



Client: Giles Farm Limited

Flood Risk Assessment for the
Proposed Development at Giles Farm,
Church Street, Higham, Gravesend,
Kent

February 2024

Canterbury Office

Unit 6 & 7
Barham Business Park
Elham Valley Road
Barham
Canterbury
Kent
CT4 6DQ

London Office

Unit 52.11
Woolyard
52 Bermondsey Street
London
SE1 3UD

Tel 01227 833855
www.herringtonconsulting.co.uk

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Contents Page

1	Background and Scope of Appraisal	1
2	Development Description and Planning Context	2
2.1	<i>Site Location and Existing Use</i>	2
2.2	<i>Proposed Development</i>	2
2.3	<i>The Sequential Test and Exception Test</i>	3
3	Definition of Flood Hazard	7
3.1	<i>Site Specific Information</i>	7
3.2	<i>Potential Sources of Flooding</i>	7
3.3	<i>Existing Flood Risk Management Measures</i>	11
4	Climate Change	12
4.1	<i>Planning Horizon</i>	12
4.2	<i>Potential Changes in Climate</i>	12
5	Probability and Consequence of Flooding	14
5.1	<i>The Likelihood of Flooding</i>	14
5.2	<i>Residual Risk of Flooding</i>	15
6	Offsite Impacts and Other Considerations	17
6.1	<i>Displacement of Floodwater</i>	17
6.2	<i>Public Safety and Access</i>	17
6.3	<i>Proximity to Watercourse</i>	17
7	Flood Mitigation Measures	19
7.1	<i>Application of the Sequential Approach at a Local Scale</i>	20
7.2	<i>Flood Defences</i>	20
7.3	<i>Flood Resistance and Resilience</i>	20
7.4	<i>Flood Warning</i>	22
7.5	<i>Surface Water Management</i>	22
8	Conclusions and Recommendations	24
9	Appendices	

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1 Background and Scope of Appraisal

Flooding is a major issue in the United Kingdom. The impacts can be devastating in terms of the cost of repairs, replacement of damaged property and loss of business. The objectives of the Flood Risk Assessment (FRA) are therefore to establish the following:

- whether a proposed development is likely to be affected by current or future flooding from any source.
- whether the development will increase flood risk elsewhere within the floodplain.
- whether the measures proposed to address these effects and risks are appropriate.
- whether the site will pass Part B of the Exception Test (where applicable).

Herrington Consulting has been commissioned by Giles Farm Limited to prepare a Flood Risk Assessment (FRA) for the proposed development at **Giles Farm, Church Street, Higham, Gravesend, Kent, ME3 7LR.**

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2023) and the National Planning Practice Guidance Suite (August 2022) that has been published by the Department for Communities and Local Government. The *Flood Risk and Coastal Change* planning practice guidance included within the Suite represents the most contemporary technical guidance on preparing FRAs. In addition, reference has also been made to Local Planning Policy.

To ensure that due account is taken of industry best practice, this FRA has been carried out in line with the CIRIA Report C624 'Development and flood risk - guidance for the construction industry'.

2 Development Description and Planning Context

2.1 Site Location and Existing Use

The site is located at OS coordinates 571576, 174084 off Church Street near Higham in Kent. The site covers an area of approximately 1000m² and currently comprises several existing agricultural buildings and an existing office building. The location of the site in relation to the surrounding area is shown in Figure 2.1.



Figure 2.1 – Location map (contains Ordnance Survey data © Crown copyright and database right 2024).

The site plan included in Appendix A.1 of this report provides more detail in relation to the site location and layout.

2.2 Proposed Development

The proposals for development comprise the conversion of the existing office building into a single residential dwelling (Figure 2.2).

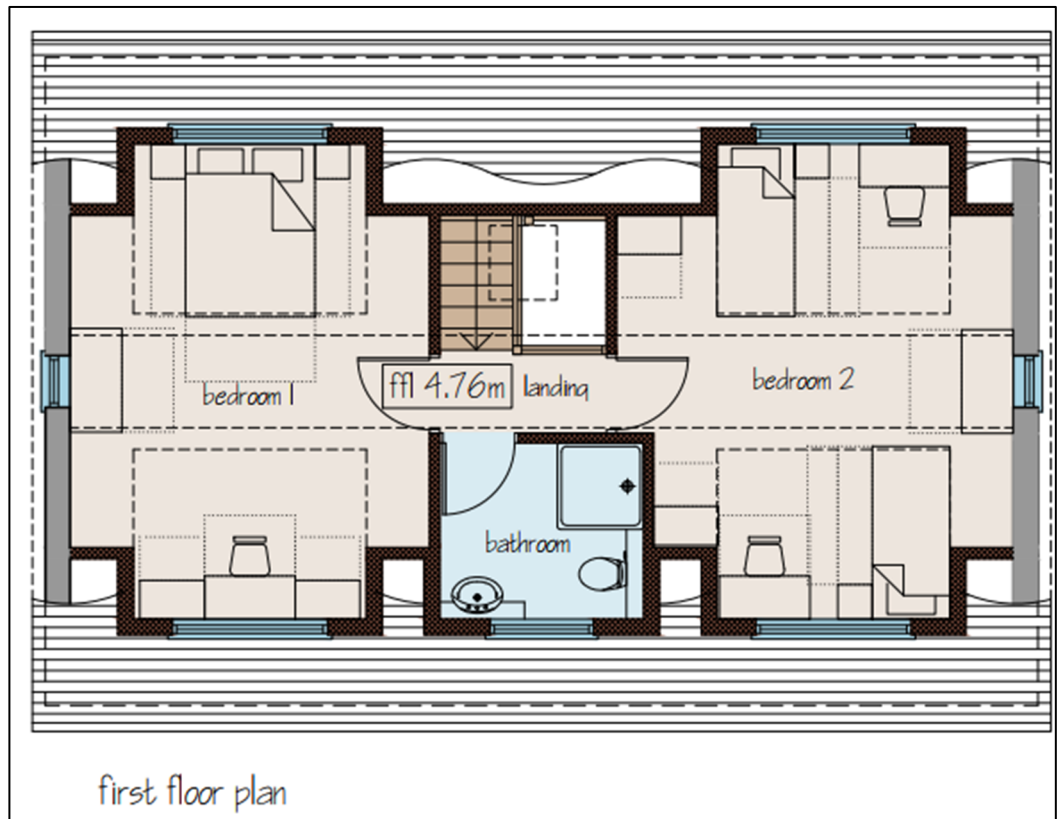


Figure 2.2 – Proposed ground floor (above) and proposed first floor plan (below).

Drawings of the proposed scheme are included in Appendix A.1 of this report.

2.3 The Sequential Test and Exception Test

The National Planning Policy Framework (NPPF) requires the Sequential Test to be applied at all stages of the planning process and generally the starting point is the Environment Agency's (EA) 'Flood Map for Planning' (Figure 2.3). These maps and the associated information are intended for

guidance and cannot provide details for individual properties. They do not take into account other considerations such as existing flood defences, alternative flooding mechanisms and detailed site-based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any particular area of the country. The Flood Zones are classified as follows:

Zone 1 – Low probability of flooding – This zone is assessed as having less than a 1 in 1000 annual probability of river or sea flooding in any one year.

Zone 2 – Medium probability of flooding – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between 1 in 200 and 1 in 1000 annual probability of sea flooding in any one year.

Zone 3a – High probability of flooding - This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding in any one year.

Zone 3b – The Functional Floodplain – This zone comprises land where water has to flow or be stored in times of flood and can be defined as land which would flood during an event having an annual probability of 1 in 30 or greater. This zone can also represent areas that are designed to flood in an extreme event as part of a flood alleviation or flood storage scheme.

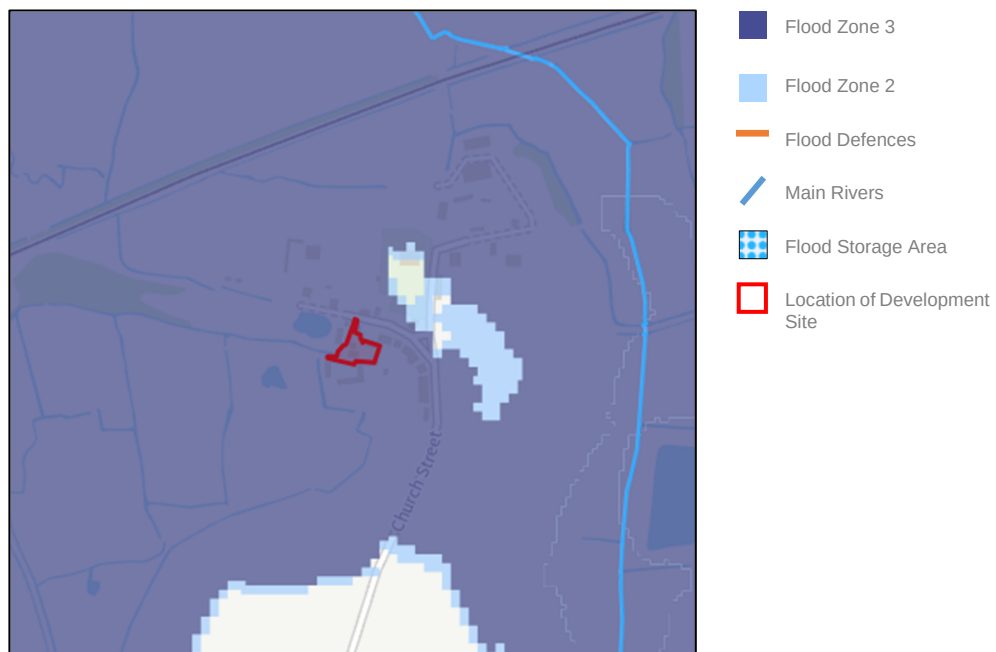


Figure 2.3 – EA's 'Flood Map for Planning' (© Environment Agency).

While providing evidence in support of the Sequential Test is outside the scope of this FRA, it is recognised that the application simply comprises the conversion of the existing building on site, therefore, the proposals cannot realistically be located elsewhere. As such, it is considered that there is evidence to suggest that the Sequential Test can be passed.

Notwithstanding this, if it is not possible, consistent with wider sustainability objectives, for the development to be located in areas at lower risk, the Exception Test may have to be applied. The application of the Exception Test will depend on the type and nature of the development, in line with the Flood Risk vulnerability classification set out in the NPPG. This has been summarised in Table 2.1 below.

Flood Risk Vulnerability Classification	Zone 1	Zone 2	Zone 3a	Zone 3b
Essential infrastructure – Essential transport infrastructure, strategic utility infrastructure, including electricity generating power stations	✓	✓	e	e
High vulnerability – Emergency services, basement dwellings, caravans and mobile homes intended for permanent residential use	✓	e	x	x
More vulnerable – Hospitals, residential care homes, buildings used for dwelling houses, halls of residence, pubs, hotels, non-residential uses for health services, nurseries and education	✓	✓	e	x
Less vulnerable – Shops, offices, restaurants, general industry, agriculture, sewerage treatment plants	✓	✓	✓	x
Water compatible development – Flood control infrastructure, sewerage infrastructure, docks, marinas, ship building, water-based recreation etc.	✓	✓	✓	✓
Key : ✓ Development is appropriate x Development should not be permitted e Exception Test required Shaded cell represents the classification of this development				

Table 2.1 - Flood risk vulnerability and flood zone compatibility.

From Table 2.1 above it can be seen that the development falls into a classification that requires the Exception Test to be applied. For the Exception Test to be passed it should be demonstrated that:

- A. the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- B. the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both parts of the test will have to be passed for development to be allocated or permitted.

Demonstrating that the development provides wider sustainability benefits to the community that outweigh flood risk is outside the scope of this report. Nevertheless, reference is made to the SFRA to establish the key risks associated with flooding and to help demonstrate that this objective can be achieved. The key focus of this FRA is therefore to establish whether the site is likely to pass Part B of the Exception Test.

3 Definition of Flood Hazard

3.1 Site Specific Information

Information from a wide range of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

Site specific flood level data provided by the EA – The EA has provided the model results of the North Kent Coast Modelling Study carried out in 2018 (by others) and the Thames Tidal Downriver Breach Inundation Modelling (2018) which have been referenced as part of this appraisal.

Information contained within the SFRA – The Thameside SFRA (2005 - updated in 2009) contains detailed mapping showing historic flood records for a wide range of sources. This document has been referenced as part of this site-specific FRA.

Information on localised flooding contained within the SWMP – A Surface Water Management Plan (SWMP) is a study to understand the risk of flooding that arises from local surface water flooding, which is defined by the Flood and Water Management Act 2010 as flooding from surface runoff, groundwater, and ordinary watercourses. Such a document has been prepared for Thameside (2013) and has therefore been referenced as part of this site-specific FRA.

Information provided by Southern Water – Southern Water has provided the results of an asset location search for the site. The response is included in Appendix A.2.

Site specific topographic surveys – A topographic survey has been undertaken for the site and a copy of this is included in Appendix A.1. From the survey, it can be seen that the level of the site varies between 2.34m and 3.12m Above Ordnance Datum Newlyn (AODN). Ground levels gradually reduce from east to west.

Geology – Reference to the British Geological Survey (BGS) map shows that the underlying solid geology in the location of the subject site is Lambeth Group (sand, silt and clay). There are no overlying superficial deposits.

Historic flooding – There are no records of flooding at the site from any source contained within the SFRA or SWMP, and within information provided by the EA.

3.2 Potential Sources of Flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table 3.1 at the end of this section summarises the risks associated with each of the sources of flooding.

Flooding from Tidal Sources – The site lies within Flood Zone 3 as shown on the EA's 'Flood Map for Planning' (Figure 2.3). Consequently, the risk of flooding from this source has been appraised further in Section 5 of this report.

Flooding from Rivers, Ordinary or Man-made Watercourses – Inspection of OS mapping identifies that there are no main rivers near to the site, however, there are ordinary watercourses adjacent to the site which form part of the Shorne and Higham marshes. The primary role of these artificial watercourses is to reduce the groundwater level within the surrounding land, with pumps or tidal sluices being used to discharge flows to the sea.

Extreme rainfall, the failure of a pumping station or the tide-locking of the tidal outlet can prevent the system discharging, which may result in increased water levels in the network of drains and ditches. However, due to the large and relatively flat nature of the land that is drained, the consequence of such an event is likely to be water logging of the ground and shallow flooding in the lower-lying areas.

Aerial height data shows that the ditch adjacent to the site and the land to the west of the site is approximately 0.7m below the elevation of the buildings on site. Given the expansive nature of the floodplain, it is considered that floodwater is unlikely to reach a depth which will be significant enough to result in flooding at the site. Consequently, the risk of flooding from this source is considered to be *low*.

Flooding from Land (overland flow and surface water runoff) – Overland flooding typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This mechanism of flooding can occur almost anywhere, but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions.

Inspection of the EA's 'Flood Risk from Surface Water' map (Figure 3.1) identifies that the site is almost entirely located within an area at 'very low' risk of flooding from surface water. Additionally, there are no records of surface water flooding on site in the past contained within the SFRA or SWMP. Consequently, the risk of flooding from this source is considered to be *low*.

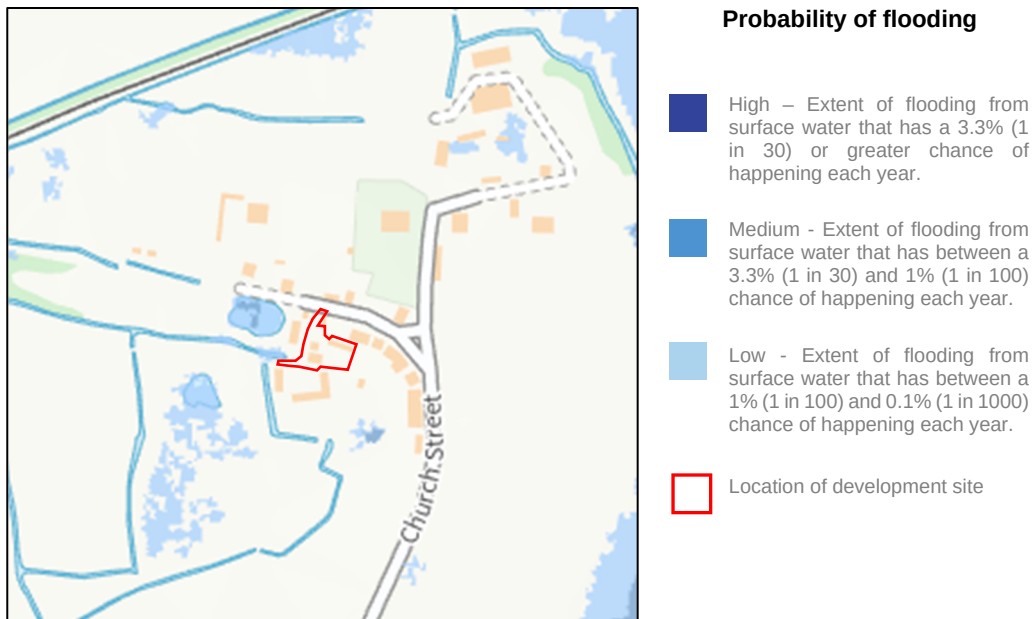


Figure 3.1 – EA's 'Flood Risk from Surface Water' map (© Environment Agency).

Flooding from Groundwater – Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year).

The underlying bedrock geology in this area is Lambeth Group (sand, silt and clay), with no overlying superficial deposits. This bedrock geology can in some cases be associated with groundwater flows and this is supported by the mapping on groundwater emergence provided as part of the Defra Groundwater Flood Scoping Study (May 2004) which shows that the site is located in an area where groundwater emergence could occur.

However, the site is elevated above land to the west of the site and this low-lying land is drained by a series of drainage ditches which have the primary aim of reducing the groundwater level in the area. As a result, above ground flooding due to groundwater emergence is considered unlikely on site.

This is supported by the absence of groundwater flooding events during the very wet periods of 2000/01 or 2002/03, and by the absence of records contained within the SFRA and SWMP. Consequently, the risk of flooding from this source is considered to be *low*.

Flooding from Sewers – In urban areas, rainwater is typically drained into surface water sewers or sewers containing both surface and wastewater known as "combined sewers". Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

An asset location search has been requested with Southern Water and the response received states that there are no public sewer assets owned or operated by Southern Water at the site or in the surrounding area (Appendix A.2). Consequently, the risk of flooding from this source is considered to be *low*.

Flooding from Reservoirs, Canals and other Artificial Sources – Non-natural or artificial sources of flooding can include reservoirs, canals, and lakes, where water is retained above natural ground level. In addition, operational and redundant industrial processes including; mining, quarrying, sand and gravel extraction, may also increase the depth of floodwater in areas adjacent to these features.

The potential effects of flood risk management infrastructure and other structures also needs to be considered. For example; reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

Inspection of the OS mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the EA's 'Flood Risk from Reservoirs' map shows that the site is not within an area considered to be at risk of flooding from reservoirs. Therefore, the risk of flooding from this source is considered to be *low*.

A summary of the overall risk of flooding from each source is provided in Table 3.1 below.

Source of Flooding	Initial Level of Risk	Appraisal method applied at the initial flood risk assessment stage
Tidal Sources (sea and rivers)	Appraised further in Section 5	OS mapping and the EA's 'Flood Map for Planning'
Rivers, Ordinary and Man-made (fluvial)	Low	OS mapping and the EA's 'Flood Map for Planning'
Surface Water	Low	EA's 'Flood Risk from Surface Water' map and historic records contained within the SFRA
Groundwater	Low	Defra Groundwater Flood Scoping Study, site-specific topographic survey and historic records in the SFRA and SWMP.
Sewers	Low	Asset location data provided by Southern Water
Artificial Sources	Low	OS mapping and EA's 'Flood Risk from Reservoirs' map

Table 3.1 – Summary of flood sources and risks.

3.3

Existing Flood Risk Management Measures

The site is protected by existing defence infrastructure along the North Kent Coast which provides a standard of protection up to a 1 in 1000 year return period event. The defences comprise a double earth embankment and piled concrete up-stand wall.

4 Climate Change

The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present, and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall could be expected.

These effects will tend to increase the size of Flood Zones associated with rivers, and the amount of flooding experienced from other inland sources. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels. It will also increase the extent of the area at risk should sea defences fail. Changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events are also predicted.

4.1 Planning Horizon

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on the extreme flood level that is commensurate with the planning horizon for the proposed development. The NPPF and supporting Planning Practice Guidance Suite state that residential development (such as the proposed development) should be considered for a minimum of 100 years.

4.2 Potential Changes in Climate

Extreme Sea Level

Global sea levels will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west.

Reference to guidance published by the EA specifies allowances for different epochs and regions across England. The predicted rates of relative sea level rise for the 'South East' region, relevant to the subject site, are shown in Table 4.1. These values which correspond with the Higher Central and Upper End percentiles (the 70th and 90th percentile respectively).

Administrative Region	Allowance Category	Net Sea Level Rise (mm/yr) (Relative to 2000)			
		2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125
South East	Higher Central	5.7	8.7	11.6	13.1
	Upper End	6.9	11.3	15.8	18.2

Table 4.1 – Recommended contingency allowances for net sea level rise.

From these values, the extreme sea level at the site can be seen to change with time and this change is not linear. The 1 in 200 year extreme sea level at the site has therefore been calculated for a number of steps between the current day and the year 2115 and these values are shown in Table 4.2 below.

Year	'Higher Central' Scenario	'Upper End' Scenario
Current Day (year 2017)	5.13	5.13
2035	5.23	5.25
2065	5.49	5.59
2080	5.67	5.83
2095	5.84	6.07
2125	6.23	6.61

Table 4.2 – Climate change impacts on extreme sea levels for a 1 in 200 year return period event based on values taken from the EA's Coastal Flood Boundary Condition database.

The development that is the subject of this FRA is classified as residential and therefore the extreme sea level is taken as 6.23m AODN in the 'Higher Central' scenario, and 6.61m AODN in the 'Upper End' scenario.

It is recognised that both the North Kent Coast Model (completed in 2018) and the Thames Tidal Downriver Breach Inundation Modelling (2018) were completed before the latest guidance on climate change was published. The models are therefore based on previous estimates of sea level rise as opposed to the values stated in Table 4.2. However, the EA has confirmed that the previous climate change allowances, which have been used within the model, "represent the high end of the range of sea level rise projected by UKCP18" (i.e. the new 'Upper End scenario'). Consequently, in the absence of detailed modelling which references the latest guidance, the North Kent Coast and Thames Downriver Breach modelling has been used to assess the risk of flooding to the development site (Section 5).

5 Probability and Consequence of Flooding

5.1 The Likelihood of Flooding

When appraising the risk of flooding to new development it is necessary to assess the impact of the 'design flood event'. Flood conditions can be predicted for a range of return periods and these are expressed in either years or as a probability, i.e. the probability that the event will occur in any given year, or Annual Exceedance Probability (AEP). The design flood event is taken as the 1 in 200 year (0.5% AEP) event for sea or tidal flooding, including an appropriate allowance for climate change (refer to Section 4.2).

The EA has previously provided the detailed tidal modelling of the North Kent Coast (completed in 2018 by others), which has been referenced as part of this assessment. The model shows results for both 'defended' and 'undefended' scenarios. The 'undefended' modelled scenarios are based on the assumption that the entire defence infrastructure is removed, thus presenting an unrealistic scenario. Notwithstanding this, Section 3.3 has identified that the development site benefits from existing defence infrastructure and therefore, it is considered more appropriate to use the 'defended' scenarios.

The detailed information provided by the EA for the 'defended' scenarios contains modelled flood levels for a number of return period events including both the current day, and future (2115) climate change scenarios. The maximum flood levels at the site under these scenarios is shown in Table 5.1 below.

Return Period	% AEP	Modelled flood levels at the site (m AODN)
1 in 30 years	3.33%	-
1 in 200 years	0.5%	-
1 in 200 year – future year 2115	0.5% - future year 2115	-

Table 5.1 – Modelled flood levels provided by the EA as part of the North Kent Coast model. A value of “-” indicates that the node point lies outside the modelled flood extent.

From Table 5.1 above, it is evident that the development site is not located within the functional floodplain, i.e. the 1 in 30 year return period. In addition, the results identify that the development site is protected by the existing defence infrastructure and remains unaffected by flooding during the 1 in 200 year return period event under current day conditions. Even when an allowance for climate change over the next 100 years is considered, the site is shown to remain dry during a 1 in 200 year return period event. Consequently, it is considered the actual risk of flooding to the proposed development is *low*.

5.2 Residual Risk of Flooding

Whilst the existing defence infrastructure provides a high standard of protection, there is always the risk that these defences could fail, for example through structural failure (i.e. a breach), or a less predictable mechanism such as ship impact, or an act of terrorism. The risk of flooding through such as scenario is termed *residual risk*.

As part of the North Kent Coast modelling study, breach scenarios were tested at eight locations for the 1 in 200 year event under current day conditions. Inspection of the model results identifies that the site is outside the predicted extent of flooding for all eight breaches. However, as the breach modelling undertaken as part of the North Kent Coast model does not include an allowance for climate change, other modelling has been referenced.

The only breach modelling available for the area that includes an allowance for climate change is the modelling undertaken as part of the Thames Tidal Downriver Breach Inundation Modelling (2018). The results of the modelling delineate the predicted flood extents for a series of tidal breaches along the River Thames from the Thames Barrier and east of Gravesend. The Thames Tidal Downriver Breach Inundation Modelling has therefore been referenced to assess the residual risk to the site.

Inspection of the results shows that if a breach in the Thames defences was to occur, the entire site would be flooded to a maximum predicted flood level of 3.75m AODN. The applicant has confirmed that the ground floor level of the existing building is 3.06m AODN. Consequently, the maximum predicted flood depth where the building is located is 0.69m (Figure 5.1).

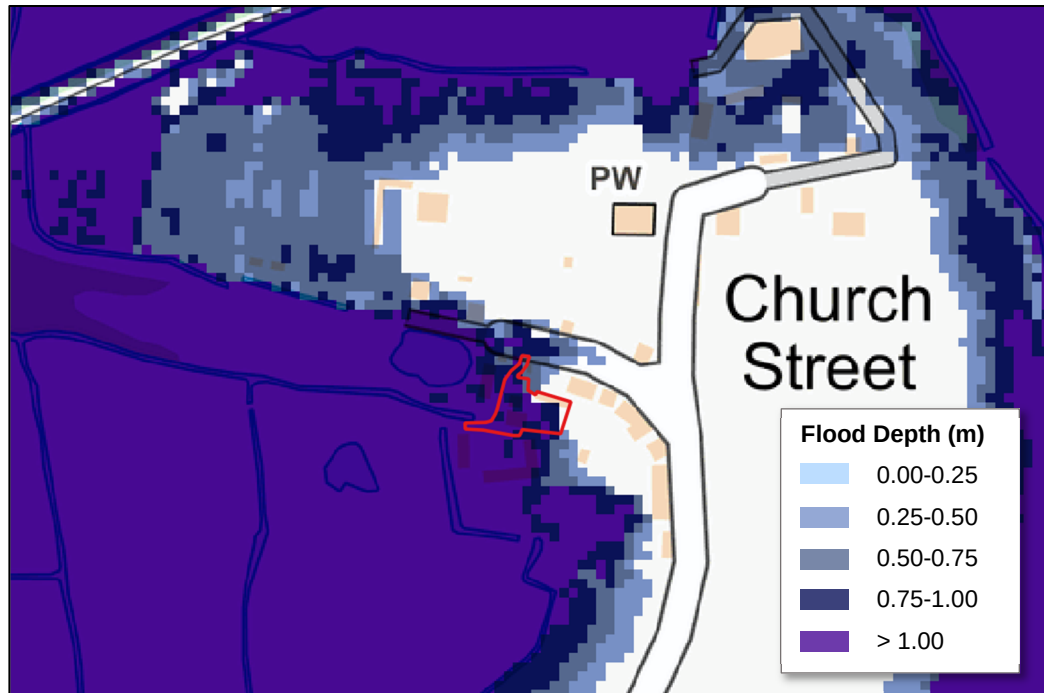


Figure 5.1 - Maximum predicted extent and depth of flooding resulting from a breach in the Thames defences during a 1 in 200 year return period event, including a 100 year allowance for climate change. Site boundary delineated in red (© Environment Agency - contains Ordnance Survey data © Crown copyright and database right 2023).

6 Offsite Impacts and Other Considerations

6.1 Displacement of Floodwater

The construction of a new building within the floodplain has the potential to displace water and to increase the risk elsewhere by raising flood levels. In this case, whilst the development proposals comprise the conversion of the existing office building, thereby not increasing the built footprint, the proposals also include the construction of a 1200mm reinforced concrete flood wall that has the potential to displace floodwater. However, where the proposed development is located in the tidal floodplains, it is generally accepted by the EA that building on the floodplain is unlikely to impact on maximum tidal levels.

6.2 Public Safety and Access

The NPPF states that safe access and escape should be available to/from new developments located within areas at risk of flooding. The Practice Guide goes on to state that access routes should enable occupants to safely access and exit their dwellings during design flood conditions and that vehicular access should be available to allow the emergency services to safely reach the development.

It has been demonstrated that the proposed development currently benefits from the existing defence infrastructure which protects the site to a 1 in 1000 year standard of protection. Even when an allowance for climate change is considered, the site is predicted to remain dry during a 1 in 200 year return period event including the appropriate allowance for climate change. As such, safe access/egress to/from the site will be available.

Notwithstanding this, it has been demonstrated that in the unlikely event that the defences along the River Thames were to fail under design event conditions, the entire site could be flooded. As the access road, and lower part of the site, is predicted to flood to a depth of greater than 0.25m, safe access/egress to/from the surrounding area would not be available once floodwater has reached the site and surrounding area. It is therefore recommended that the residents sign up to receive the EA's Flood Warnings, which in conjunction with a flood evacuation plan, will enable the occupants to evacuate the site before a breach occurs, allowing them to reach the area of elevated ground to the east of the site.

Notwithstanding this, in the event residents are unable to evacuate the site before the onset of flooding, safe refuge will be available on the first floor of the building, above maximum predicted flood level.

6.3 Proximity to Watercourse

Under the Land Drainage Act 1991, as amended by the Flood and Water Management Act 2010, an Internal Drainage Board (IDB) is responsible for the regulation of watercourses located within defined 'internal drainage districts'. The site subject to this FRA is located within the jurisdiction of the North Kent Marshes IDB.

The North Kent Marshes IDB land drainage bylaws states that *“No person without the previous consent of the Board shall erect any building or structure, whether temporary or permanent, or plant any tree, shrub, willow or similar growth within 8 metres of the landward the of the bank....”*. Inspection of the scheme drawings identifies that the proposed development is located over 8m from the adjacent IDB maintained watercourse and therefore it is considered that the proposals will likely be acceptable to the IDB.

7 Flood Mitigation Measures

The key objectives of flood risk mitigation are:

- to reduce the risk of the development being flooded.
- to ensure continued operation and safety during flood events.
- to ensure that the flood risk downstream of the site is not increased by increased runoff.
- to ensure that the development does not have an adverse impact on flood risk elsewhere.

The following section of this report examines ways in which the risk of flooding at the development site can be mitigated.

Mitigation Measure	Appropriate	Comment
Careful location of development within site boundaries (i.e., Sequential Approach)	X	Considering the development consists of the conversion of an existing office space, these mitigation measures are not considered to be feasible or necessary.
Land raising	X	
Compensatory floodplain storage	X	
Alterations/ improvements to channels and hydraulic structures	X	
Raising floor levels	✓	Refer to Section 7.1
Flood defences	✓	Refer to Section 7.2
Flood resistance & resilience	✓	Refer to Section 7.3
Flood warning	✓	Refer to Section 7.4
Surface water management	✓	Refer to Section 7.5

Table 7.1 – Appropriateness of mitigation measures.

7.1 Raising Floor Levels

Given that the development proposals include converting the existing office building, it is not possible to raise the ground floor levels higher. However, in order to minimise the risk of internal flooding during the extremely unlikely event of a tidal breach scenario, a flood wall will be included within the scheme, surrounding the existing building. It is therefore only in the unlikely event that both the Thames defences and onsite flood wall were to fail simultaneously during an extreme event, that floodwater could reach the building. Flood resistance measures will be included within the ground floor (refer to Section 7.2 and 7.3 below) to manage the impact of flooding should such a catastrophic event occur.

7.2 Flood Defences

The applicant has confirmed that a 1200mm reinforced concrete flood wall will be constructed surrounding the proposed development (Figure 7.1). Given the maximum predicted flood depth where the proposed development is located is 0.69m during an extreme tidal breach event, the proposed flood wall surrounding the development should provide a sufficient level of protection against flooding during an event of this nature.

Nevertheless, as it is necessary to consider the 'residual risk' of flooding in the event that both these flood defences fail, the below mitigation measures are recommended to mitigate the risk of flooding to the proposed development in the extremely unlikely event that the Thames defences and site defences were to fail simultaneously. However, it should be acknowledged that the chances of both defences failing at the same time is extremely low.



Figure 7.1 – Indicative ground floor plan, including the proposed flood wall in brown.

7.3 Flood Resistance and Resilience

Flood Resistance or 'dry proofing', where flood water is prevented from entering the building. For example, using flood barriers across doorways and airbricks, or raising floor levels. These

measures are considered appropriate for 'more vulnerable' development where recovery from internal flooding is not considered to be practical.

Flood Resilience or 'wet proofing', accepts that flood water will enter the building and allows for this situation through careful internal design for example raising electrical sockets and fitting tiled floors. The finishes and services are such that the building can quickly be returned to use after the flood. Such measures are generally only considered appropriate for some 'less vulnerable' uses and where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable.

This assessment has concluded that the risk of flooding is *low* from all sources. However, in the extremely unlikely event that the tidal flood defences and onsite defences breached during a design flood event, the area where the proposed development is proposed could be subject to flooding. Whilst the applicant has confirmed that a 1200mm reinforced concrete wall is proposed surrounding the development, it is recommended as a precautionary measure to include flood resistance and resilience measures within the ground floor of the development, to reduce the risk of floodwater damage on the ground floor of the building if the on-site floodwall were to fail.

Typical examples of flood resilience measures which may be appropriate for the development site include (but are not limited to) the following:

- Bringing the electrical supply in at first floor.
- Placing boilers and meter cupboards on the first floor.
- Water-resistant plaster/tiles on the walls of the ground floor.
- Solid stone or concrete floors with no voids underneath.
- Covers for doors and airbricks.
- Non-return valves on new plumbing works.
- Avoidance of studwork partitions on the ground floor.

Details of flood resilience and flood resistance construction techniques can be found in the document '*Improving the Flood Performance of New Buildings; Flood Resilient Construction*', which can be downloaded from www.gov.uk.

A Code of Practice (CoP) for Property Flood Resilience (PFR) has been put in place to provide a standardised approach for the delivery and management of PFR. Further information on the CoP and guidance on how to make a property more flood resilient can be accessed, and downloaded, from the Construction Industry Research and Information Association (CIRIA) Website:

https://www.ciria.org/Resources/Free_publications/CoP_for_PFR_resource.aspx

7.4 Flood Warning

The nature of the flood mechanism in this location is tidal flooding associated with a tidal surge in the North Sea. Such an event is dependent on meteorological conditions that can be monitored reliably and therefore it is likely that a minimum of 12 hours warning could be given. It is therefore recommended that the residents of the site sign up to the EA's Flood Warning Service to enable them to be made aware of flooding in the wider area either by calling 0345 988 1188, or by visiting;

www.gov.uk/sign-up-for-flood-warnings

The flood warning service could also be used in combination with a robust Flood Warning and Evacuation plan (FEP) for the site. An FEP could be issued to the residents and would need to be reviewed on an annual basis.

A Flood Warning and Evacuation Plan:

- identifies areas of the site that are above the predicted flood level and will therefore be used as a safe haven until floodwaters recede.
- contains detailed site plans that identify emergency access routes through the site.
- provides information to residents on flood warning procedures.
- includes emergency contact numbers and other site-specific information that will enable residents to manage the impacts of flood event.

7.5 Surface Water Management

The general requirement for all new development is to ensure that the runoff is managed sustainably, and that the development does not increase the risk of flooding at the site, or within the surrounding area. In addition, the NPPF states that sustainable drainage systems should be incorporated in areas at risk of flooding and therefore, use of SuDS has been considered with the aim of minimising the risk of flooding both on and off site.

A range of typical SuDS that can be used to improve the environmental impact of a development is listed in Table 7.2 below along with the relative benefits of each feature and the appropriateness for the subject site.

SuDS	Description	Constraints/Comments	Appropriate for site?
Rainwater harvesting systems	Collection of rainwater and storage for reuse on site.	No known constraints of including water butts.	Yes
Green/Blue roofs	Provide landscaping and planting at roof level to reduce surface water runoff rates.	No proposed changes to the roof structures.	No
Infiltration Systems	Allow water to percolate into the ground at a controlled rate via natural infiltration.	Potentially high groundwater.	No
Filter strips	Wide gently sloping densely planted areas promoting sedimentation and filtration.	Infiltration unlikely to be viable.	Unknown
Filter drains	Trenches infilled with stone/gravel providing attenuation, sedimentation and filtration.	Infiltration unlikely to be viable.	Unknown
Swales	Broad shallow channels that convey and store runoff and allow infiltration.	No known constraints to include on wider site area.	Yes
Bioretention systems / rain gardens	A shallow landscaped depression allowing runoff to pond temporarily on the surface.	No known constraints.	Yes
Permeable pavements	Runoff is allowed to soak into structural paving and stored potentially being allowed to infiltrate.	No known constraints.	Yes
Underground storage	Below ground storage which can be used to temporarily store storm water.	No known constraints.	Yes
Detention basins	A landscaped depression for attenuation with a restricted runoff.	No known constraints to include on wider site area.	Yes
Ponds and wetlands	A permanent pool of water which can be used for attenuation and controlled outflows by water levels.	No known constraints to include on wider site area.	Yes

Table 7.2 – Suitability of SuDS.

From Table 7.2, it can be seen that there are a number of SuDS which could be considered suitable for use at this site. It is therefore recommended that options to include SuDS are explored further to ensure that rain falling on site is managed appropriately and will not increase flood risk elsewhere.

8 Conclusions and Recommendations

The overarching objective of this report is to appraise the risk of flooding at Church Street, Higham in Kent to ensure that the proposals for development are acceptable and that any risk of flooding to the residents of the proposed dwelling is appropriately mitigated.

The proposals for development are located within Flood Zone 3 and therefore the Sequential Test and Exception Test should be applied. Application of the Sequential Test is outside the scope of this report, however, it is considered that as the proposals are for the conversion which cannot be located elsewhere, there is evidence to suggest that the Sequential Test can be passed. The main focus of this report is therefore demonstrating that Part B of the Exception Test can be passed.

The analysis has demonstrated that the risk of flooding to the development is *low* from all sources, with the exception of flooding from the sea. The site is protected from sea flooding by the existing defence infrastructure, even when an appropriate allowance for climate change is considered, and therefore the actual risk is *low*. It is only in the event that the Thames defences to the northwest of the site were to breach that the site could flood. Therefore, the following mitigation measures have been confirmed by the applicant and recommended to ensure the development is safe for its lifetime and the risk of flooding offsite does not increase as a result of the proposed development:

- **A 1200mm flood wall is proposed around the site.** The applicant has confirmed that a 1200mm high reinforced concrete wall will be erected around the proposed development, with gated entrances to the property to be fitted with flood defence gates/barriers. It should therefore be emphasized that the risk of flooding on site occurring from a breach in both the tidal flood defences and the flood wall on site simultaneously is considered be very low.
- **Flood resistance and resilience measures should be included on the ground floor of the existing building.** The proposed flood wall surrounding the development should protect the site during the extremely unlikely event of a tidal breach scenario, however in event this flood wall were to fail, flood resistance and resilience measures on the ground floor will ensure the risk of damage from floodwater is mitigated.
- **The residents of the dwellings should sign up to the EA's Flood Warning Service.** As the site could be flooded in the event of a breach in the Thames defences, the residents should sign up to receive the EA's Flood Warnings to ensure that they are aware of flooding in the wider area. If it is not possible to evacuate to an area outside the extent of flooding (which is only 100m away), residents will have access to the upper floors raised well over 600mm above the flood level.
- **Options to include SuDS should be explored where possible.** It has been demonstrated that there are a number of options for including SuDS, therefore these

should be explored where possible in order to manage surface water runoff on site is managed appropriately.

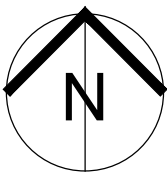
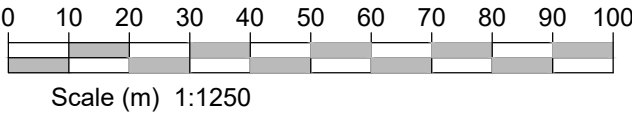
With the above mitigation measures incorporated into the design of the development, the proposals will pass Part B of the Exception Test and meet the requirements of the NPPF. The proposed development is therefore considered to be acceptable and sustainable in terms of flood risk

9 Appendices

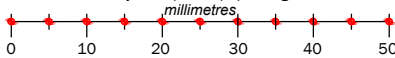
Appendix A.1 – Drawings

Appendix A.2 – Southern Water Asset Location Data

Appendix A.1 – Drawings



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Revisions

A Jan 24 drawing updated



Job title

Conversion
of
Giles Farm
Church Street
Higham

for

Network Hub

Drawing title

LOCATION PLAN

1

the
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partnership



Scale
1 : 1250

Date
Jan 2024

Drawn

pg

Job no

19.035

Dwg no

35

Rev

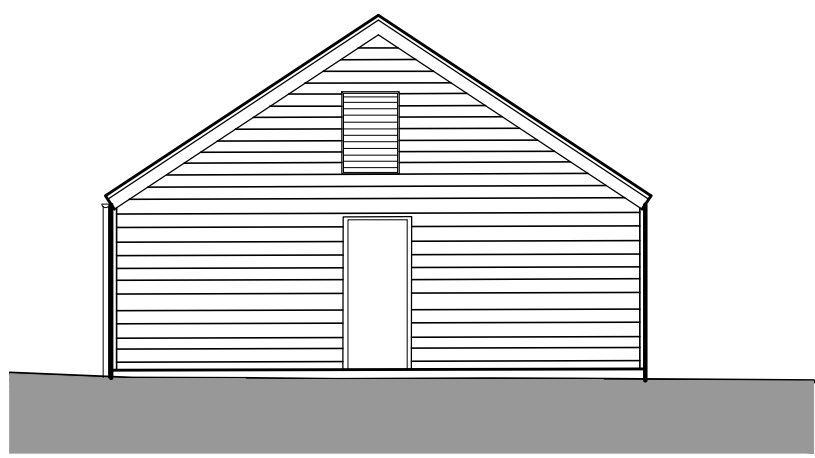
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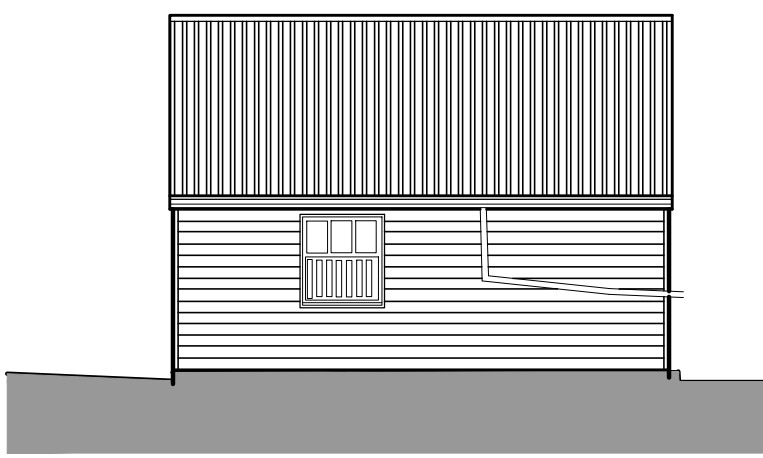
tel
01843 223488

email
margate@duncan-graham.co.uk
web
www.duncan-graham.co.uk

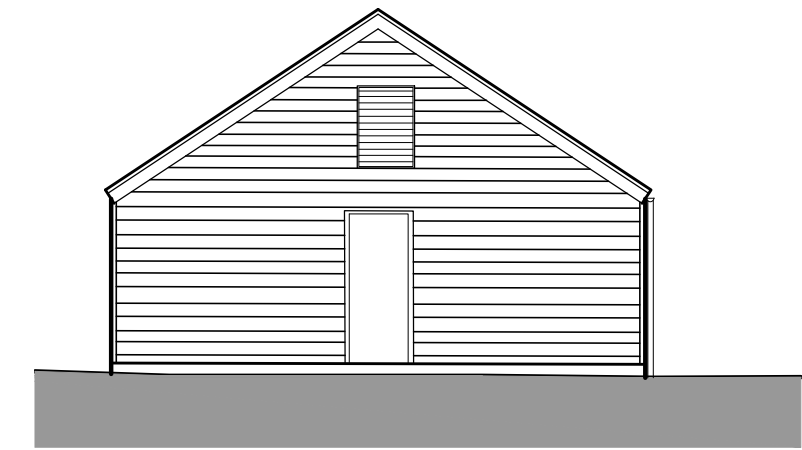
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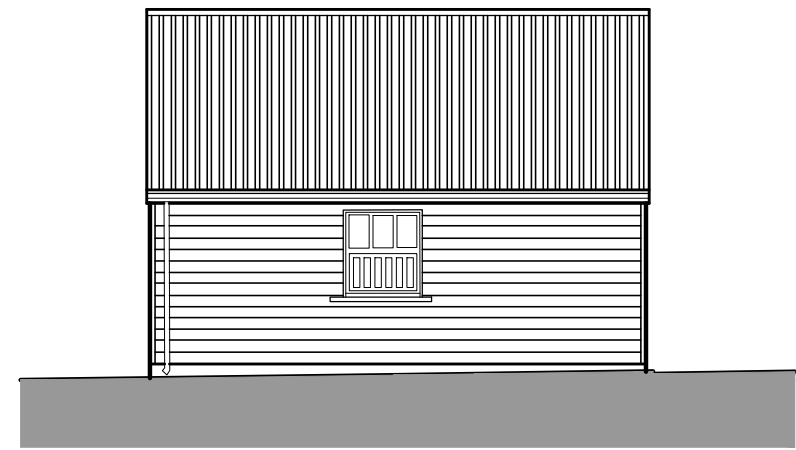
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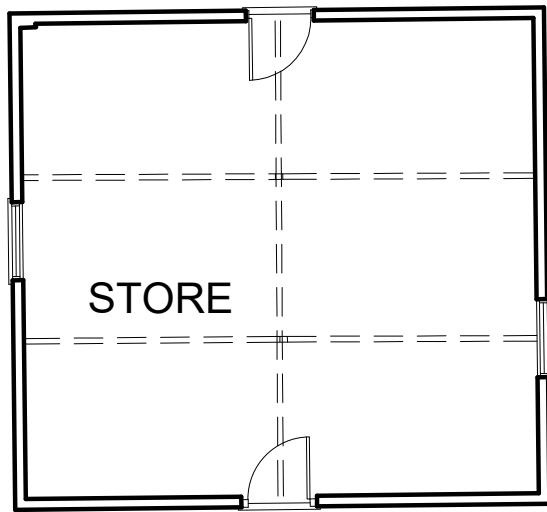
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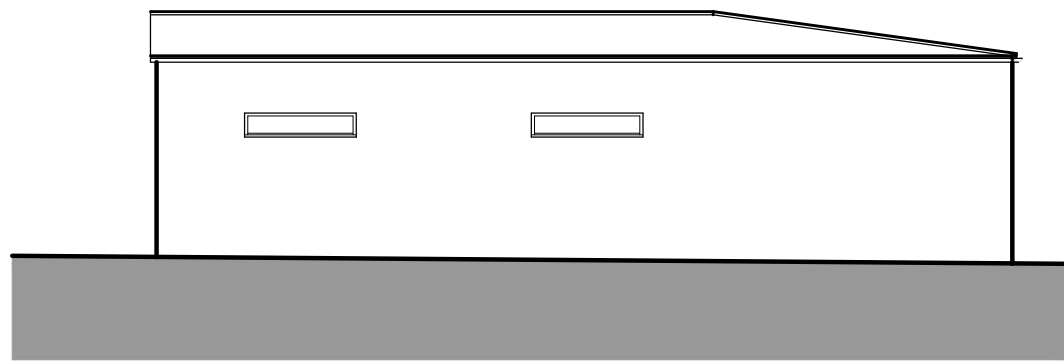
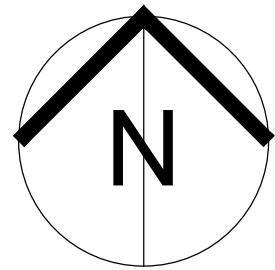
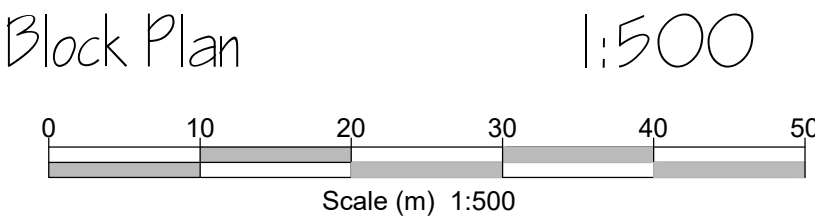
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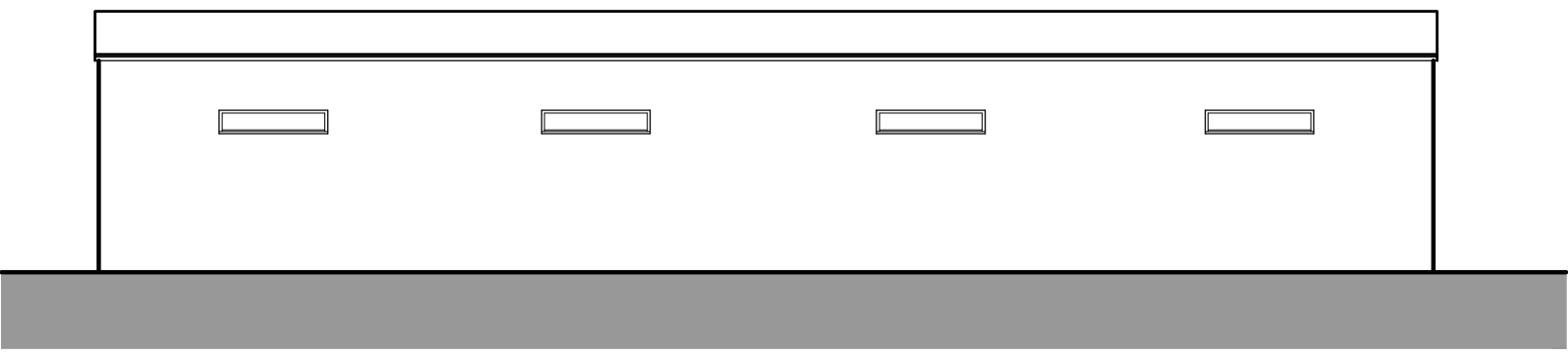
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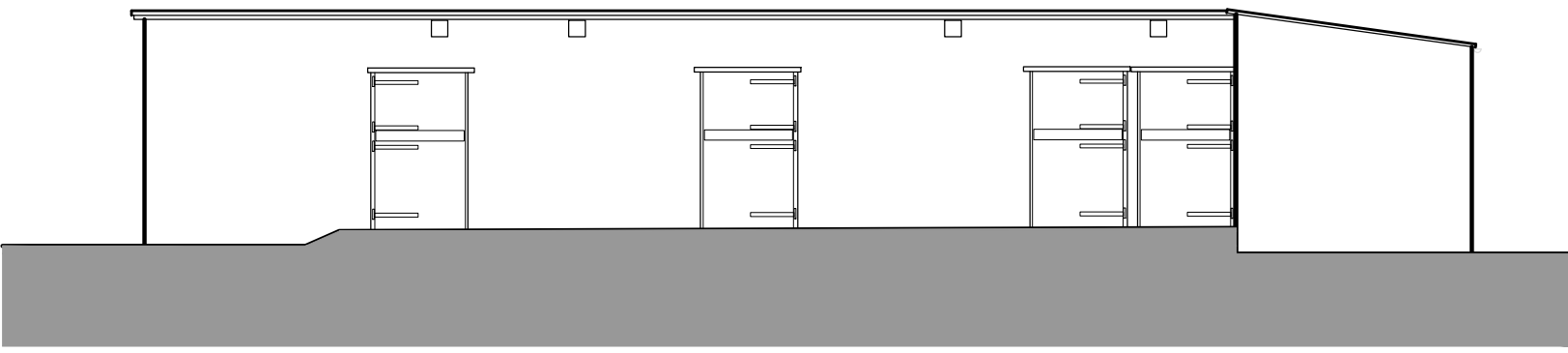
plan
Building 3



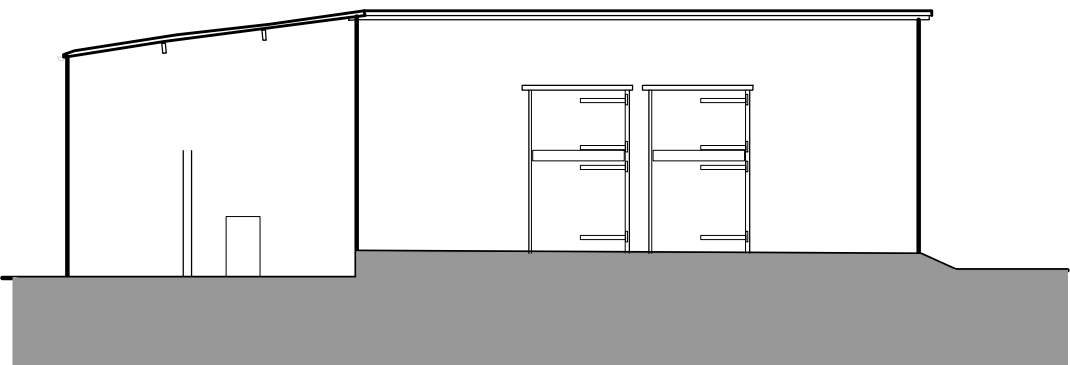
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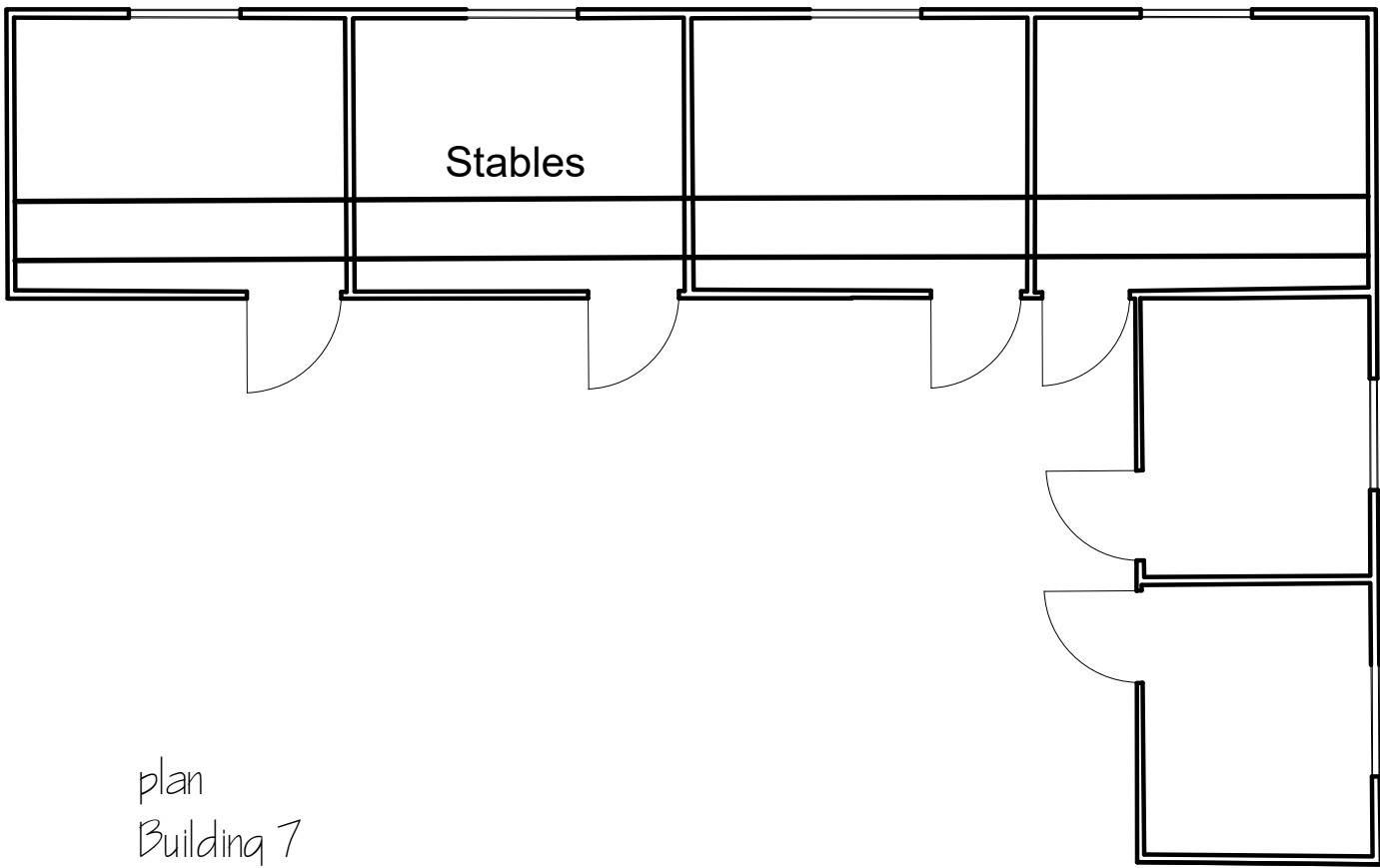
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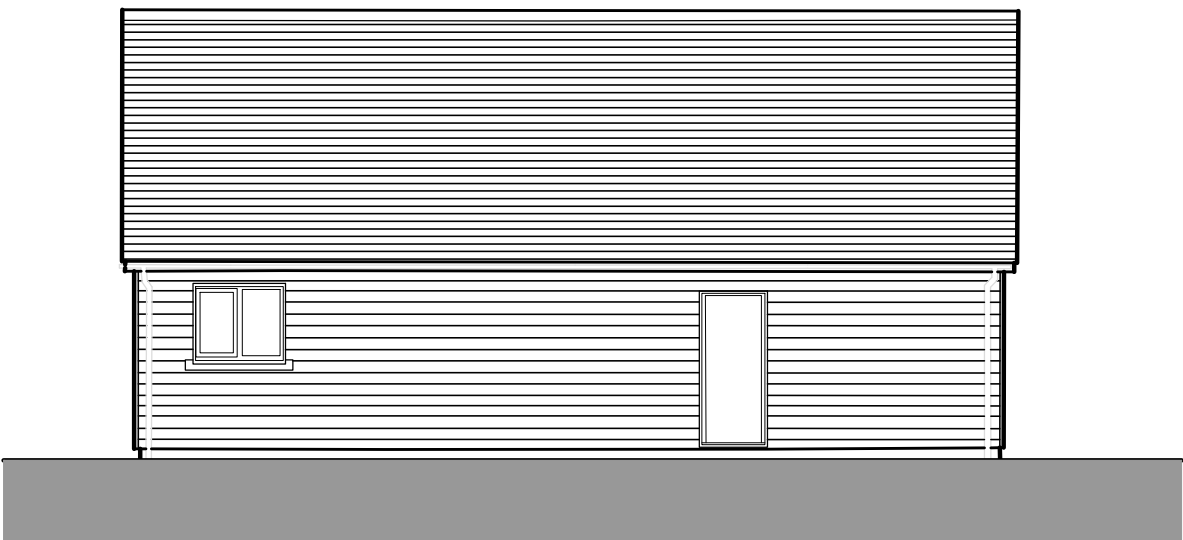
Building 7 front elevation



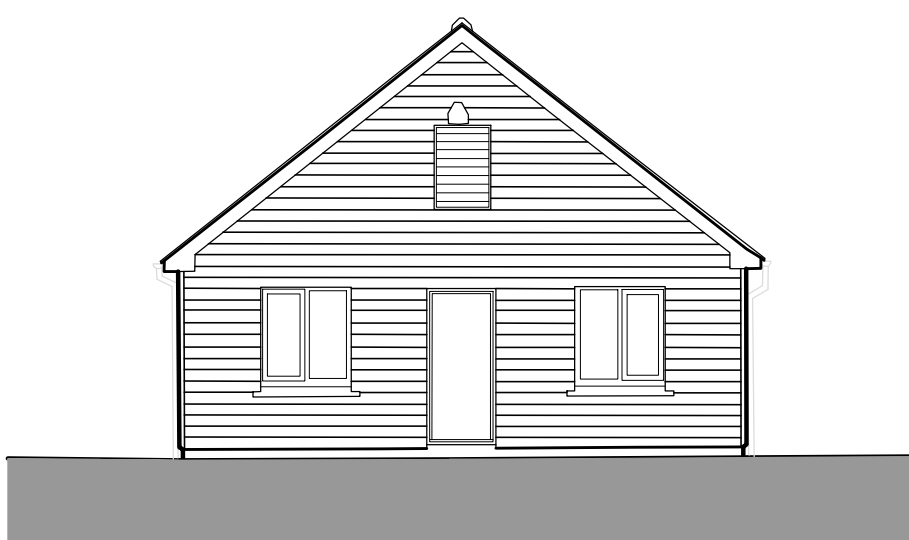
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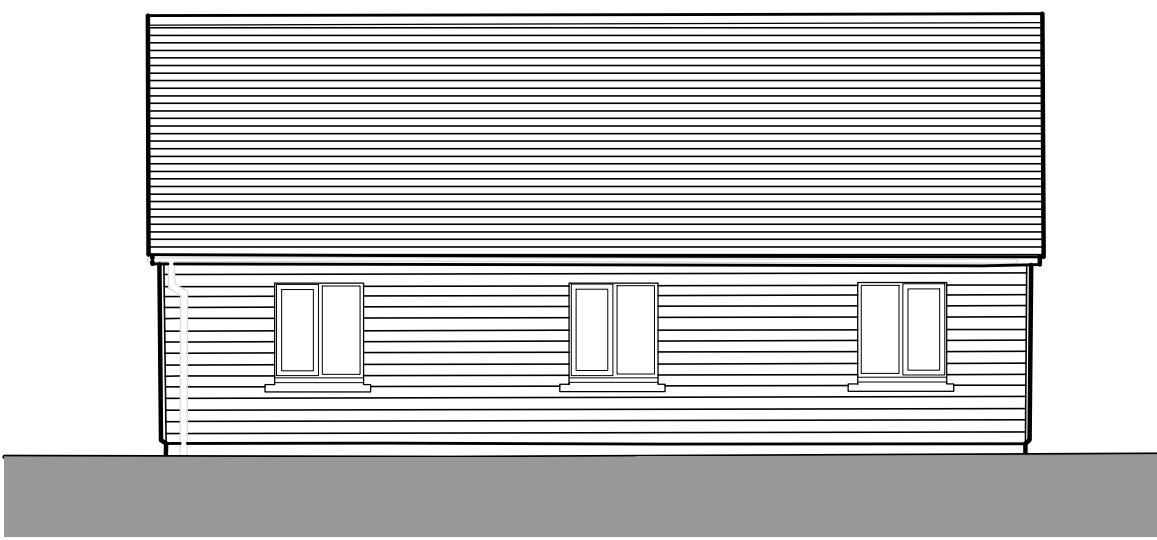
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Building 7



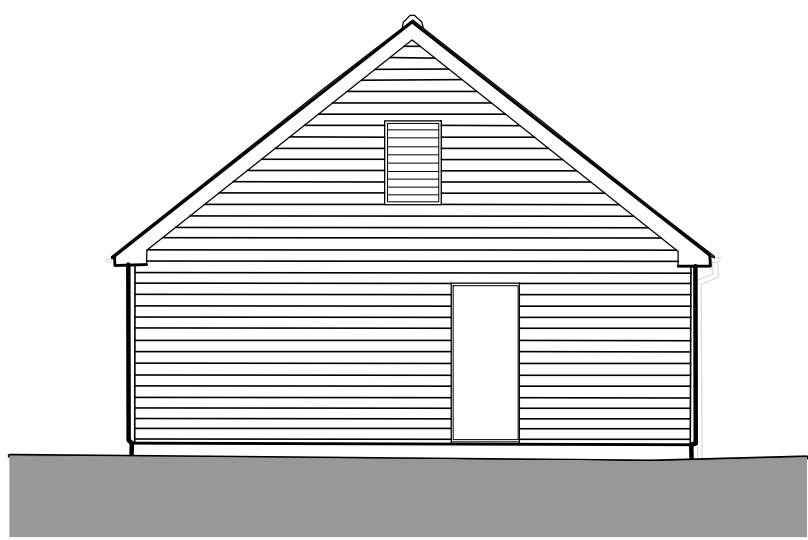
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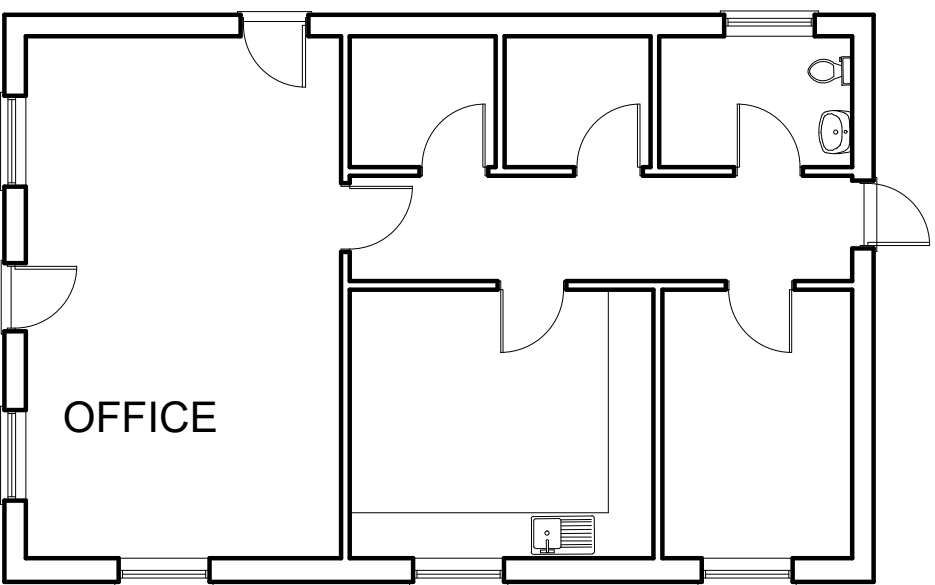
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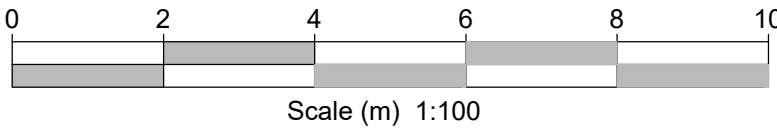
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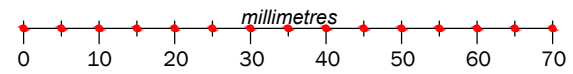
rear elevation



plan
Building 4



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Revisions

A Jan 24 existing details of building 3 added

Job title

Conversion
of
Giles Farm
Church Street
Higham
for
Network Hub

Drawing title

SURVEY DRAWING

floor plans & elevations
Buildings 3, 4 & 7

duncan+graham
partnership

chartered
architects

8 Cecil Square Margate Kent CT9 1BD

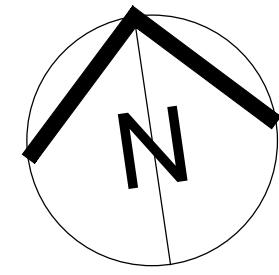
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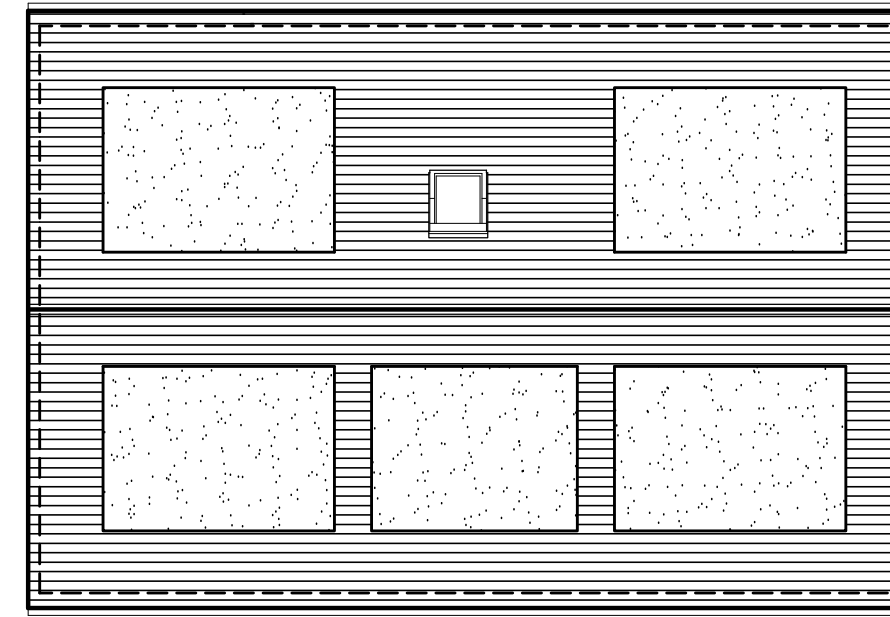
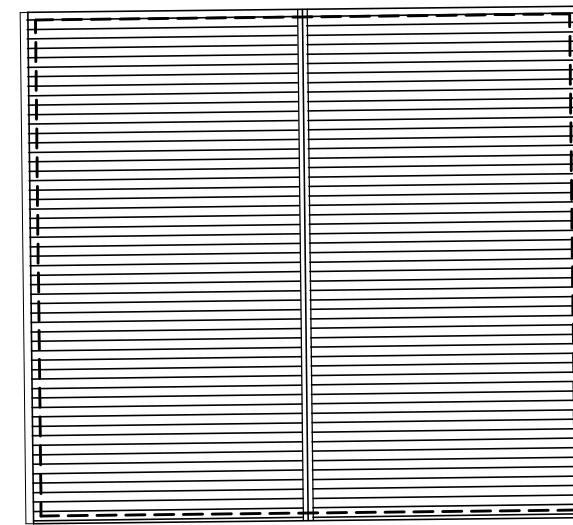
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Rev A

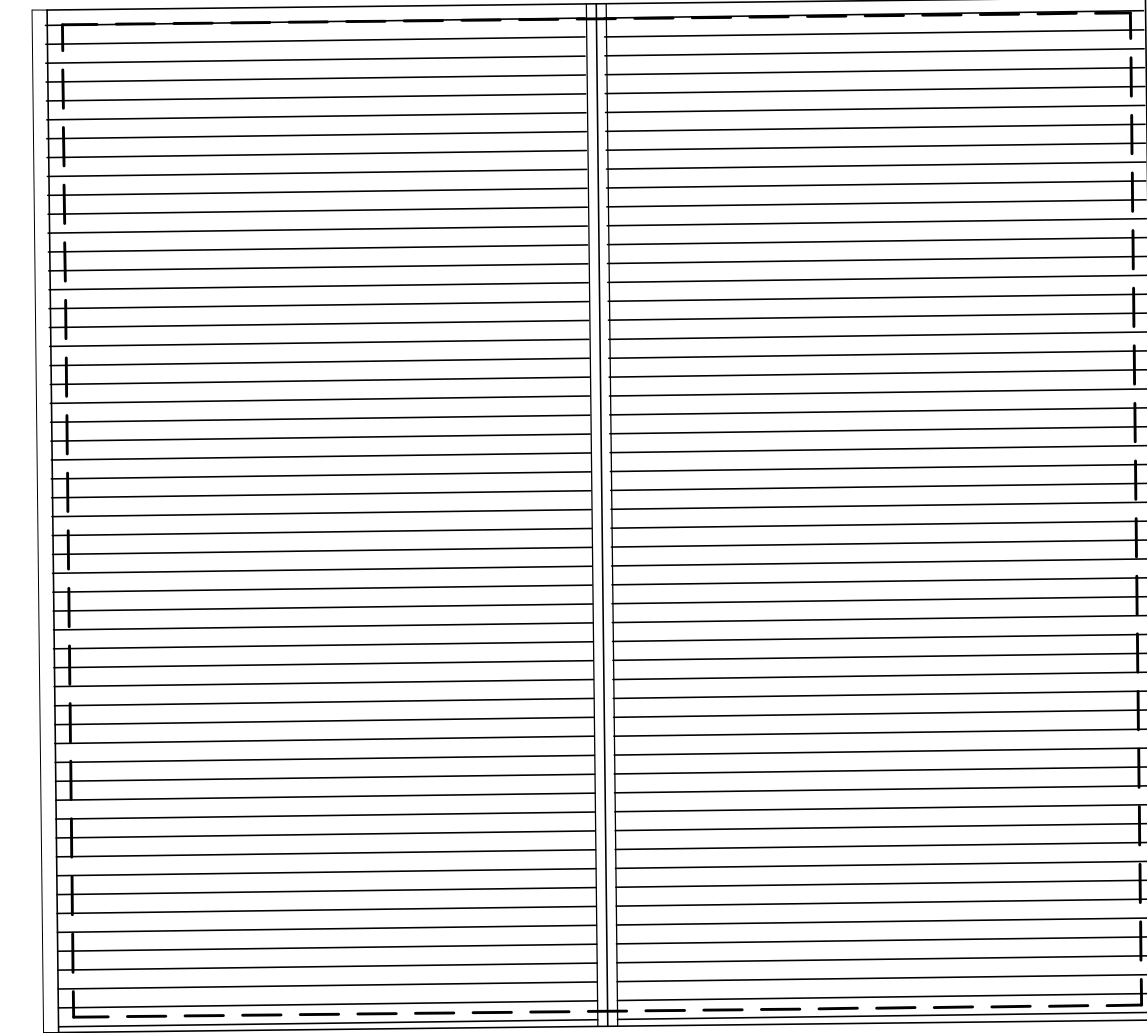
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Building 4 ground floor plan



roof plan 1:100



block plan 1:500

External Finishes

Walls
walls black stained timber cladding – existing cladding to be retained and repaired as necessary, all new and existing timber cladding to be black stained

Doors
doors to be changed to composite flood doors, solid bottom section, any glazing to be in the upper section only

Windows
All windows to be timber, double glazed, all black stained to match the cladding.

Soffit and Eaves
all to be s/w timber fascia, soffit, barge boards etc, and all black stained to match the existing.

Rainwater Goods
all fittings to be replaced with new, all to be black half round gutters 100mm and black 75mm diam down pipes, all fittings to be plastic or grp

Roof Coverings
existing slate roof to be retained unaltered
new roof to linking building between building 3&4 to be finished with natural slates to match the adjoining roofs

Flood Risk Improvements
walls – lower section of existing walls to be wrapped in damp proof membrane for a height of 1.2m from finished floor level, and then new timber cladding refixed.

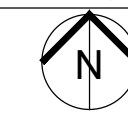
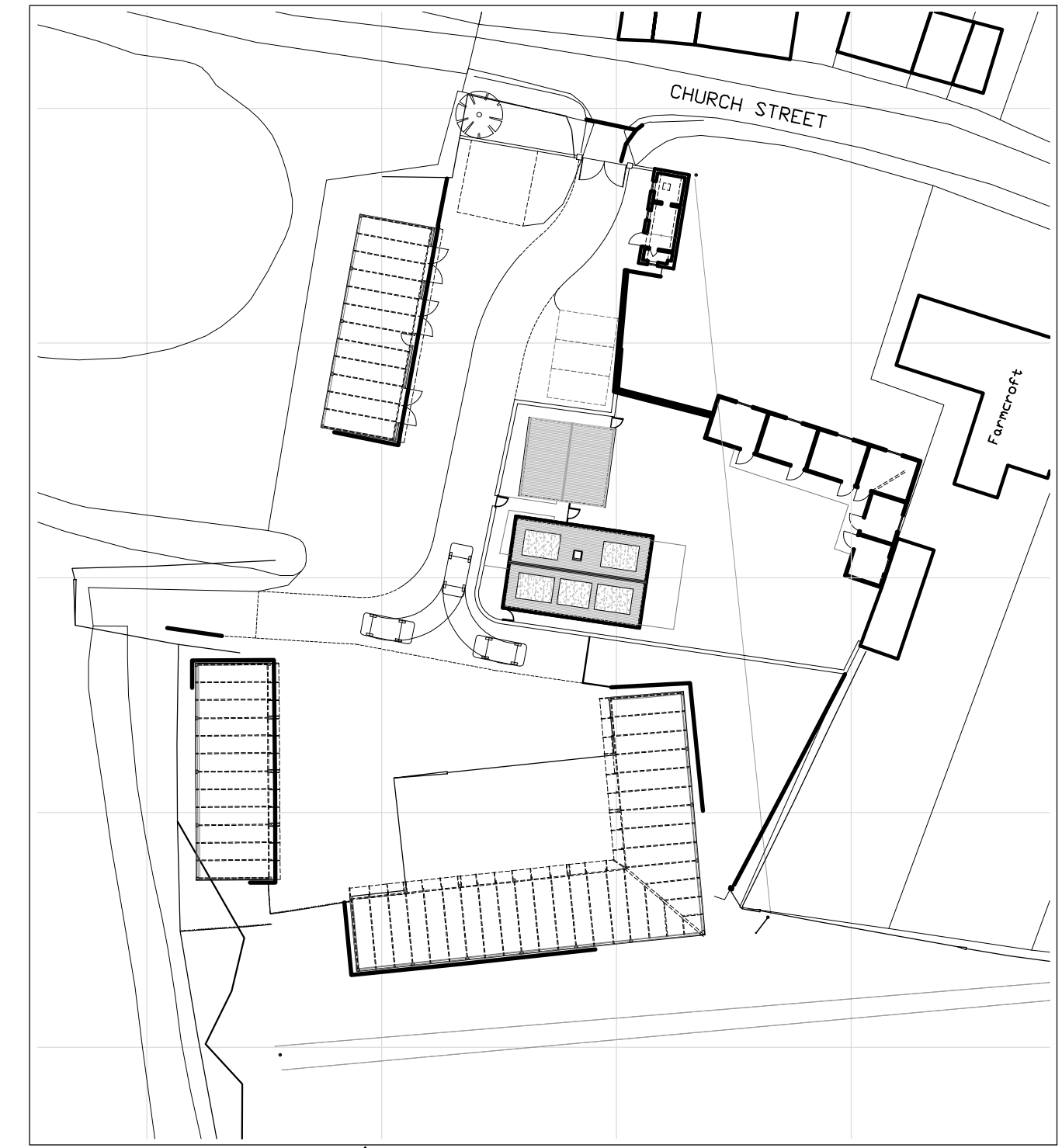
Air bricks – all existing and any new floor vents to be changed to flood resistant units with non-return flaps on the units to prevent the ingress of water if the site floods.

drainage – all underground drainage pipes leaving the building to be fitted with non return valves

external doors – to be composite flood defence doors.

Bund to the site – erect a new 1200mm high reinforced concrete wall around the site and garden land as indicated, with timber cladding to both sides to soften appearance. Gated entrance to property to be fitted with a flood defence gate/barrier

Services – all internal services to be relocated to come down from first floor level, with all consumer units and fuses at high level.



Scale (m) 1:500

Scale (m) 1:50

Scale (m) 1:50

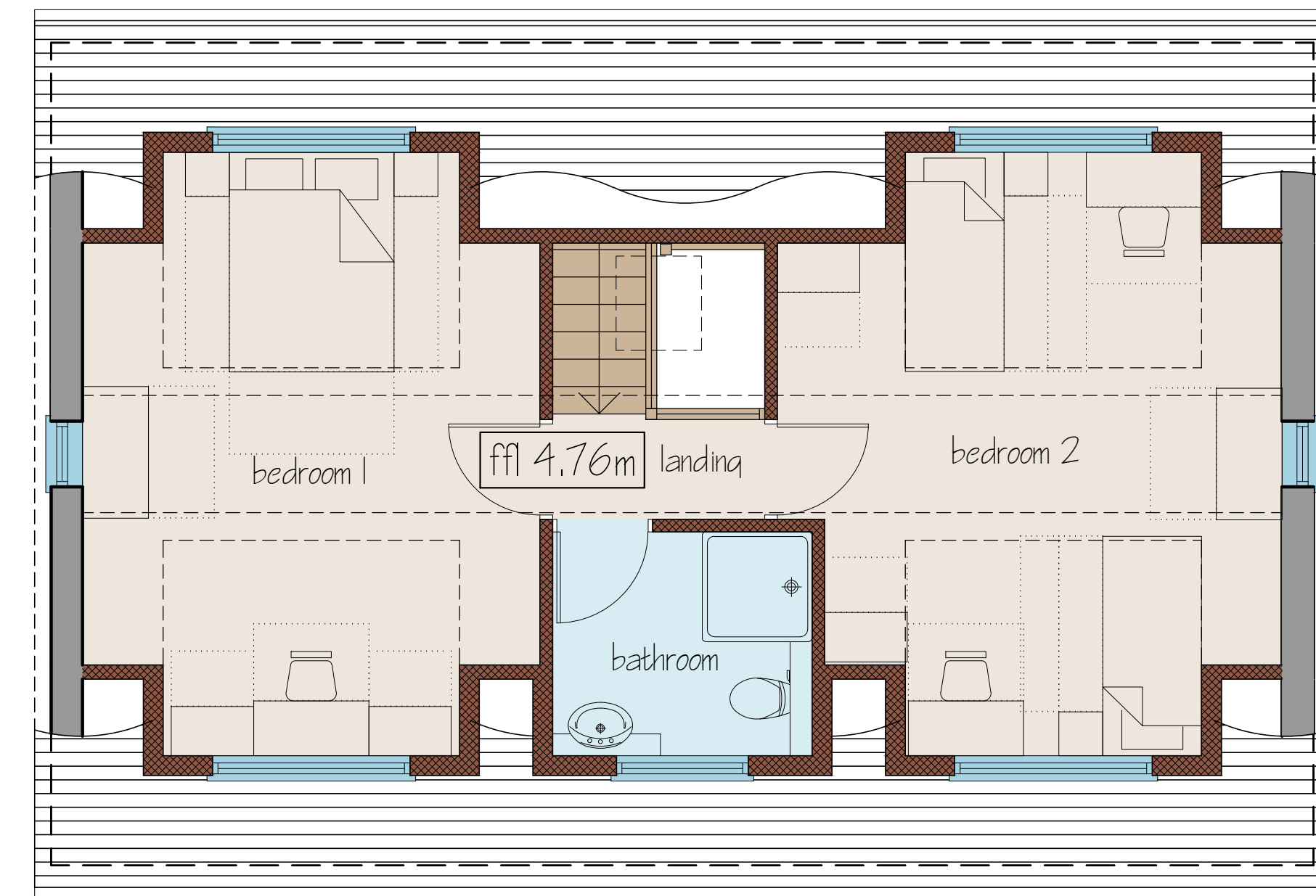
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Revisions



first floor plan

Job title

Conversion of

Giles Farm

Church Street

Higham

for

Giles Farm Limited

Drawing title

PROPOSED SCHEME

floor plans & block plan

building 4 & 3

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Scale 1 : 50

Date Jan 2024

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Job no 19.035

Dwg no 37

Rev 1

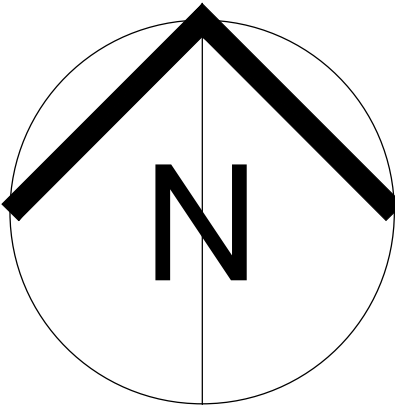
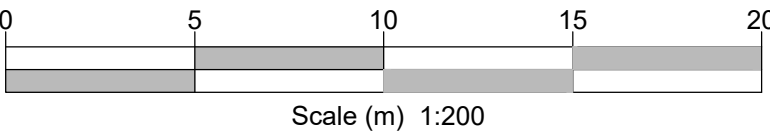
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External Finishes

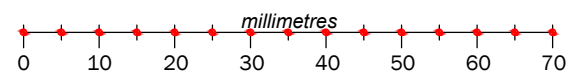
Garden areas
to be laid to grass using a meadow/rough grass mix to maintain the rural setting of the area

Parking areas and Circulation areas
to be finished a permeable surface finish to allow natural drainage of the surface water, finish to be agreed and edged with timber sleepers installed flush with the ground levels.

Fences
bund wall around the plot to be 1200mm high reinforced concrete wall, clad both sides with blocks stained feather edge timber boarding to soften appearance.
gated entrance to plot to have a flood defence gate or removable flood barrier across opening

overall site wide boundaries to be maintained as existing and repaired as required.

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Revisions
A Jan 24 client revisions

Job title

Conversion
of
Giles Farm
Church Street
Higham
for
Network Hub

Drawing title
PROPOSED SCHEME

site plan

Yew Trees

Seathwaite

the duncan+graham partnership



chartered architects

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email margate@duncan-graham.co.uk

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Scale
1 : 200

Date
Jan 2024

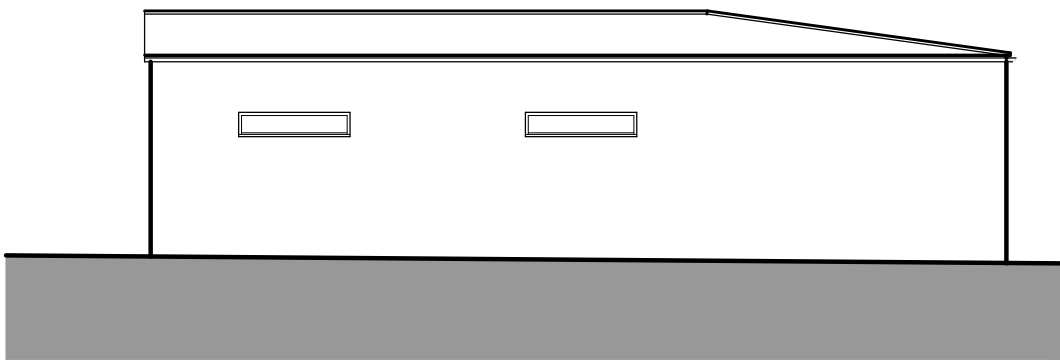
Drawn
PG

Job no
19.035

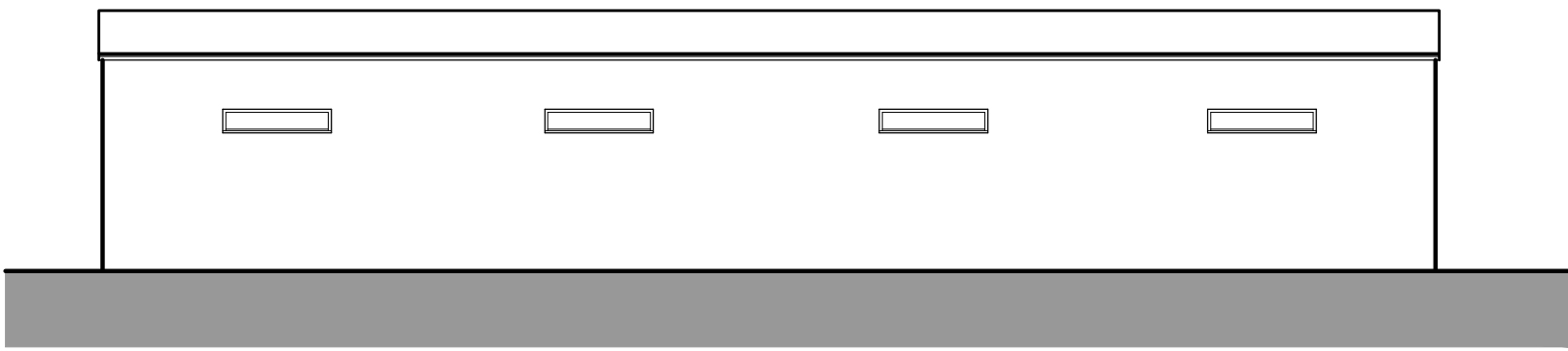
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Rev
A

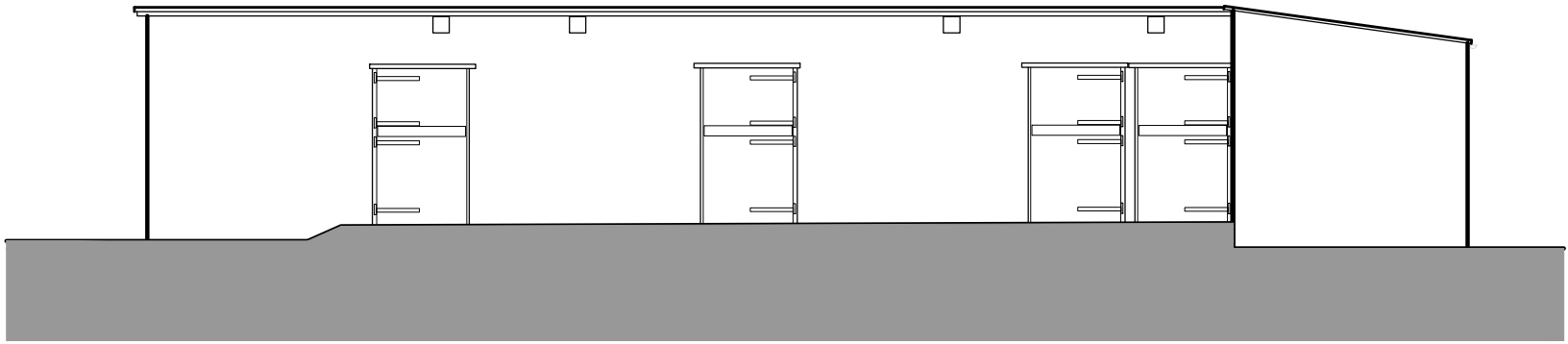
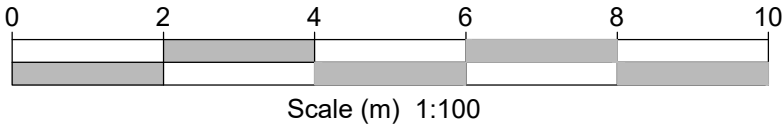
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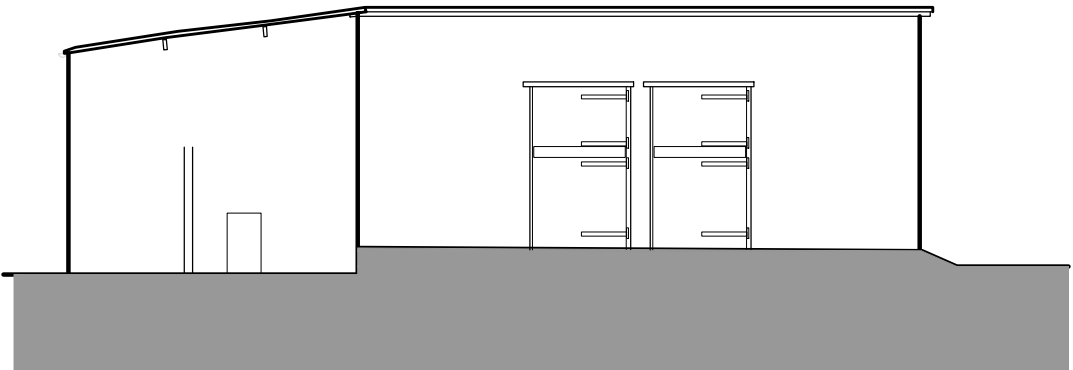
side elevation



rear elevation

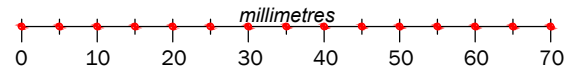


Building 7 front elevation



side elevation

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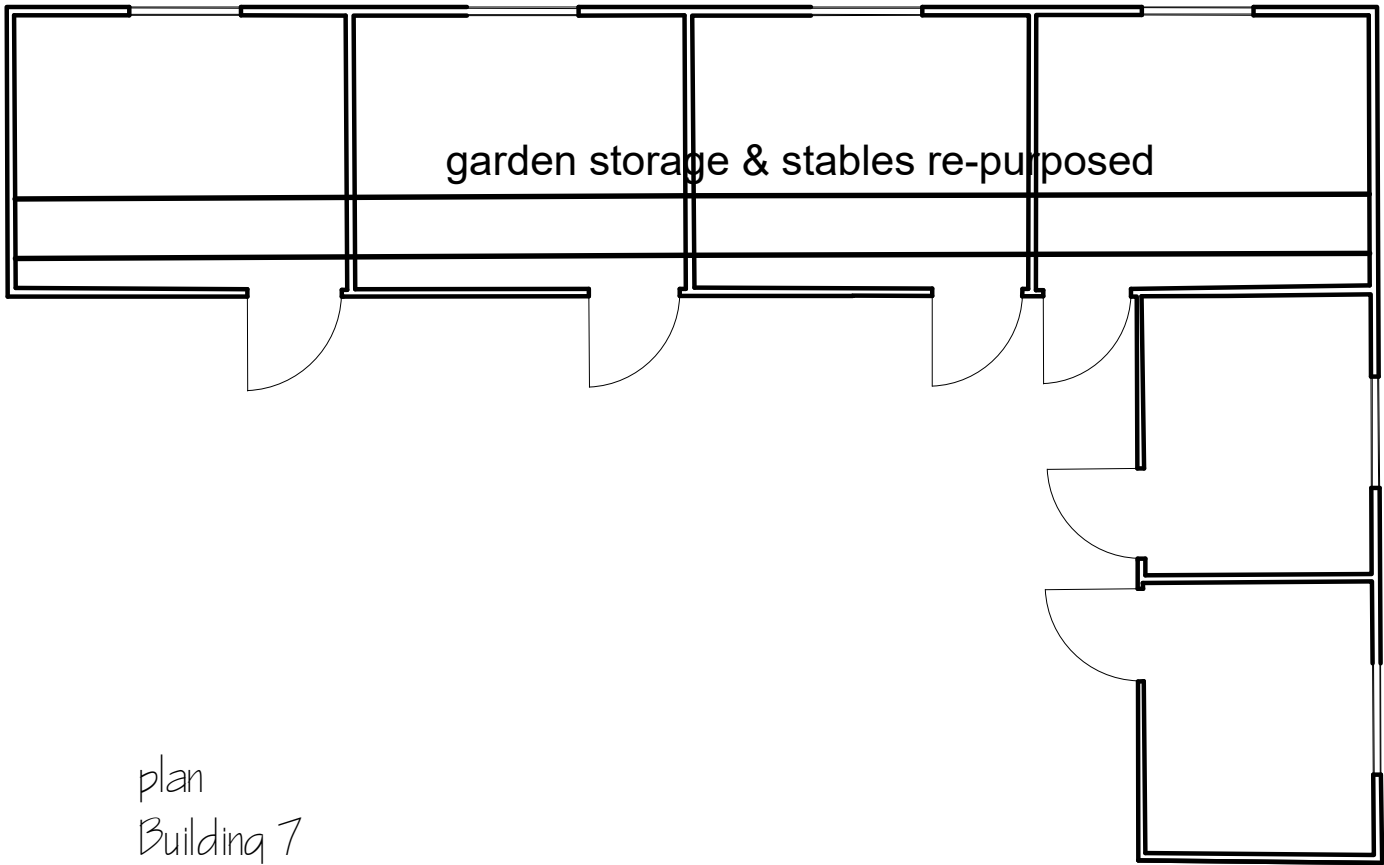


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Revisions

A Jan 24 details of building 3 added



plan Building 7

Job title

Conversion
of
Giles Farm
Church Street
Higham

for

Network Hub

Drawing title

PROPOSED SCHEME

floor plans & elevations
Buildings 3 & 7

the duncan+graham partnership



Scale

1 : 100

Date

Jan 2024

Drawn

pg

Job no

19.035

Dwg no

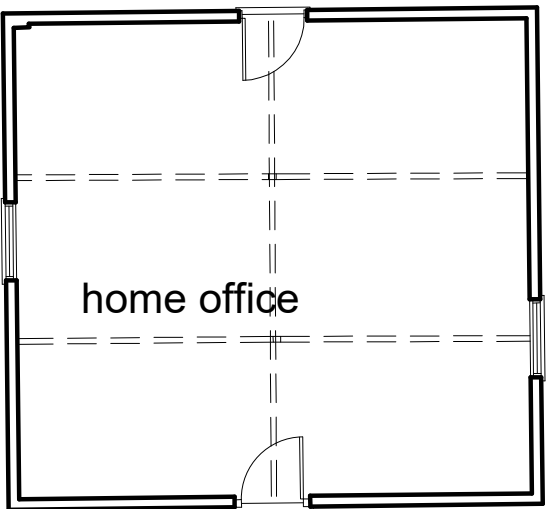
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Rev

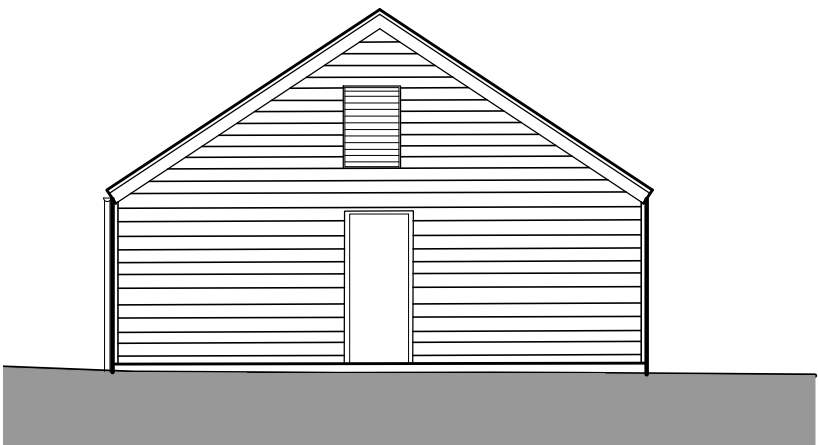
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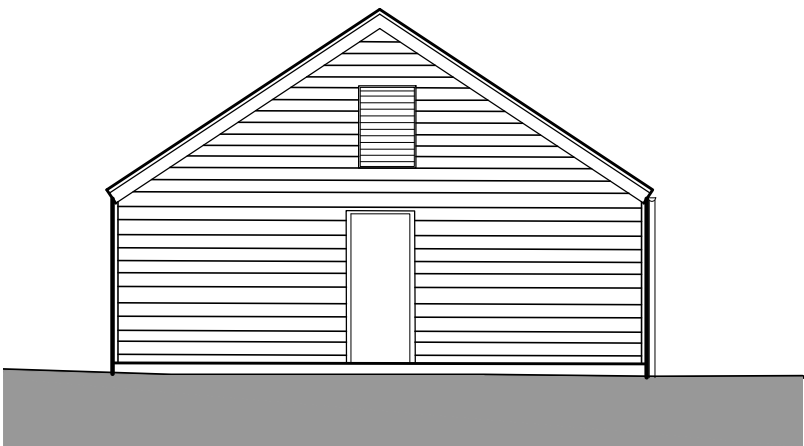
NO CHANGES ARE
PROPOSED TO THE
BUILDINGS EXTERNALLY



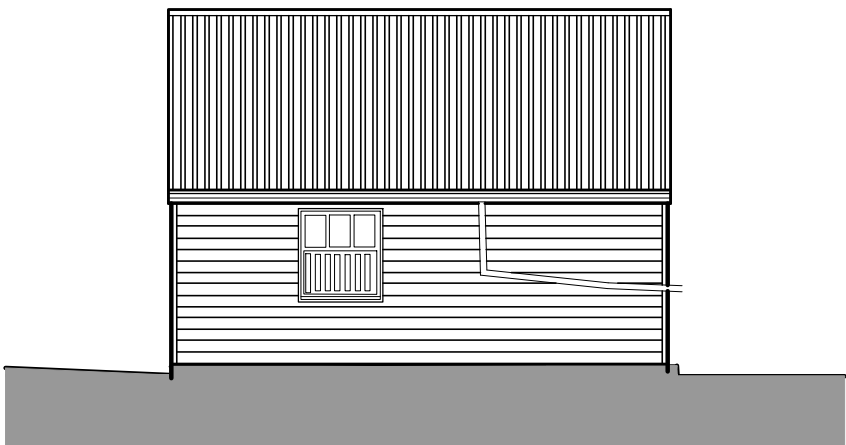
plan Building 3



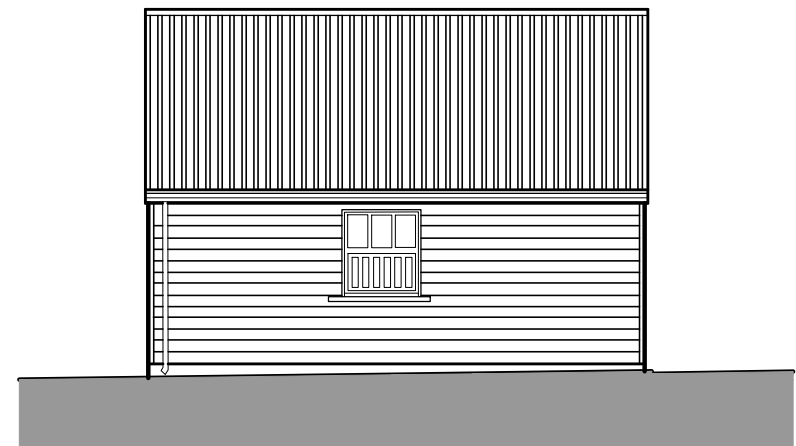
rear elevation



Building 3 front elevation

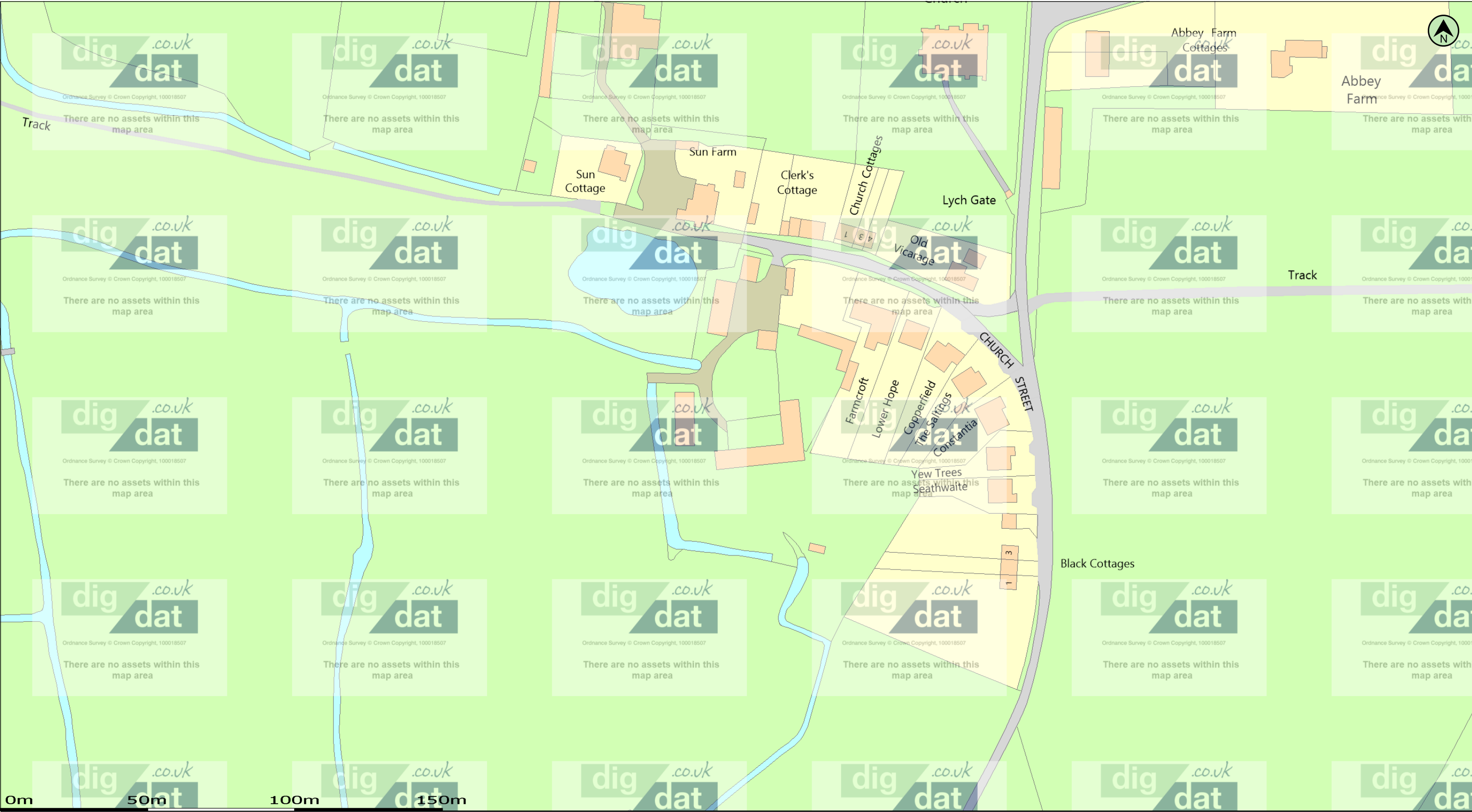


side elevation



side elevation

Appendix A.2 – Southern Water Asset Location Data

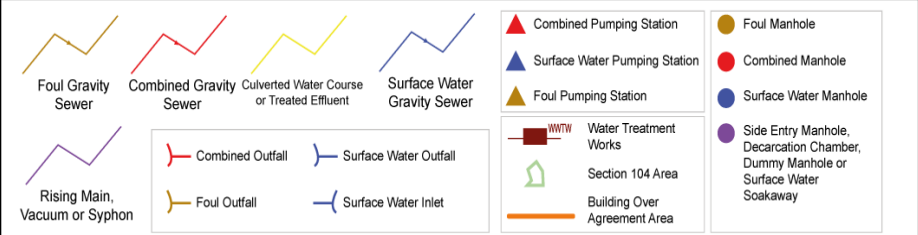


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The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2020 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



flood@herringtonconsulting.co.uk

2772 - Church Street



