50 North Road, Kirkburton, Huddersfield, West Yorkshire, HD8 0RW

Flood Risk Assessment

For GoGri Group Ltd

KRS.0785.001.R.001.B

June 2024

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Project	Flood Risk Assessment
Client	CoGri Group Ltd
Status	Final
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EXECUTIVE SUMMARY

The Site would be expected to remain dry in all but the most extreme conditions. The consequences of flooding are acceptable, and the development would be in accordance with the requirements of the National Planning Policy Framework (NPPF). The Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF.

The Proposed Development should not therefore be precluded on the grounds of flood risk or drainage.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by KRS Enviro at the request of CoGri Group Ltd to support a planning application for the demotion of a workshop/garage, construction of a three-storey office building and the formation of parking including the creation of a new Site entrance ("the Proposed Development") at 50 North Road, Kirkburton, Huddersfield, West Yorkshire, HD8 0RW ("the Site").

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)[1], associated Planning Practice Guidance on flood risk and coastal change[2] (PPG) and the PPG 'Site-specific flood risk assessment checklist. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a Proposed Development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

The report findings are based upon professional judgement and are summarised below with detailed recommendations provided at the end of the report. The report includes rainfall data

[1] Ministry for Housing, Communities and Local Government (2023) National Planning Policy Framework: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf
[2] Communities and Local Government (2022) Planning Practice Guidance - Flood Risk and Coastal Change: https://www.gov.uk/guidance/flood-risk-and-coastal-change

from the Flood Estimation Handbook (FEH) and hydrogeological information from the British Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location and the existing and Proposed Development;
- Section 3 outlines the flood risk to the existing and Proposed Development;
- Section 4 details the proposed surface water drainage for the Site and assesses the potential impacts of the Proposed Development on surface water drainage;
- Section 5 outlines the mitigation measures used to reduce the overall level of flood risk;
- Section 6 details the Sequential and Exception Tests; and
- Section 7 presents a summary and conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located at 50 North Road, Kirkburton, Huddersfield, West Yorkshire, HD8 0RW (see Figure 1).

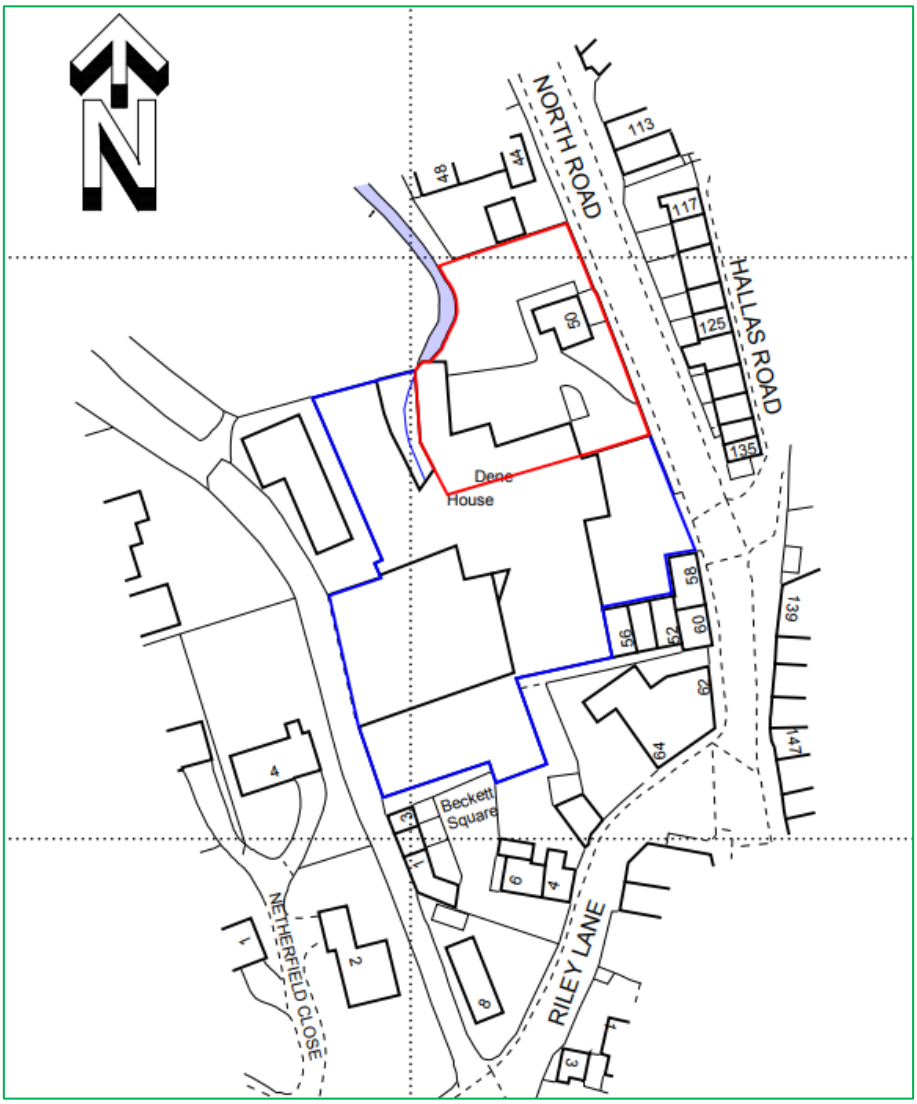


Figure 1 - Site Location

2.2 Existing Development

The existing Site consists of a detached dwelling and a range of buildings associated with a former funeral service business (see Appendix 1).

2.3 Proposed Development

It is understood the Proposed Development is for the demotion of a workshop/garage building, the construction of a three-storey office building and the formation of parking including the creation of a new Site entrance (see Appendix 1). Further details with regard to the Proposed

Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

A topographical survey has recently been undertaken (see Appendix 2). The survey shows a maximum ground level of 122.86 metres Above Ordnance Datum (mAOD) to the south and a minimum ground level of 119.25mAOD to the south west of the Site,

2.5 Catchment Hydrology

Dean Bottom Dike is located adjacent to the western boundary of the Site and is culverted beneath the buildings to the south west of the Site. Dean Bottom Dike becomes culverted approximately 115m to the south of the Site at Riley Lane. There is a unnamed watercourse located approximately 75m to the south east of the Site and Thunder Bridge Dike is located approximately 780m to the west of the Site.

2.6 Ground Conditions

The British Geological Survey (BGS) map[3] shows that no superficial deposits underlay the Site. The bedrock deposits consist of the Pennine Lower Coal Measures Formation – mudstone, siltstone and sandstone. Information from the National Soil Resources Institute[4] details the Site area as being situated on freely drainage slightly acid loamy soils.

[3] https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.14476159.932338379.1655890995-1831306757.1655472887
[4] http://www.landis.org.uk/soilscapes/

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Environment Agency

Information regarding the current flood risk at the application Site and local flood defences has been obtained from the Environment Agency.

3.3 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance[5].

The flood risk assessments: climate change allowances guidance recommends that for 'more vulnerable' that the central allowances are used to assess climate change throughout the lifetime of the development. Table 1 shows the peak river flow allowances by river catchment therefore, the fluvial design event for the Site is the 1 in 100 year (+23%) event.

Table 1 - Peak River Flow Allowances by River Catchment

River Catchment	Allowance Category	2020s	2050s	2080s
Aire & Calder Management Catchment	Upper	+24%	+31%	+51%
	Higher	+15%	+18%	+31%
	Central	+11%	+13%	+23%

3.4 Environment Agency Flood Zones

A review of the Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 1 and therefore has a 'low probability' of flooding with less than a 1 in 1000 annual probability of river flooding in any year (<0.1%). However, a small area of the Site, approximately 5%, along the western boundary, is located within Flood Zone 3 and therefore has a 'high probability' of flooding, as shown in Figure 2. Flood Zone 3 has a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The Site should not be designated as Flood Zone 3b 'Functional Floodplain'. The definition of Flood Zone 3b 'Functional Floodplain' as per the PPG is: "*This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:*

- *land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or*

[5] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances

- *land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).*

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency."

The Site does not comprise land where water has to flow or be stored in times of flood. The Site does not perform a water conveyance flood route or a flood storage area. The Site does not provide a function of flood conveyance (i.e. free flow) or flood storage, either through natural processes, or by design (e.g. washlands and flood storage areas). The Site is already developed therefore, the Site is located within Flood Zone 3a.

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst case scenario. The Environment Agency Flood Zones and acceptable development types are explained in Table 2. Table 2 shows that some development types are generally acceptable in Flood Zone 1 and 3a.

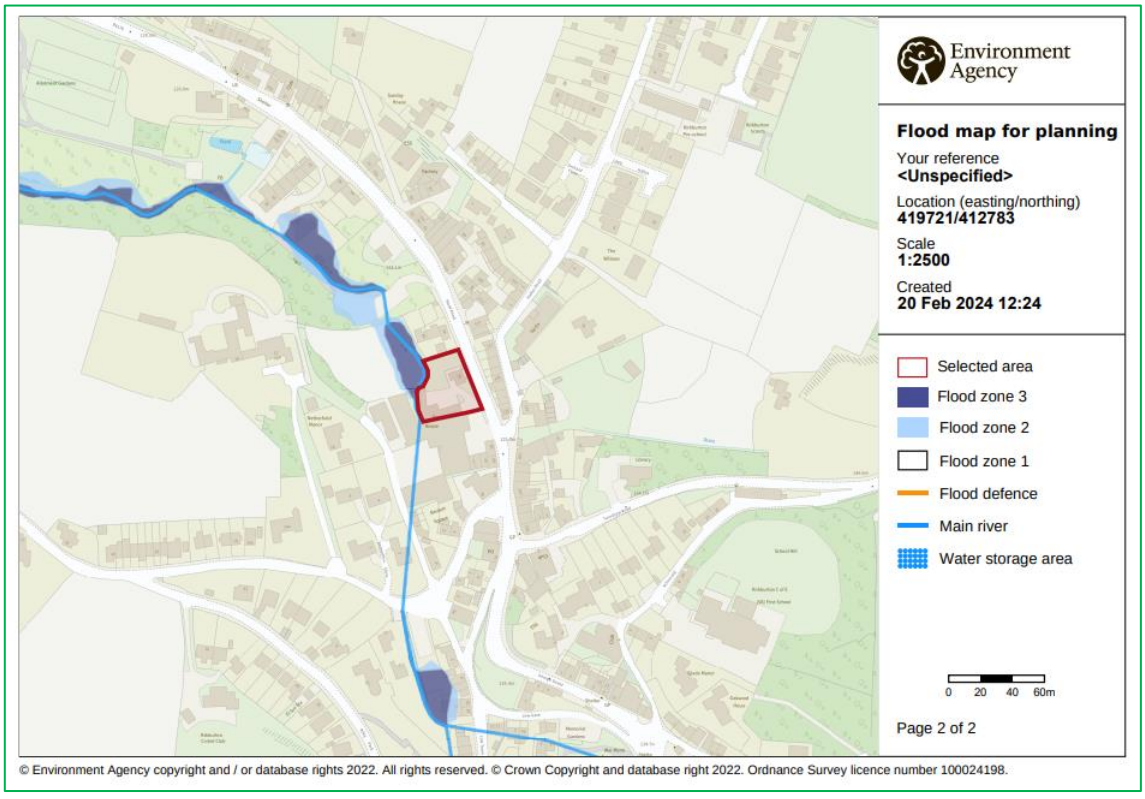


Figure 2 - Environment Agency Flood Zones

Table 2 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	Some development types not acceptable

3.5 Flood Vulnerability

In the PPG, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the existing and proposed use is classified as 'more vulnerable' (residential) and 'less vulnerable' (commercial). The Proposed Development will not introduce a new 'more vulnerable' development into the floodplain. The 'more vulnerable' residential use is located wholly within Flood Zone 1.

Table 3 of this report and the PPG state that 'more vulnerable' and 'less vulnerable' uses are appropriate within Flood Zones 1 and 3a after the completion of a satisfactory FRA.

Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	×	×	×

Key: *✓: Development is appropriate, ×: Development should not be permitted.*

3.6 Historic Flooding

The Environment Agency data shows that the Site has not historically flooded (see Figure 3). However, it is understood that areas within the vicinity of the Site may have suffered from flooding during the December 2015 flood event.

Kirklees Council as the Lead Local Flood Authority (LLFA) has confirmed the following *"Cellar Flooding has been recorded recently to no.50...."* It is understood that this flooding was due to water ingress via a coal chute from North Road, the coal chute is located adjacent to a blocked road gully which was the source of the floodwater. The coal chute will be closed off and the lower ground floor will be tanked.

The LLFA has confirmed the following *"Flooding has been recorded previously to Dene House (formerly Dene Works)."* It is understood that this flooding occurred due to poor maintenance of the culvert trash screen, by Kirklees Council, within the vicinity of the Site. The Client has been maintaining the culvert trash screen recently, since which, flooding has not occurred.

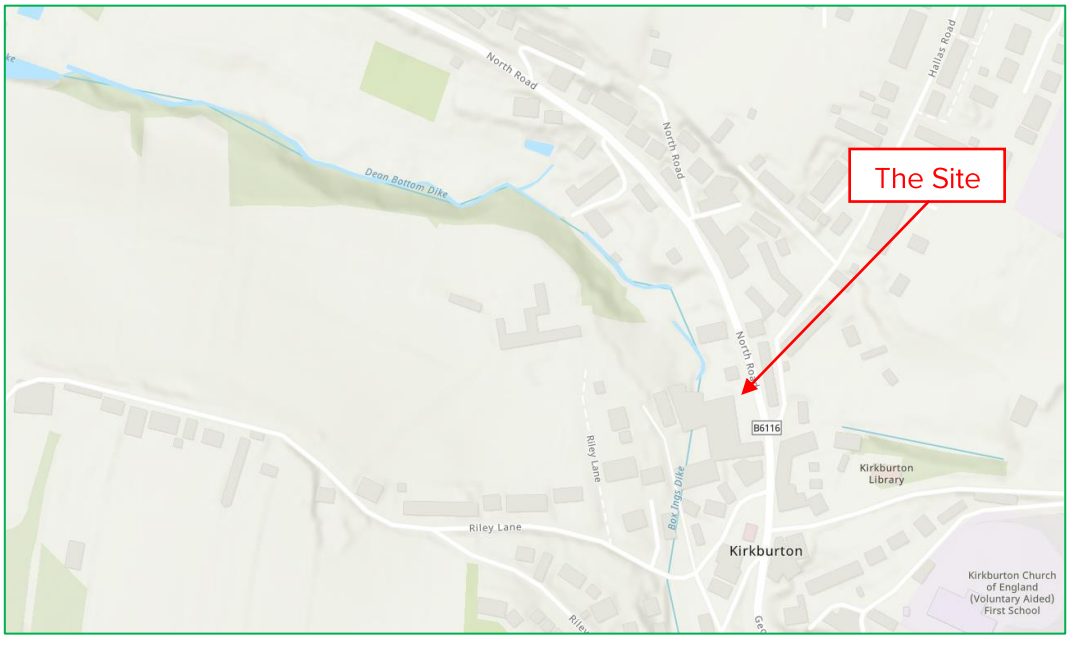


Figure 3 - Environment Agency Historic Flood Map

3.7 Existing and Planned Flood Defence Measures

The Environment Agency data confirms that the Site is protected against flooding by existing flood defence measures. These are privately maintained defences and provide a Standard of Protection (SoP) of 1 in 20 years.

Table 4 - Flood Defences

Asset ID	Asset Maintainer	Type	Length (m)	Target Condition	Overall Condition	Design SoP
145775	Private	High Ground	31.43	3	3	20
145776	Private	High Ground	21.39	3	2	20
145585	Private	High Ground	312.83	3	3	20
145586	Private	High Ground	66.21	3	2	20
145587	Private	High Ground	29.63	3	3	20
145588	Private	High Ground	47.66	3	3	20
145774	Private	High Ground	17.40	3	2	20

3.8 Fluvial (River) Flooding

The Dean Bottom Dike is located adjacent to the western boundary of the Site, therefore fluvial flooding poses the primary flood risk to the Site. Table 5 show the Environment Agency's in channel modelled water levels and flows. The existing modelled water level and flow data has been used to construct a stage-discharge rating curve, from which a rating equation has been used to calculate the water levels for the climate change allowances for node 886 (see Figure 4).

The modelled water levels from node 886 have been compared to the ground levels of the Site and areas within the vicinity of the Site to assess the flood risk in detail therefore, this assessment of fluvial flood risk is a conservative estimate.

Water levels have been modelled at 116.36mAOD and 116.53mAOD during the 1 in 100 year (+50%) and 1 in 1000 year events, respectively. The approximate minimum Site ground level is 119.25mAOD therefore, the Site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+50%) and 1 in 1000 year events. The Site will be flood free during the 1 in 100 year (+50%) and 1 in 1000 year events and therefore, the design event for the Site which is the 1 in 100 year (+23%) event.

Table 5 - Environment Agency Modelled Water Levels and Flows

Node Reference	Location	Return Period (yrs)								
		10	25	50	75	100	100 +20%	100 +30%	100 +50%	1000
886	Water Level (mAOD)	115.58	115.72	115.84	115.91	115.97	116.18	116.20	116.36	116.53
	Flow (m^3/s)	2.00	2.50	3.00	3.30	3.60	4.60	4.68	5.40	4.60

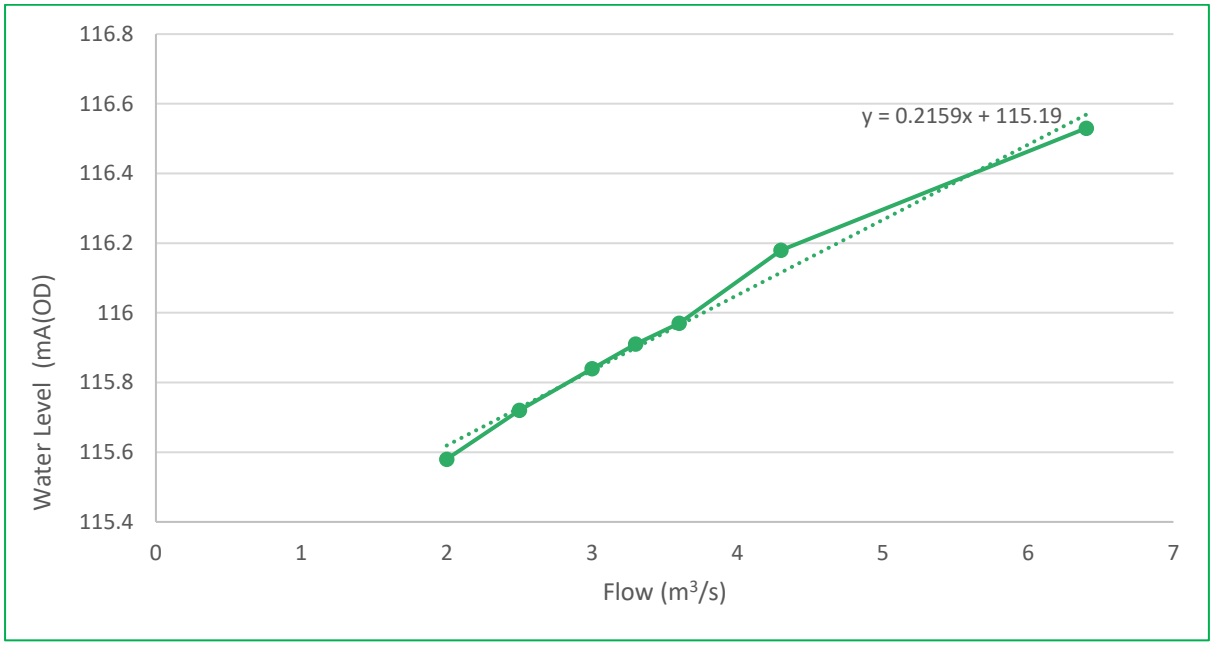


Figure 4 - Rating Curve

Flood risk to the Site from the Dean Bottom Dike can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow directly to the north rather than flowing towards the Site. The flood risk can also be considered to be limited due to the difference in elevations. The ground levels of the Site are located a minimum of 5.00m above the normal water level of the Dean Bottom Dike.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of low significance.

Therefore, the risk of fluvial flooding is considered to be of low significance. The risk of fluvial flooding will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 5.0).

3.9 Tidal (Coastal) Flooding

The Site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be not significant.

3.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding. The risk of flooding from groundwater flooding is considered to be not significant.

3.11 Surface Water (Pluvial) Flooding

The Site is not situated near to large areas of poor permeability and the soil conditions at the Site and within the vicinity of the Site indicate that the Site would not be at risk of surface water flooding. Surface water flooding tends to occur sporadically in both location and time such surface water would tend to be confined to the streets around the development.

The Environment Agency Surface Water flood map (see Figure 5) shows that the majority of the Site has a very low risk of surface water flooding with an annual probability of flooding of less than 1 in 1000 (0.1%) years. However, a small section of the Site, less than 5%, on the western boundary has a medium to high risk of surface water flooding, with an annual probability of flooding of 1 in 1000 (0.1%) to 1 in 100 (1%) to greater than 1 in 30 (3.3%) years.

The LLFA has confirmed the following *"First generation surface water flood mapping suggests that a tributary to Dean Bottom Dike enters the site from the east. The exact location is unknown. Current surface water flood risk mapping shows a catchment flood route (the route water would take if drainage systems were blocked or had capacity exceeded, flows through the site."*

The overland flow path is shown from the drain to the south east of the Site, the water is shown to flow out of the drain, following the local topography and follows the path of least resistance from east flowing to the north west along North Road and then flows down the Site entrance towards Dean Bottom Dike, as shown in Figures 6 and 7.

During the 1 in 1000 year event the water depths are shown to be less than 300mm with velocities of over 0.25m/s. Figure 7 shows that during the 1 in 100 year event the flow path is confined to the boundaries of the Site.

Figure 5 - Environment Agency Surface Water Flood Map

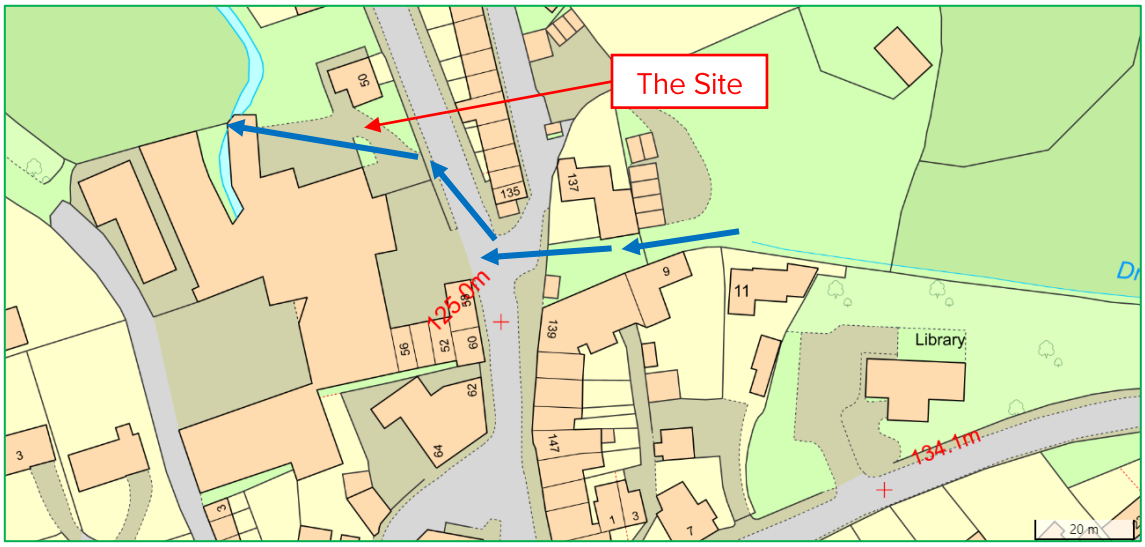


Figure 6 - Overland Flow Path

Figure 7 - Environment Agency Surface Water 1 in 100 Year Velocities (medium risk)

Given the scale and nature of the Proposed Development and the size and location of the surface water flooding sources it has been concluded that surface water flooding poses a low flood risk to the Site and the risk of surface water flooding is considered to be of low significance. The risk of surface water flooding will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 5.0).

3.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

There are existing sewers located within the vicinity of the Site and these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years. The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk of flooding from sewer flooding is considered to be not significant.

3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the Site. The Environment Agency Reservoir flood map shows that the Site is not at risk of reservoir flooding (see Figure 8). However, areas within the vicinity of the Site are shown to be at risk. The risk of flooding from artificial drainage systems/infrastructure failure is considered to be not significant.

Figure 8 - Environment Agency Reservoir Flood Map

3.14 Impact of the Proposed Development on Flood Risk

The Site will be flood free during the 1 in 100 year (+23%) event, which is the design flood event for the Site, and the 1 in 1000 year event. The Proposed Development will therefore, have no impact on flood risk. The conveyance routes (flow paths) will not be blocked or obstructed. The Proposed Development will have no impact on flood risk.

3.15 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 6.

Table 6 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	Yes	Dean Bottom Dike	Low
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	Yes	Low Spots / Poor Permeability	Low
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	No	None Reported	None

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial flooding from the Dean Bottom Dike. The Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 1 however, a small area, approximately 5% of the Site, along the western boundary, is located within Flood Zone 3a.

The existing and proposed use is classified as 'more vulnerable' (residential) and 'less vulnerable' (commercial). The Proposed Development will not introduce a new 'more vulnerable' developments into the floodplain. 'More vulnerable' and 'less vulnerable' uses are appropriate within Flood Zones 1 and 3a after the completion of a satisfactory FRA. The 'more vulnerable' residential use is located wholly in Flood Zone 1.

The Dean Bottom Dike is located adjacent to the western boundary of the Site, therefore fluvial flooding poses the primary flood risk to the Site. Water levels have been modelled at 116.36mAOD and 116.53mAOD during the 1 in 100 year (+50%) and 1 in 1000 year events, respectively. The approximate minimum Site ground level is 119.25mAOD therefore, the Site will not be inundated with floodwater for all events up to and including the 1 in 1000 year event. The Site will be flood free during the 1 in 100 year (+50%) and 1 in 1000 year events.

Flood risk to the Site from the Dean Bottom Dike can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow directly to the north rather than flowing towards the Site. The flood risk can also be considered to be limited due to the difference in elevations. The ground levels of the Site are located a minimum of 5.00m above the normal water level of the Dean Bottom Dike.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site. Therefore, the risk of fluvial flooding is considered to be of low significance. A secondary flooding source has been identified which may pose a low significant risk to the Site. This is:

- Surface Water Flooding

The risk from all flooding sources will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 5.0).

The Proposed Development will have no impact on flood risk, the overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The chance of flooding each year is low each year. This takes into account the property level protection measures.

4.0 SURFACE WATER DRAINAGE

4.1 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the Site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the Site. The assessment considers the impact of the proposals compared to current conditions. Therefore, the surface water attenuation requirement for the developed Site can be determined and reviewed against existing arrangements.

The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the Proposed Development unless specific off-site arrangements are made and result in the same net effect.

4.2 Surface Water Runoff

The pre-application Site is constructed predominantly from impermeable surfaces. The post-application Site will not increase the impermeable surfaces on the Site. As there is no history of surface water flooding at the Site it is likely that the current drainage system is sufficient for the current and proposed Site use.

The surface water runoff from the developed Site will be no different to pre-and post-application. There will be no increase in surface water runoff or exacerbation of off-site risk as a result of the development.

5.0 RISK MANAGEMENT

5.1 Introduction

The flood risk at this location is considered suitable for the Proposed Development within the NPPF. In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

The flooding sources will be mitigated on the Site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the Site. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the Proposed Development on flood risk generally; and;
- Minimal disruption to natural heritage.

The flood risk at the Site will be reduced by mitigation measures; these are discussed in more detail below.

5.2 Sequential Approach

The sequential approach has been applied within the site by locating the most vulnerable elements of the development in the lowest risk areas. The most vulnerable use, the residential uses, is situated on the higher part of the Ste at a lower risk of flooding with the more flood-compatible uses the commercial uses being situated on the lower part of the Site.

5.3 Lower Ground Floor

The coal chute will be closed off and the lower ground floor will be lined with a cementitous or cavity wall membrane known as tanking this ensures that groundwater will not enter the building.

5.4 Finished Floor Levels

The Site will be flood free during the 1 in 100 year (+23%) event, which is the design flood event for the Site. The finished floor levels will be set no lower than the existing ground levels. It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further, than those stated above. Therefore, in order to mitigate against this, it is recommended that the occupants of the Site implement a Flood Plan to a safe area away from the buildings during times of flood.

It is also proposed that flood protection measures are employed within the building design to reduce the overall risk to the occupants. This is discussed below.

5.5 Flood Resilience and Resistance

The development of the layout should always consider that the Site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

To make the buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All windows will be located above the ground levels. All external doors and windows will be constructed from robust materials. The walls of the buildings will be thick.

To improve the buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor levels.

5.6 Flood Plan

A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed. Sensible precautions would include raising electrical items, irreplaceable items and sentimental items off the ground or where possible moving them to a higher level, rolling up carpets and rugs and turning off utilities. In addition, consider what actions you would take should the property need to be evacuated including access and egress routes and preparing a flood kit in advance containing warm clothing, medication, a torch, food and wellingtons.

The Flood Plan is a 'living' document and therefore should be periodically reviewed and updated to provide advice and guidance to occupants in the event of an extreme flood. The Flood Plan will therefore reduce the vulnerability of the occupants to flooding and makes them aware of the mechanisms of flooding at the Site.

5.7 Safe Access and Egress Routes

The NPPF requires that, where required, safe access and escape is available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit their houses in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot. The Site and Site access route are shown to be located outside of the 1 in 100 year (+23%) and 1 in 1000 year flood outlines. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

5.8 Residual Risk

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The Site is unlikely to flood except in extreme conditions. This takes into account the property level protection measures.

6.0 SEQUENTIAL APPROACH

6.1 Sequential / Exception Tests

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding from all sources (i.e. Flood Zone 1). However, paragraph 174 of the NPPF confirms that: *'Applications for minor development and changes of use*[6] *should not be subject to the Sequential or Exception Tests but should still meet the requirements for site-specific flood risk assessments'.*

The LLFA has confirmed the following *"As this application is for a change of use, a sequential test is not required."* The Proposed Development will not change the vulnerability of the Site or introduce a new 'more vulnerable' development into the floodplain. The new office building will replace the existing workshop/garage and therefore in essence the Site use will not change. The development proposals should therefore be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

[6] This includes householder development, small non-residential extensions (with a footprint of less than 250m^2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home pr park home site, where the sequential and exception tests should be applied as appropriate.

7.0 SUMMARY AND CONCLUSIONS

7.1 Introduction

This report presents a FRA in accordance with the NPPF for the Proposed Development at 50 North Road, Kirkburton, Huddersfield, West Yorkshire, HD8 0RW.

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

7.2 Flood Risk

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial flooding from the Dean Bottom Dike. The Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 1 however, a small area, approximately 5% of the Site, along the western boundary, is located within Flood Zone 3a.

The existing and proposed use is classified as 'more vulnerable' (residential) and 'less vulnerable' (commercial). The Proposed Development will not introduce a new 'more vulnerable' developments into the floodplain. 'More vulnerable' and 'less vulnerable' uses are appropriate within Flood Zones 1 and 3a after the completion of a satisfactory FRA. The 'more vulnerable' residential use is located wholly in Flood Zone 1.

The Dean Bottom Dike is located adjacent to the western boundary of the Site, therefore fluvial flooding poses the primary flood risk to the Site. Water levels have been modelled at 116.36mAOD and 116.53mAOD during the 1 in 100 year (+50%) and 1 in 1000 year events, respectively. The approximate minimum Site ground level is 119.25mAOD therefore, the Site will not be inundated with floodwater for all events up to and including the 1 in 1000 year event. The Site will be flood free during the 1 in 100 year (+50%) and 1 in 1000 year events.

Flood risk to the Site from the Dean Bottom Dike can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow directly to the north rather than flowing towards the Site. The flood risk can also be considered to be limited due to the difference in elevations. The ground levels of the Site are located a minimum of 5.00m above the normal water level of the Dean Bottom Dike.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the Site. Therefore, the risk of fluvial flooding is considered to be of low significance. A secondary flooding source has been identified which may pose a low significant risk to the Site. This is:

- Surface Water Flooding

The risk from all flooding sources will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site.

The Proposed Development will have no impact on flood risk, the overall direction of the movement of water will be maintained within the developed Site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The chance of flooding each year is low each year. This takes into account the property level protection measures.

7.3 Surface Water Drainage

The pre-application Site is constructed predominantly from impermeable surfaces. The post-application Site will not increase the impermeable surfaces on the Site. As there is no history of surface water flooding at the Site it is likely that the current drainage system is sufficient for the current and proposed Site use.

The surface water runoff from the developed Site will be no different to pre-and post-application. There will be no increase in surface water runoff or exacerbation of off-site risk as a result of the development.

7.4 Risk Management

The flood risk at the Site will be reduced by mitigation measures, discussed below.

Sequential Approach: The sequential approach has been applied within the site by locating the most vulnerable elements of the development in the lowest risk areas. The most vulnerable use, the residential uses, is situated on the higher part of the Ste at a lower risk of flooding with the more flood-compatible uses the commercial uses being situated on the lower part of the Site.

Lower Ground Floor: The coal chute will be closed off and the lower ground floor will be lined with a cementitous or cavity wall membrane known as tanking this ensures that groundwater will not enter the building.

Finished Floor Levels: The Site will be flood free during the 1 in 100 year (+23%) event, which is the design flood event for the Site. The finished floor levels will be set no lower than the existing ground levels. It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further, than those stated above. Therefore, in order to mitigate against this, it is recommended that the occupants of the Site implement a Flood Plan to a safe area away from the buildings during times of flood.

It is also proposed that flood protection measures are employed within the building design to reduce the overall risk to the occupants. This is discussed below.

Flood Resilience and Resistance: To make the buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All windows will be located above the ground levels. All external doors and windows will be constructed from robust materials. The walls of the buildings will be thick.

To improve the buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor levels.

Flood Plan: A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed.

Safe Access and Egress Route: A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot. The Site and Site access route are shown to be located outside of the 1 in 100 year (+23%) and 1 in 1000 year flood outlines. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency guidance.

7.5 Sequential Approach

The development proposals should be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

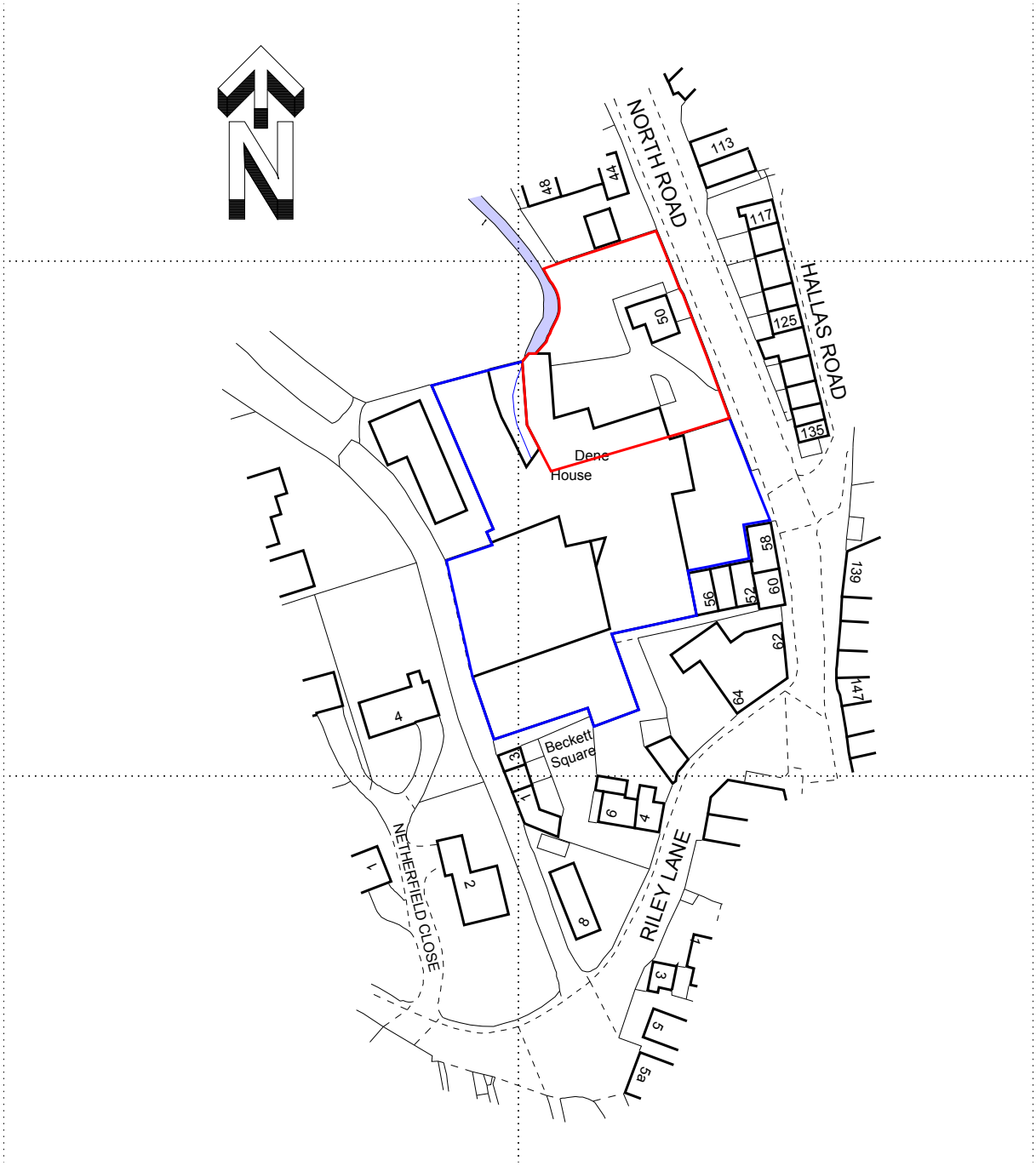
7.6 Conclusion

In conclusion, the Proposed Development would be expected to remain dry in all but the most extreme conditions. The Site is unlikely to flood except in extreme conditions. Providing the recommendations made in this FRA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable, and the development would be in accordance with the requirements of the NPPF.

This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

APPENDICES

APPENDIX 1 – Existing and Proposed Site Layout



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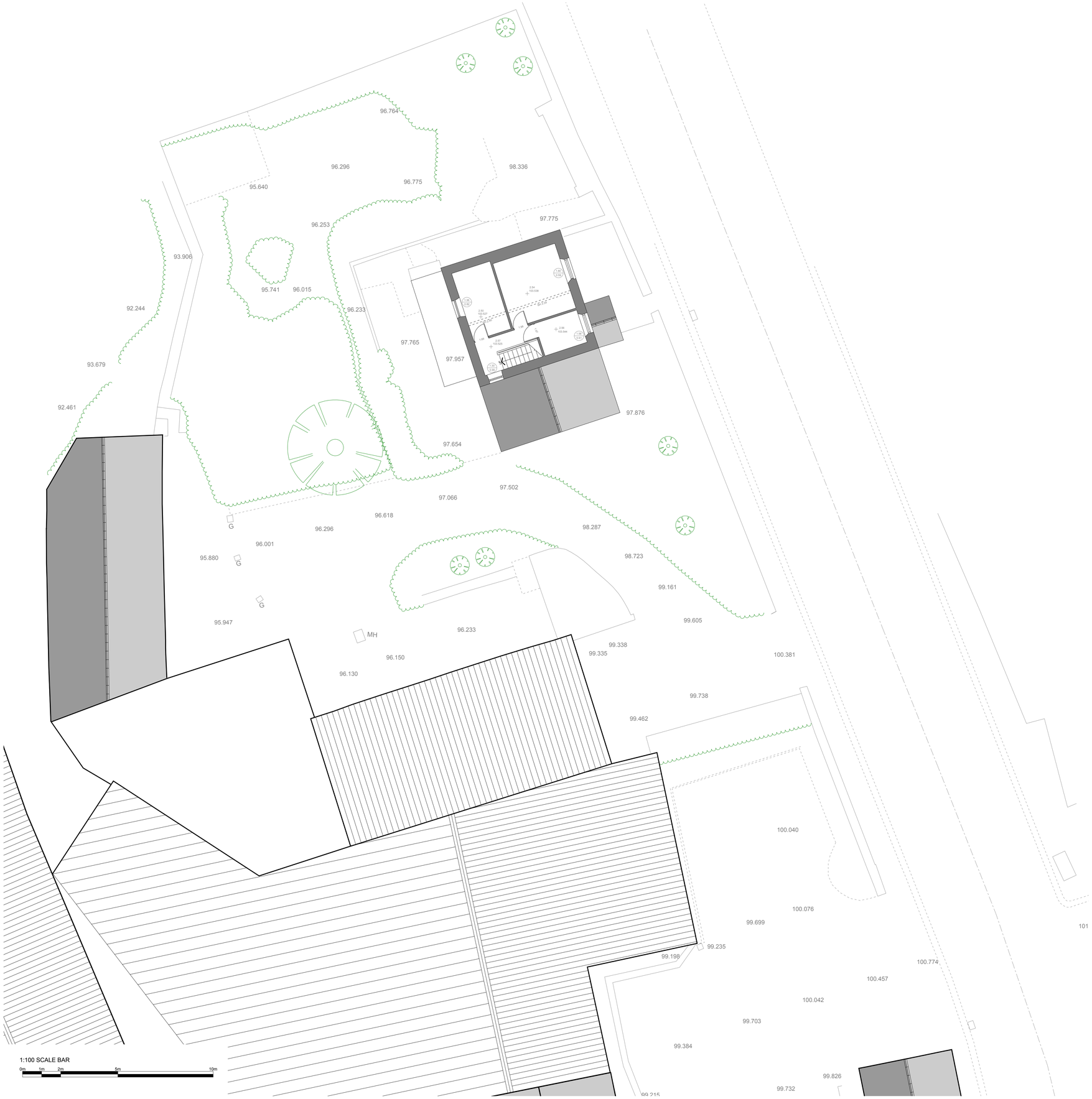

WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
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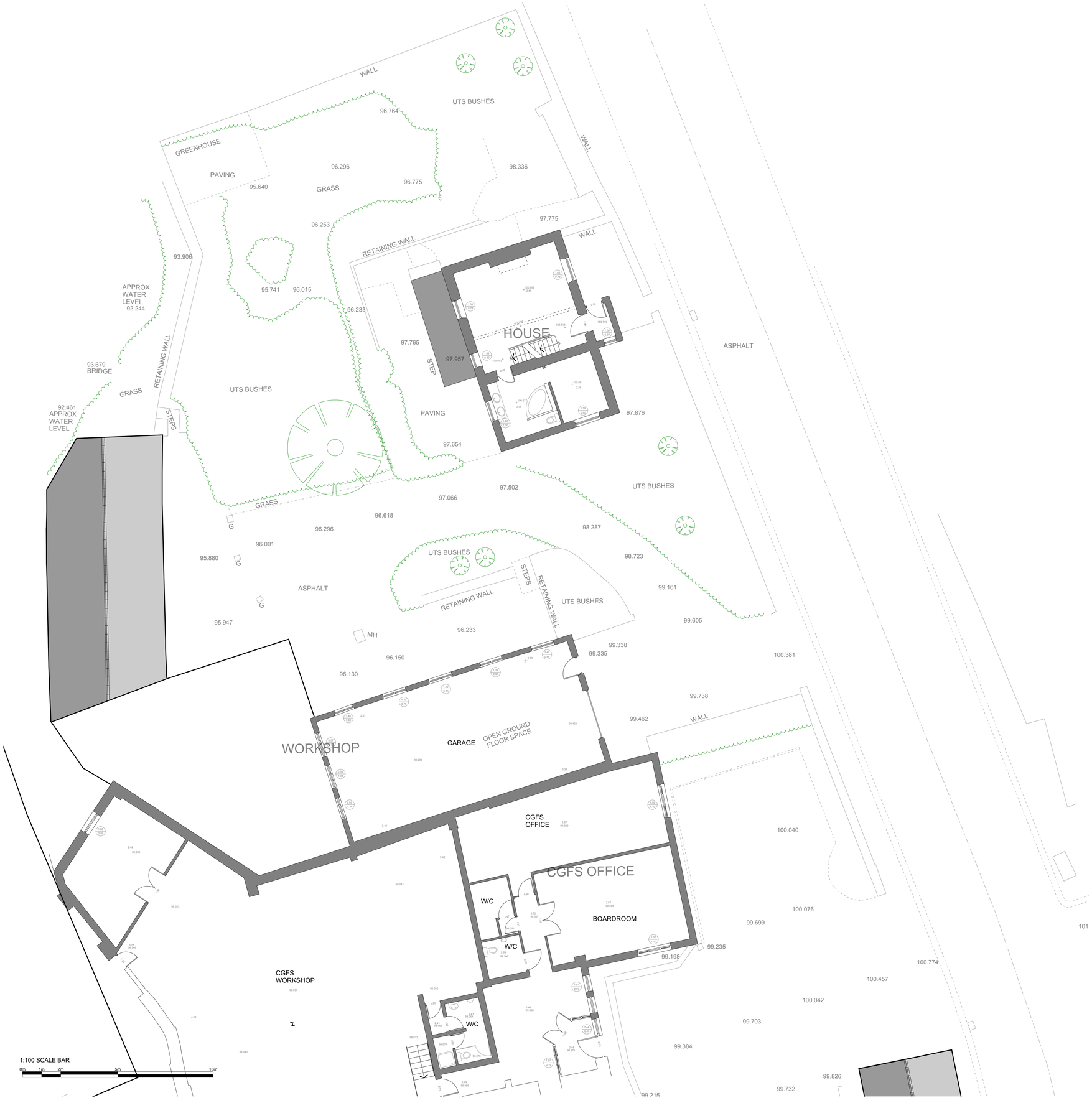

WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
GROUND FLOOR PLAN - EXISTING

JOB NO	DRG NO	REV	SCALE @ A1	DATE
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1:100 SCALE BAR

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WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
LOWER GROUND FLOOR PLAN - EXISTING

JOB NO	DRG NO	REV	SCALE @ A1	DATE
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ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
TOPOGRAPHICAL SURVEY

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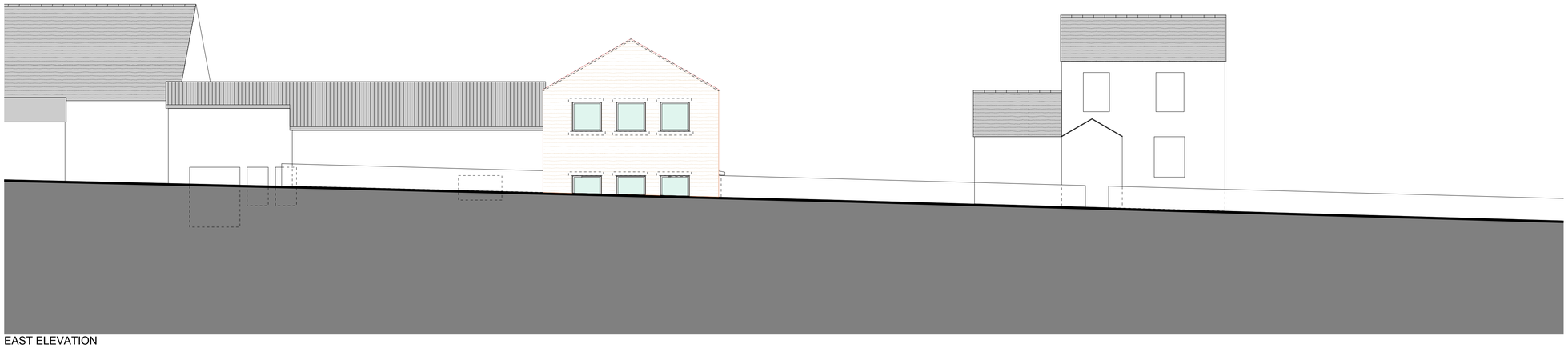
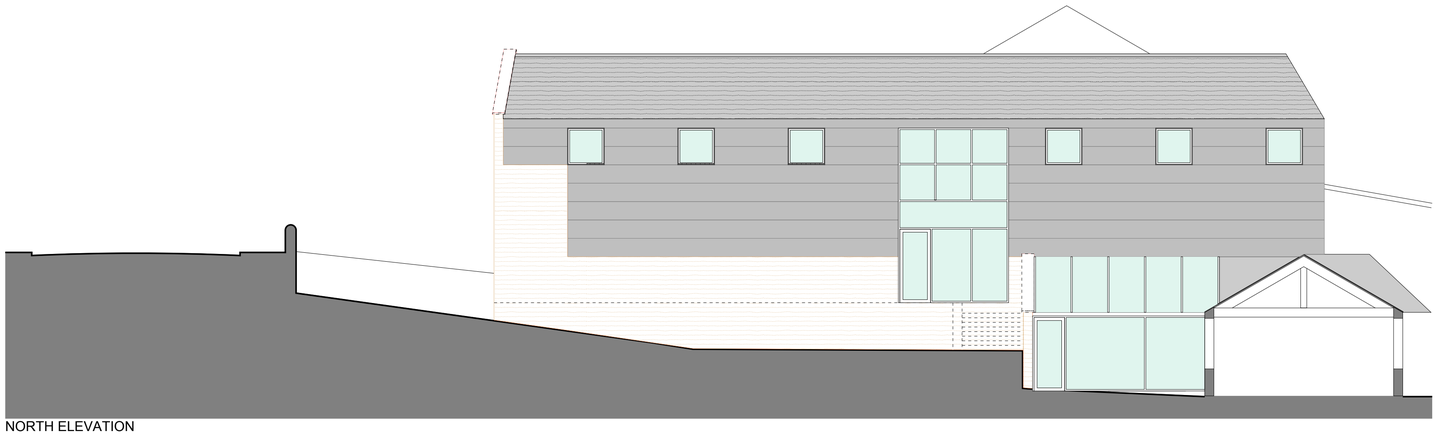


EAST ELEVATION
NORTH ROAD



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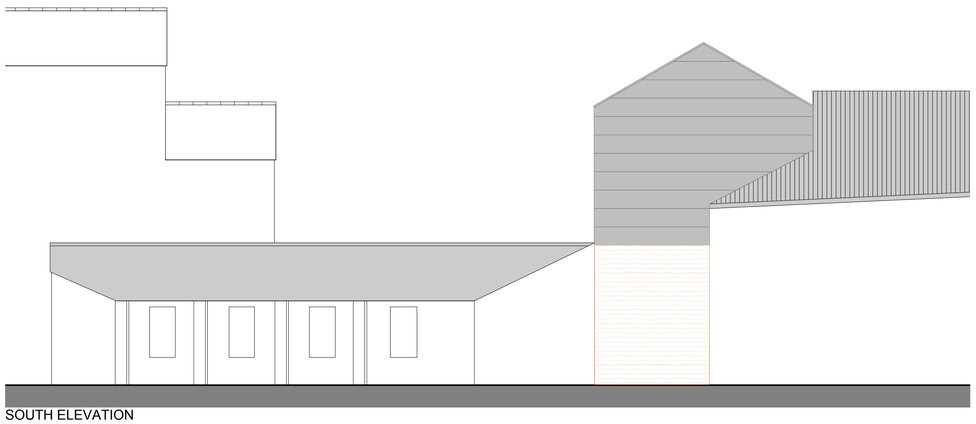

SOUTH ELEVATION

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MATERIALS NOTES

WALLS
NATURAL COURSED STONE
COLOUR COATED STEEL CLADDING

ROOF
COLOUR COATED STEEL CLADDING

WINDOWS & DOORS
POWDER COATED ALUMINIUM FRAMES

WHP ARCHITECTURE

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COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
ELEVATIONS - PROPOSED

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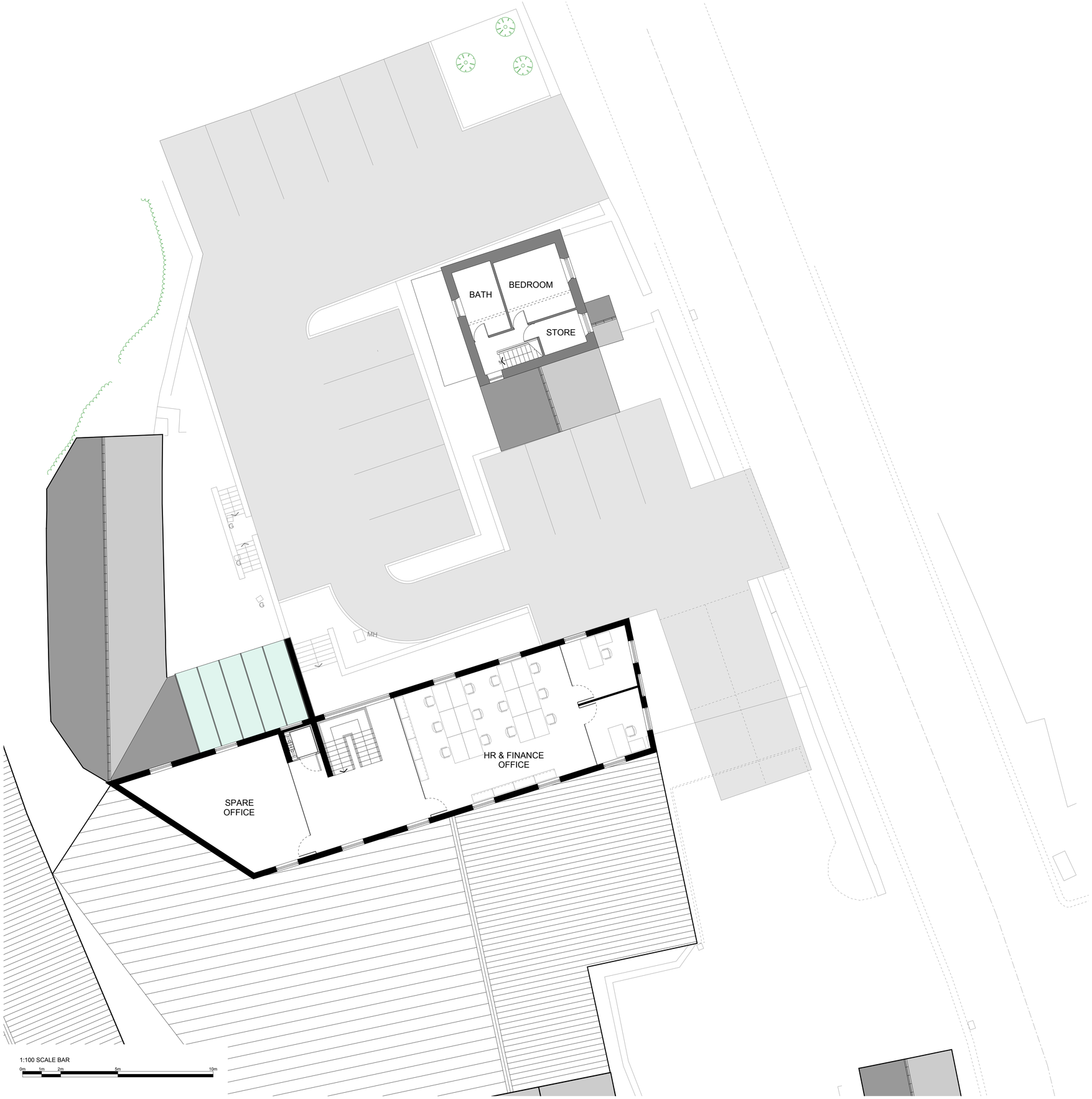

WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
FIRST FLOOR PLAN - PROPOSED

JOB NO	DRG NO	REV	SCALE @ A1	DATE
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WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
GROUND FLOOR PLAN - PROPOSED

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WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
LOWER GROUND FLOOR PLAN - PROPOSED

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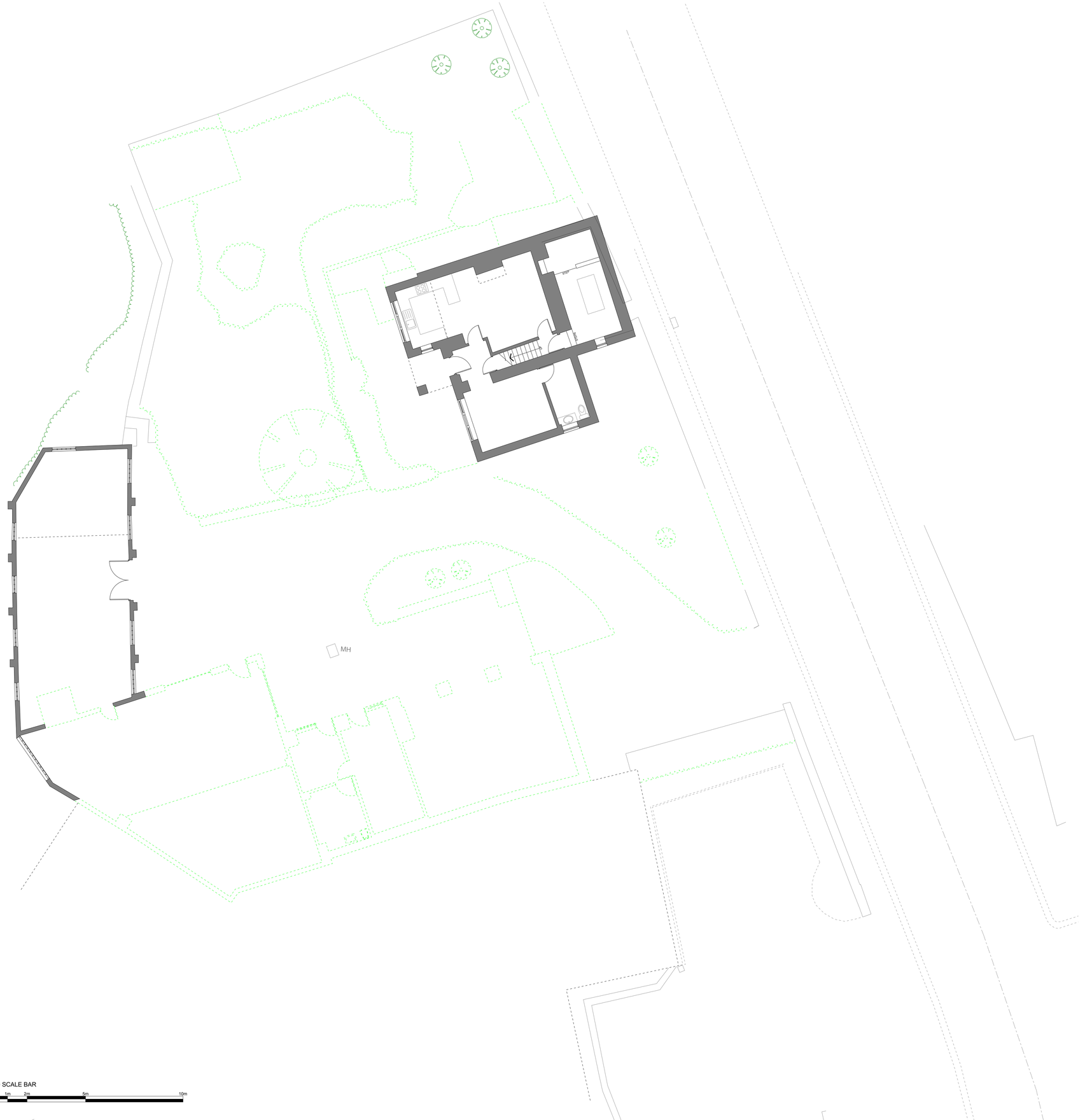

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WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
LOWER GROUND FLOOR - DEMOLITIONS

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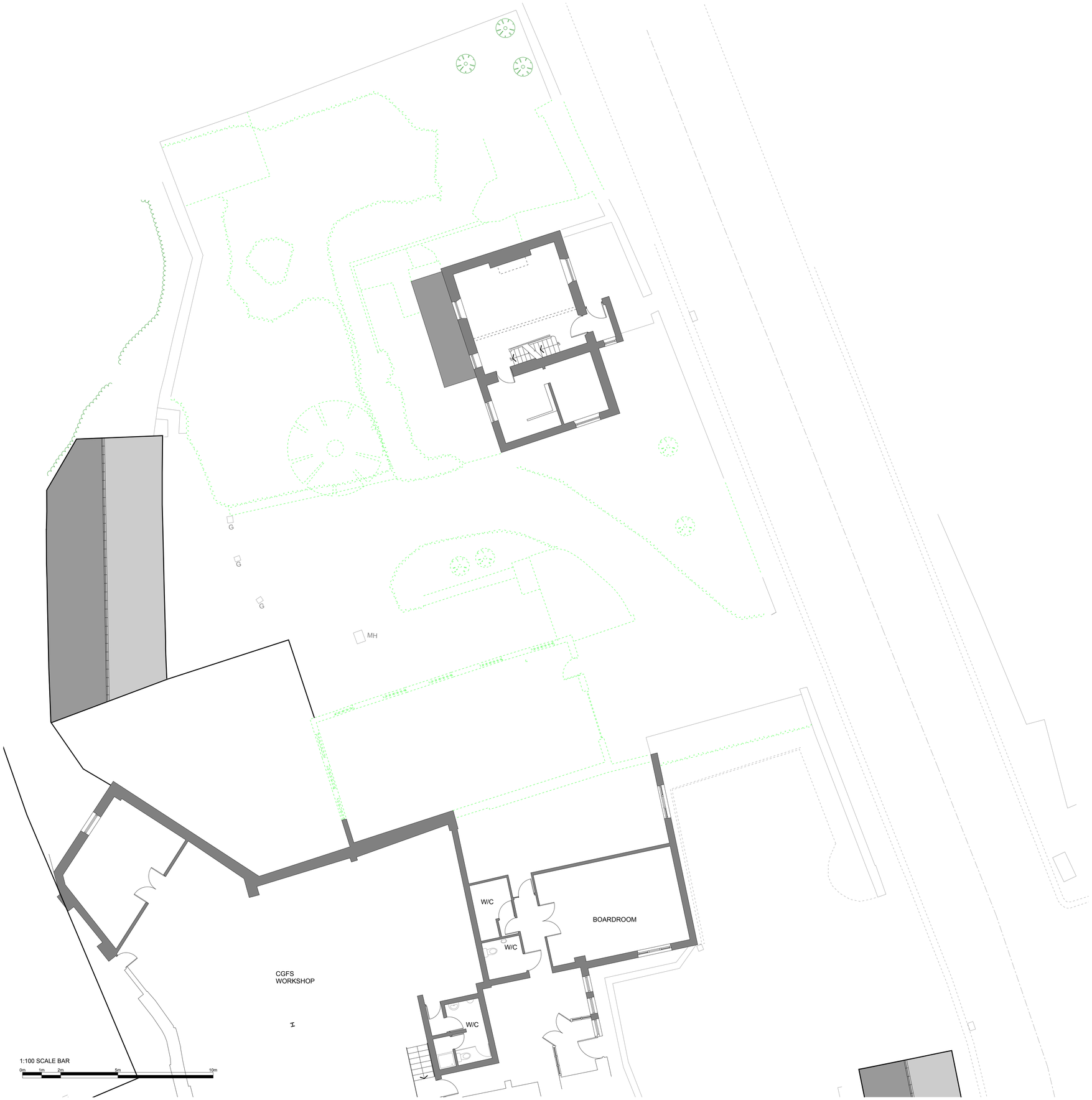

WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
GROUND FLOOR - DEMOLITIONS

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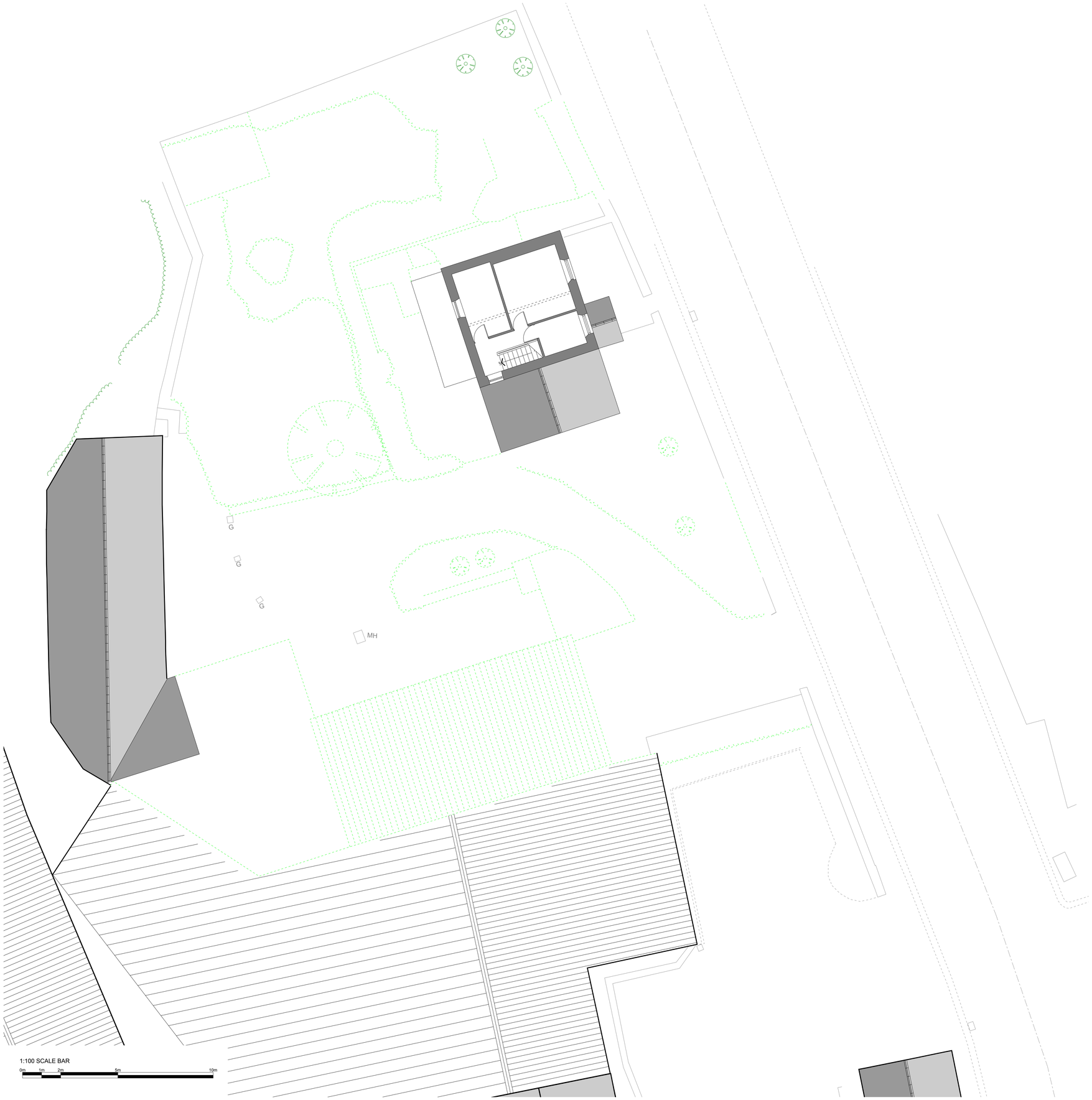

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WHP ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
FIRST FLOOR - DEMOLITIONS

JOB NO	DRG NO	REV	SCALE @ A1	DATE
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APPENDIX 2 – Topographical Survey

1:100 SCALE BAR

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ARCHITECTURE

CLIENT
COGRI GROUP LTD

PROJECT
DENE HOUSE, NORTH ROAD, KIRKBURTON

DRAWING TITLE
LOWER GROUND FLOOR - PROPOSED

JOB NO	DRG NO	REV	SCALE @ A1	DATE
WHPR 23-0046	11	D	1:100	02 11 23

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