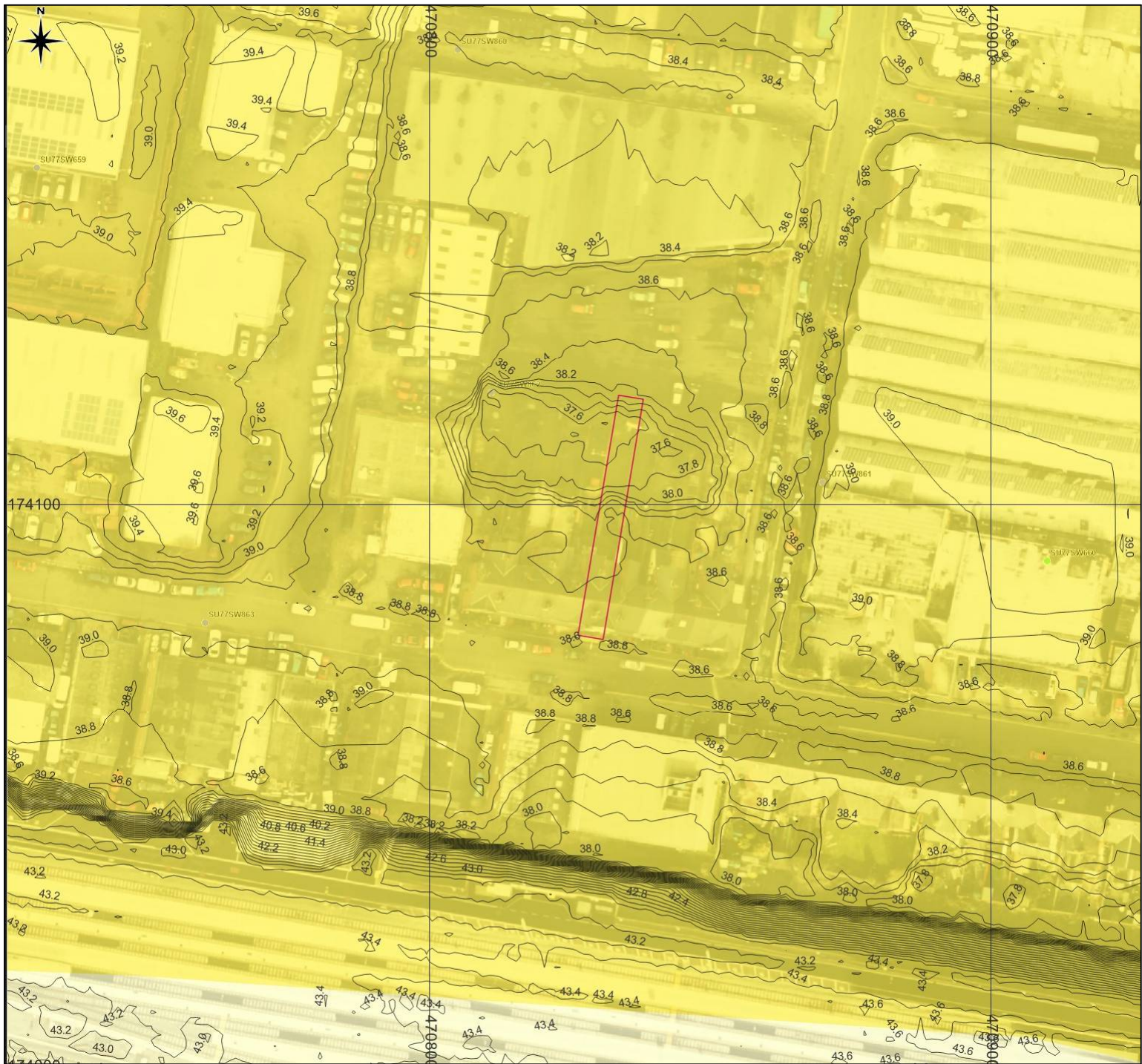


EXTENT OF HISTORIC FLOODING

EA FLOOD WARNING AREA

EXTENTS OF HISTORIC
FLOODING AND EA FLOOD
WARNING AREA

PLANNING RED LINE



ALLUVIUM - CLAY, SILT, SAND AND
GRAVEL SUPERFICIAL DEPOSITS

LANGLEY SILT MEMBER - CLAY AND SILT

PUBLISHED SURFACE
GEOLOGY

THIS PLAN SHOWS SUPERFICIAL
DEPOSITS, BEDROCK COMPRISES
SEAFORD CHALK FORMATION AND
NEWHAVEN CHALK FORMATION
(UNDIFFERENTIATED)

PLANNING RED LINE

NOTES

- THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE FLOOD RISK ASSESSMENT FOR DEVELOPMENT AT THE 50 CARDIFF ROAD, READING.
- MAPPED FLOOD RISK AND GEOLOGICAL DATA SHOWN ON THIS DRAWING WAS DOWNLOADED FROM ENVIRONMENT AGENCY AND BGS WMS SERVERS ON 19 AUGUST 2024.
- THE METHOD USED BY THE ENVIRONMENT AGENCY TO DEFINE THE RISK OF SURFACE WATER FLOODING MAP IS SET OUT IN THE APRIL 2019 VERSION OF THE 2013 ENVIRONMENT AGENCY PUBLICATION "WHAT IS THE RISK OF FLOODING FROM SURFACE WATER MAP".
- CONTOURS SHOWN ON THIS DRAWING ARE COMPUTED FROM OPEN GOVERNMENT 1M LIDAR DTM, AND ARE SHOWN AT 0.2 M VERTICAL INTERVALS TO ORDNANCE SURVEY DATUM.
- "AEP" IS THE ACRONYM FOR "ANNUAL EXCEEDANCE PROBABILITY".

0 32 64 96 128 160 metres

CONTAINS PUBLIC SECTOR INFORMATION
LICENSED UNDER THE OPEN GOVERNMENT
LICENCE V3.0

CONTAINS ORDNANCE SURVEY DATA © CROWN
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MR S DATE

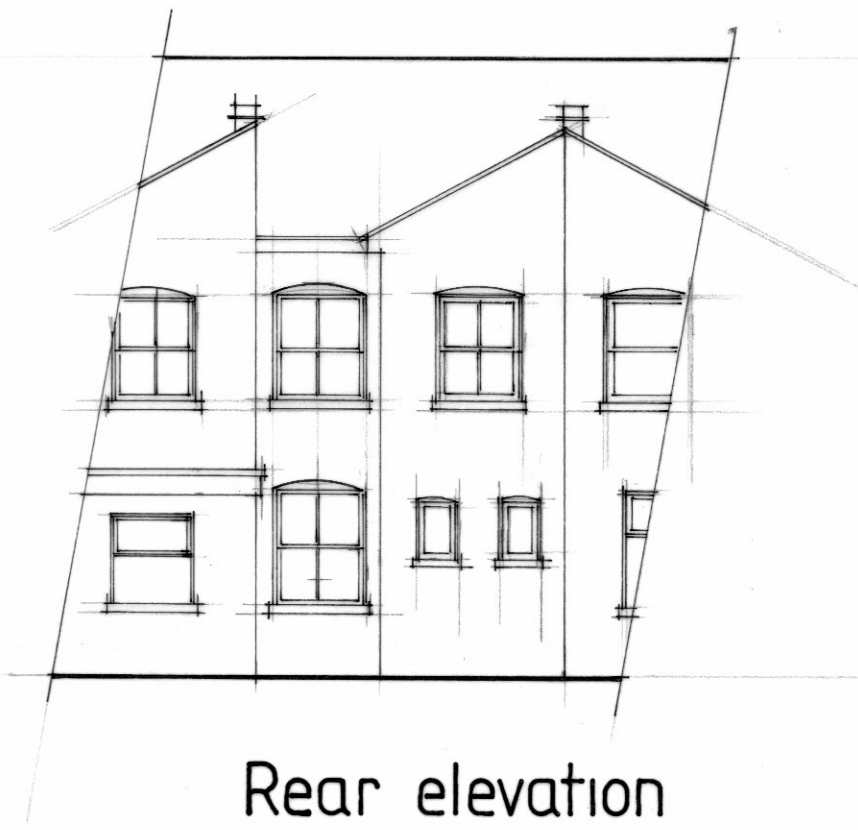
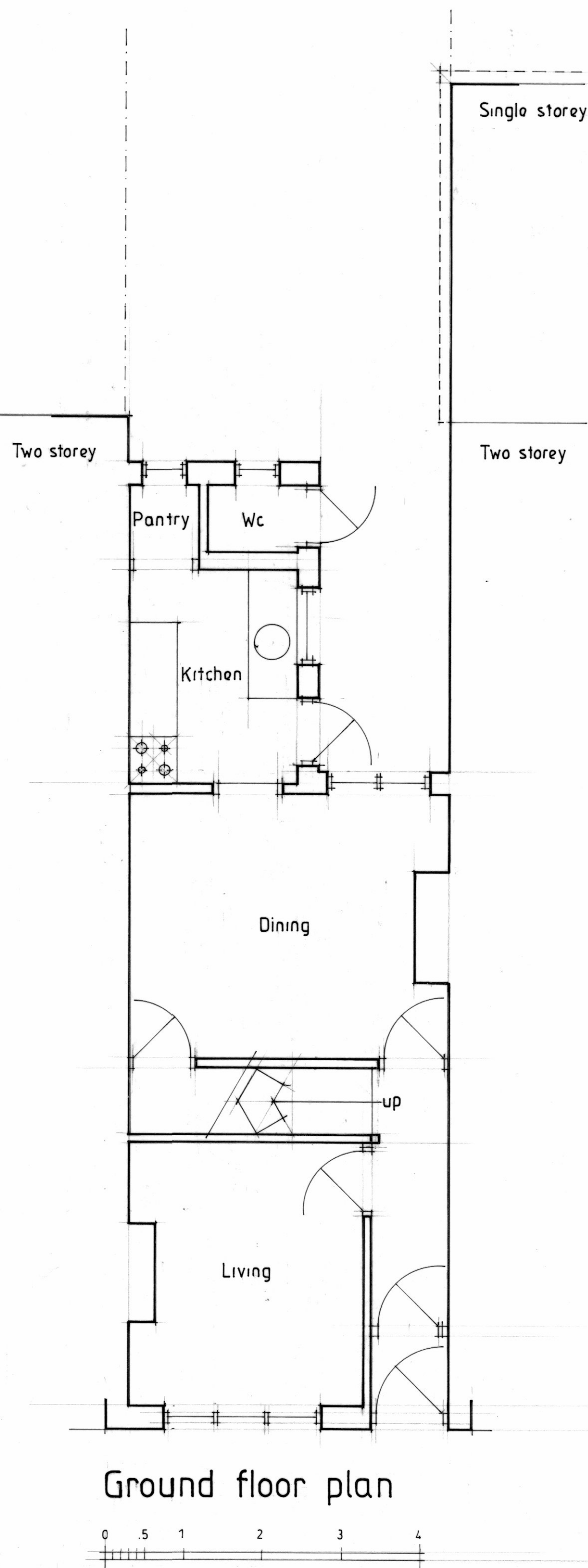
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MAPPED FLOOD RISK AND
SURFACE GEOLOGY

Scale
1:1,000@ A1

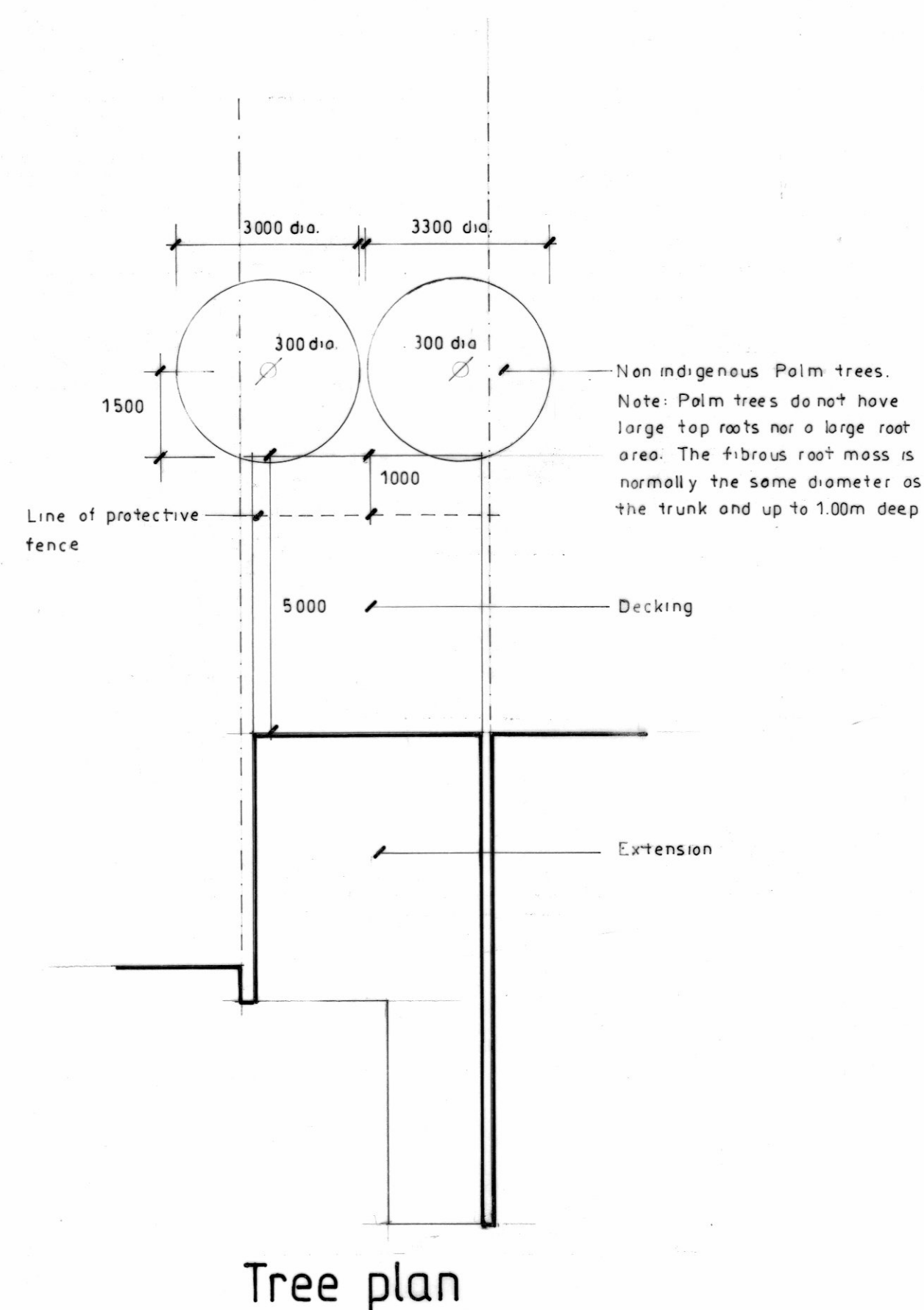
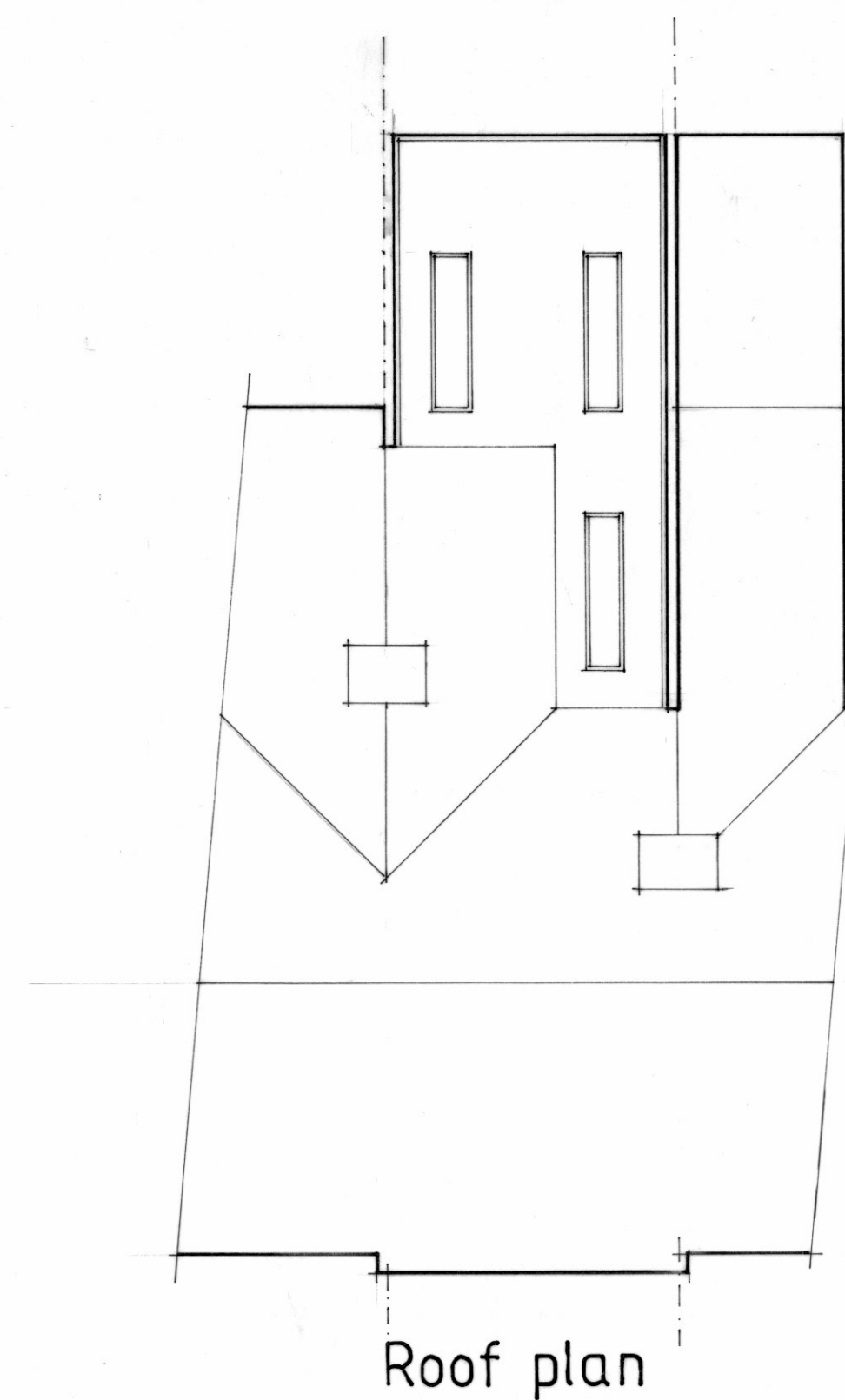
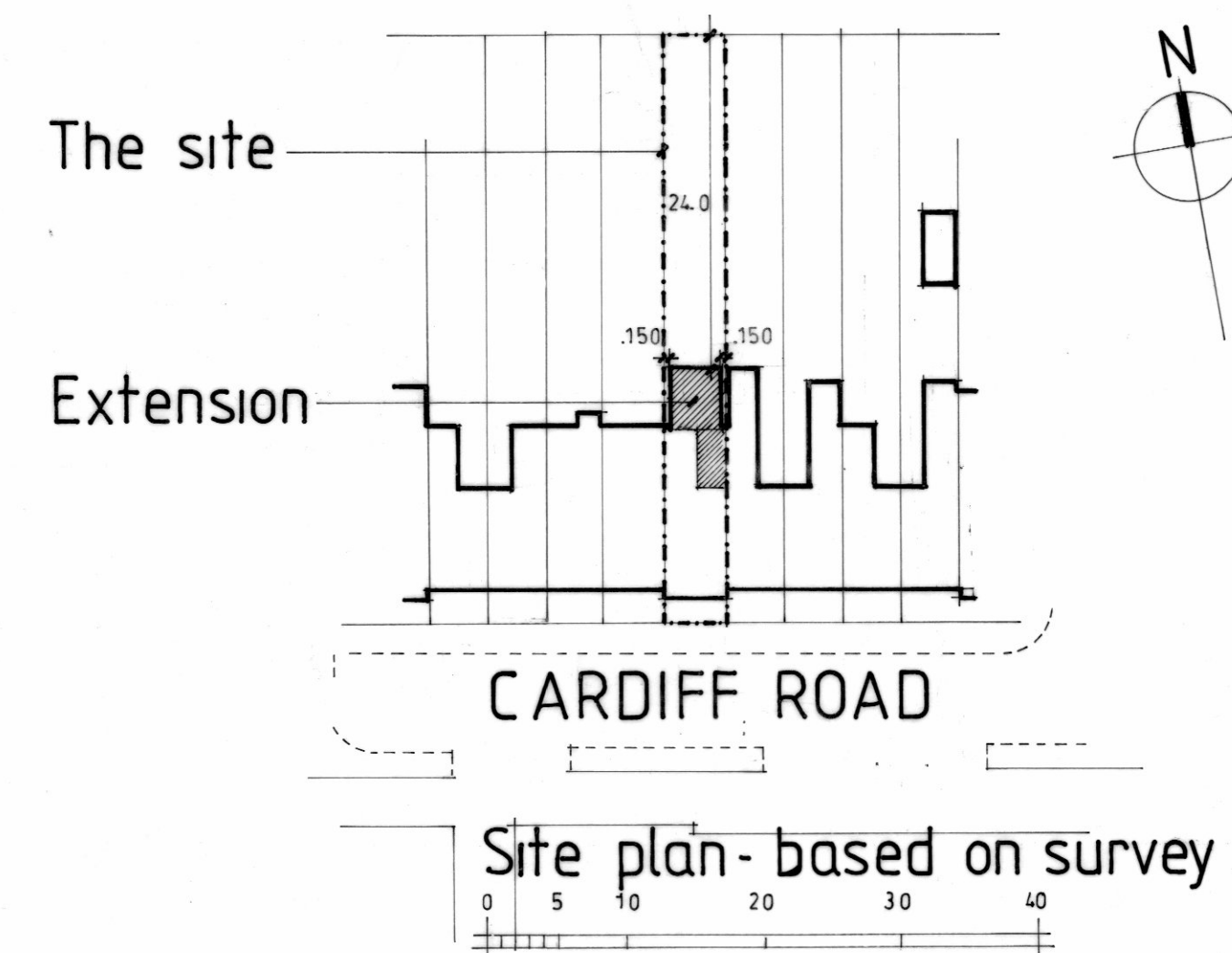
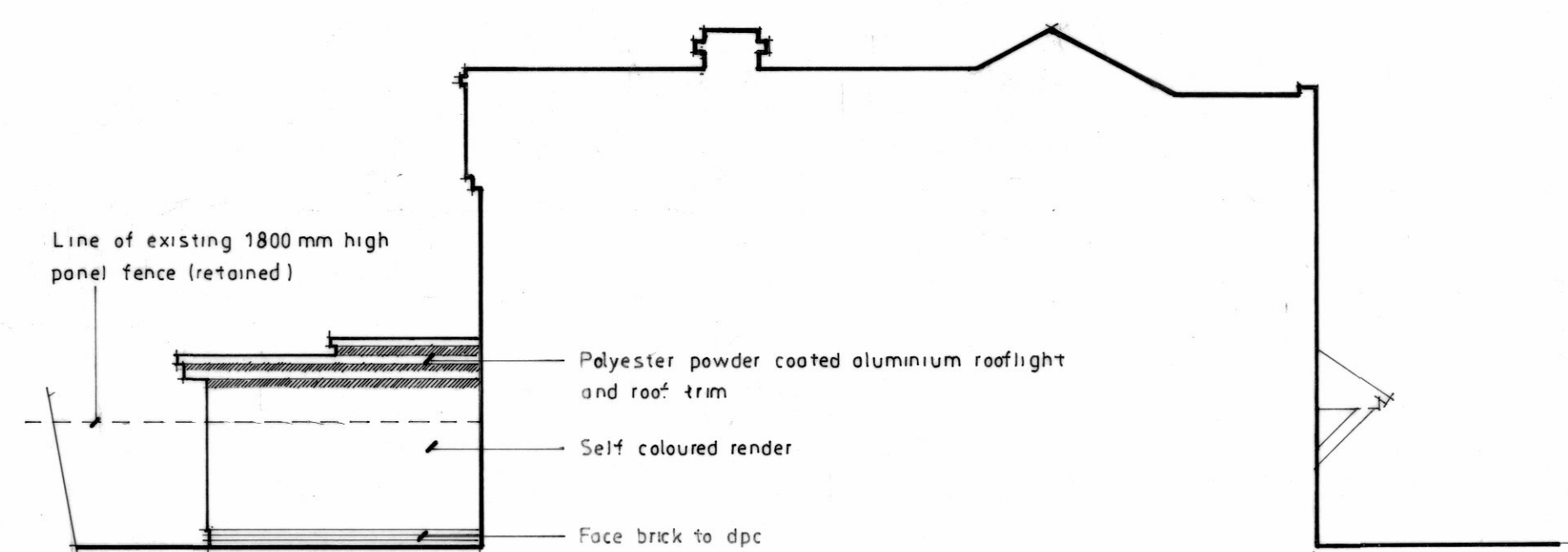
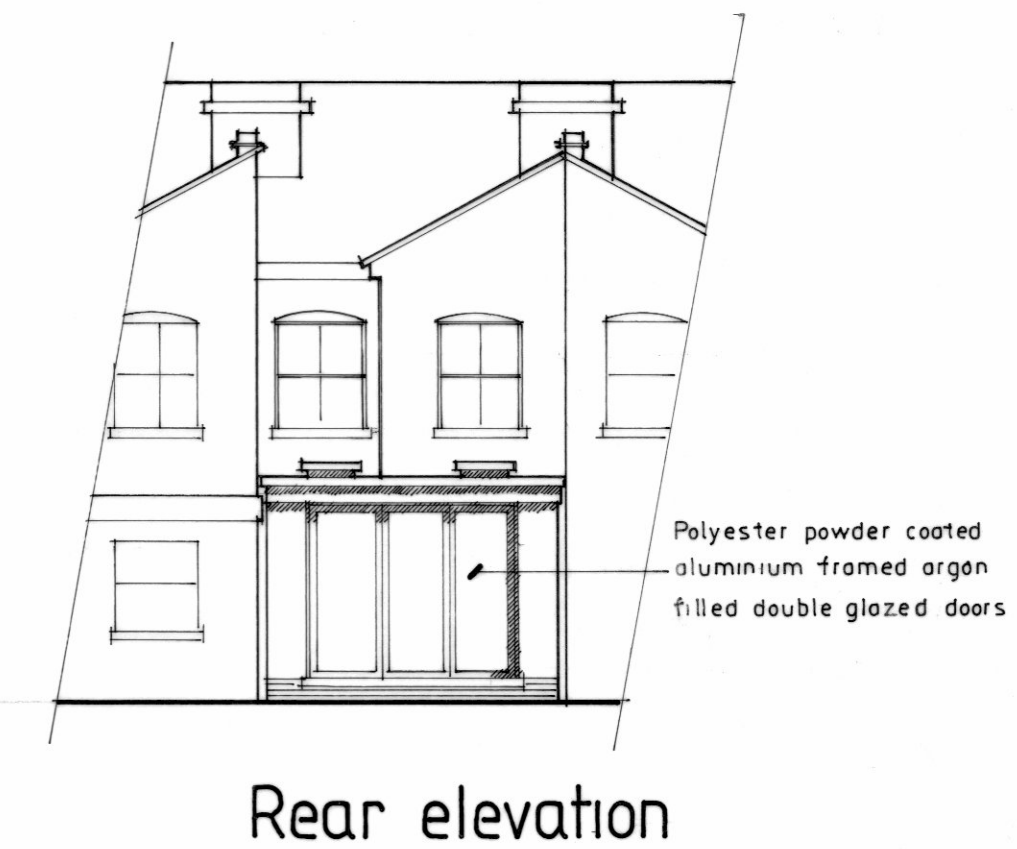
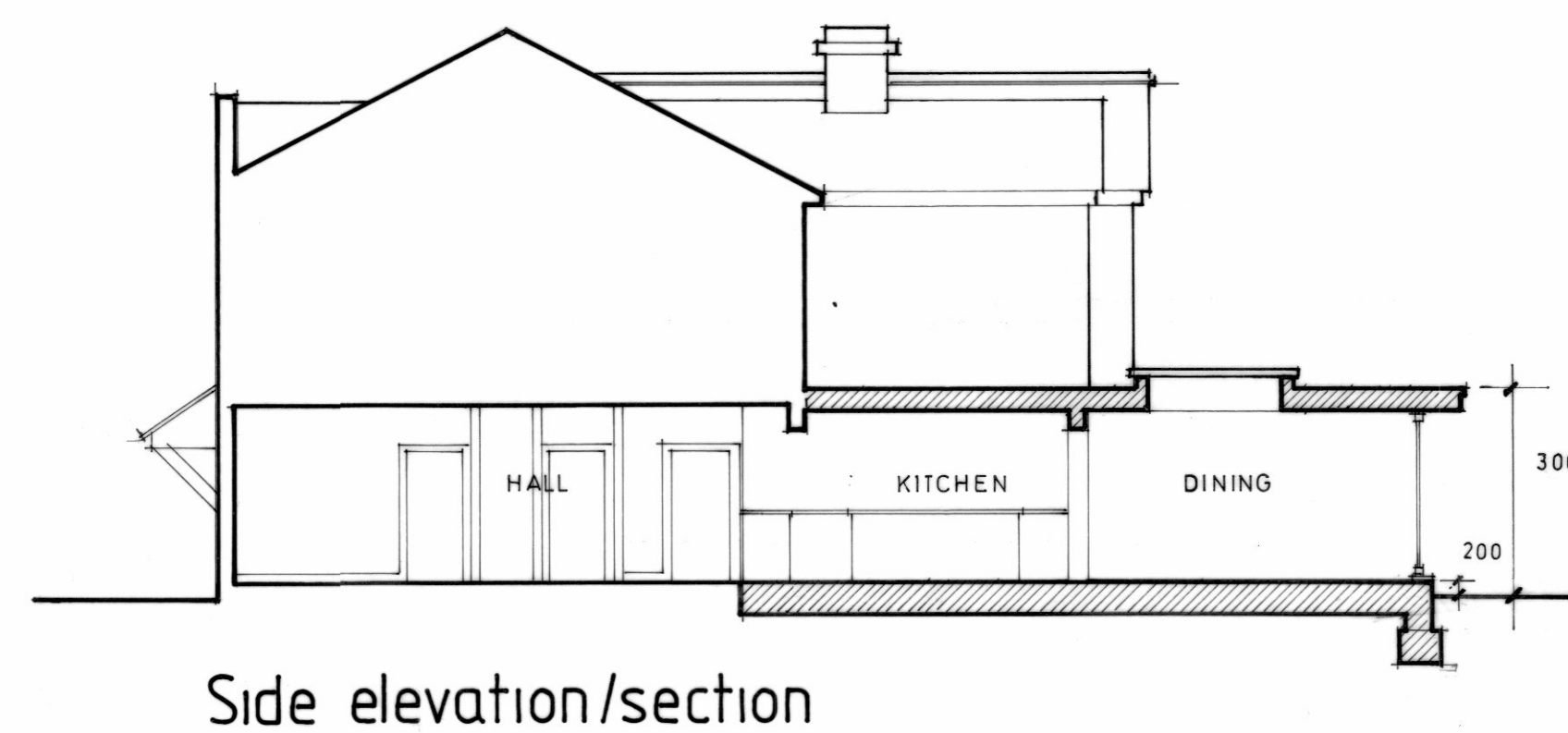
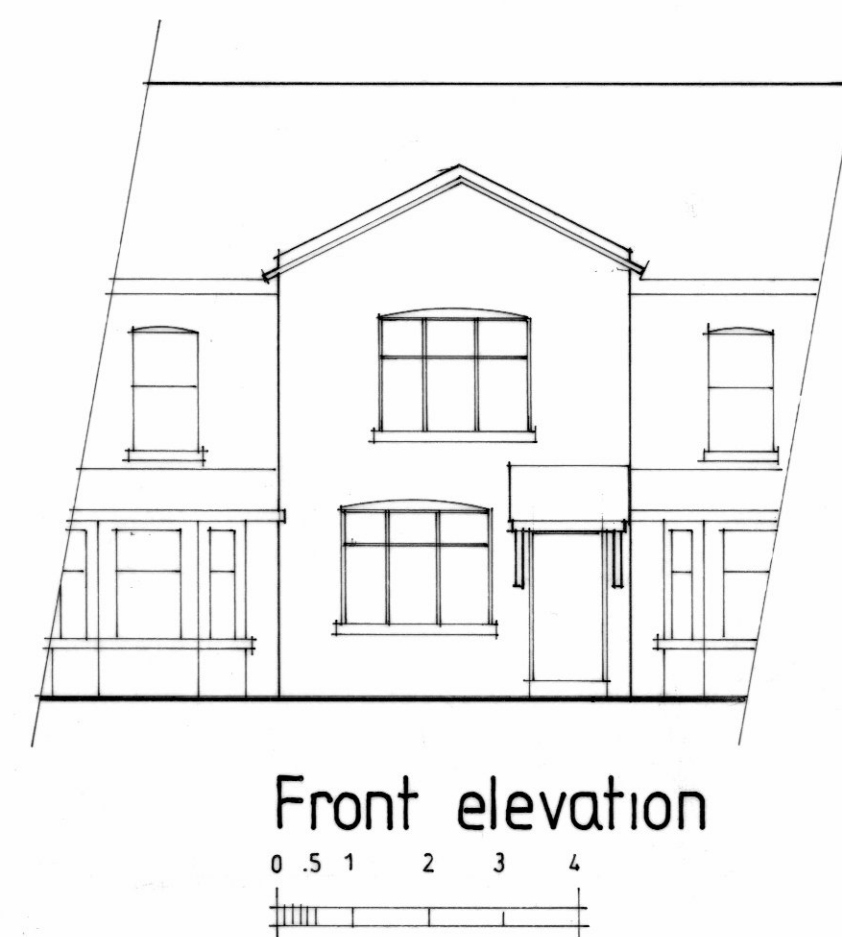
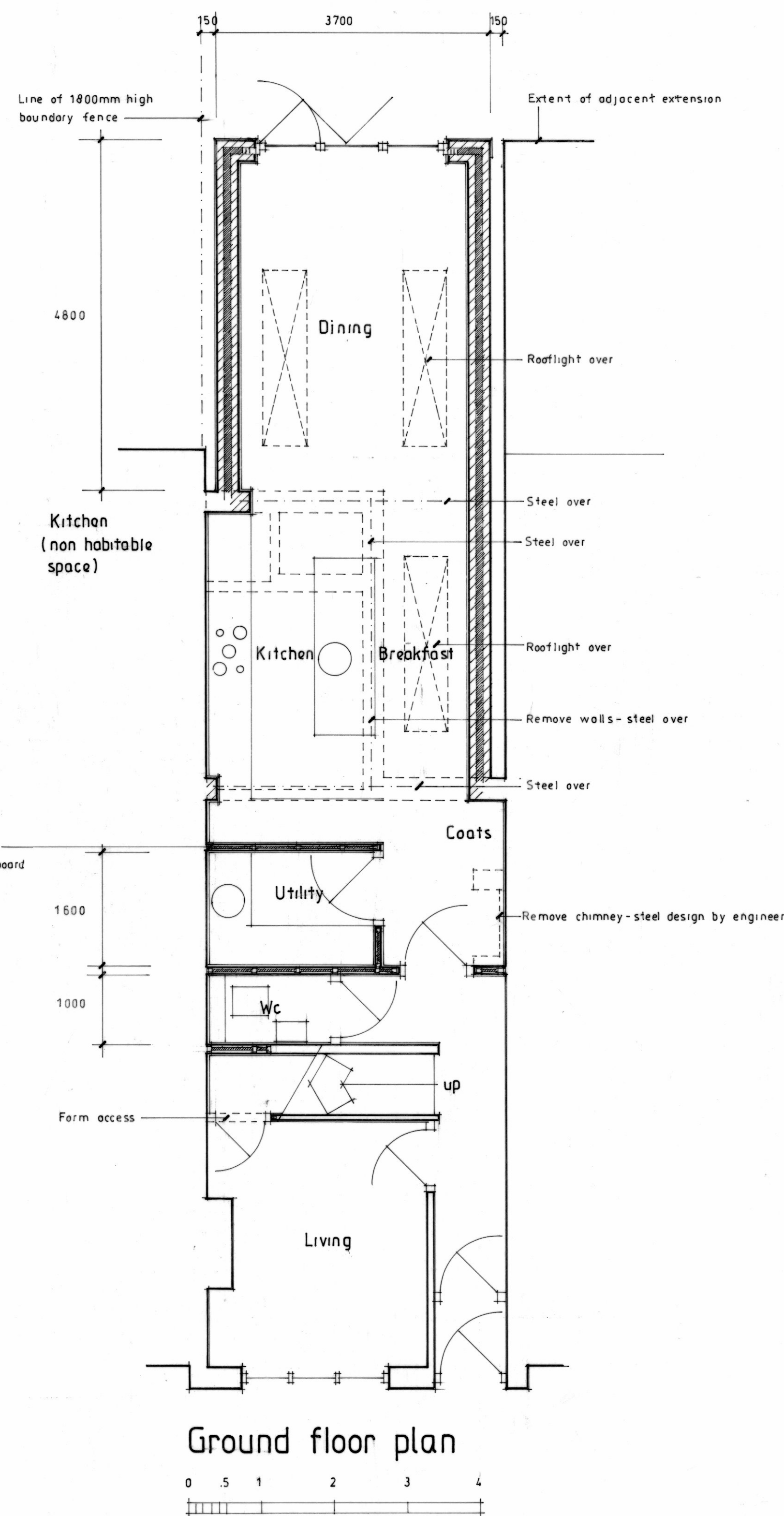
Date
19/08/2024

Drawing Nr
50



project Single storey rear extension
location 50 Cardiff Road, Reading
drawing Existing
drawing no. 1150 / 01
scale 1 : 50 1 : 100
date April 2024

T.Neal Ltd
Architectural Design



A June 21 Tree plan indicated. Slab height indicated on section.

project Single storey rear extension

location 50 Cardiff Road, Reading

drawing Proposed

drawing no. 1150 / 05 A

scale 1 : 50 1 : 100 1 : 500

date May 2024

T.Neal Ltd
Architectural Design

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