GeoSmart Information

FloodSmart Plus

Flood Risk Assessment

Site Address

Holden Clough Nurseries
Bolton by Bowland
Lancashire
BB7 4PF

Grid Reference

377384, 449484

Report Prepared for

John Metcalfe
Holden Clough Nurseries
Bolton-by-Bowland
Lancashire
BB7 4PF

Date

2022-04-27

Report Status

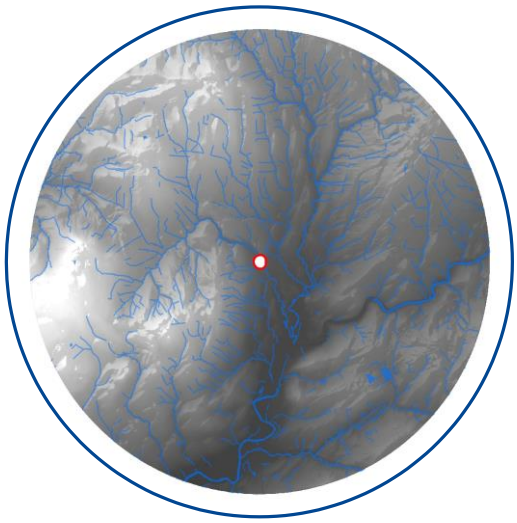
FINAL

Site Area

0.1443 ha

Report Reference

76707R1



RISK - Negligible to Moderate

The majority of the Site is located in the EA's fluvial Flood Zone 1 (Low probability) and partially within a Flood Zone 2 and 3 (medium/high probability), defined as having a very low to high risk of flooding from rivers and sea.

The extent of the EA's Flood Zones were produced in 2004 using the national generalised (JFLOW) model, this uses low resolution ground elevation data and flood flow routing methods, considered to be outdated.

The EA's 2014 Risk of Flooding from Surface Water (RoFSW) mapping however, uses more up to date ground elevation data than the JFLOW and provides a more realistic representation of flooding from the adjacent watercourse. This mapping has therefore been used to confirm flood levels in the 1 in 30, 100 and 1000 year events and to confirm the impacts of climate change at the Site. The RoFSW map confirms the Site is not affected in the 1 in 100 year event and an modelled flood level of 105.6 mAOD during the 1 in 100 year plus 36% climate change scenario. This would not impact the area proposed for development.

The Site is therefore at a Very Low to Low risk of fluvial and pluvial flooding, a Negligible-Moderate risk of groundwater flooding and a Negligible risk of flooding from artificial sources.

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1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with the National Planning Policy Framework (NPPF) (2021) and National Planning Practice Guidance (NPPG) (2014). A site-specific flood risk assessment, to assess the flood risk to and from the development Site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation
River (fluvial) flooding	Very Low-High	Very Low-Low	Low
Sea (coastal/tidal) flooding	N/A	N/A	N/A
Surface water (pluvial) flooding	Very Low-Low	Very Low-Low	Very Low
Groundwater flooding	Negligible	Negligible-Moderate	Negligible-Low
Other flood risk factors present	Yes		
Is any other further work recommended?	Yes (see below)		

N/A = mitigation not required

[1] Based upon the EA's outdated National Generalised Modelling.

[2] Based upon the EA's high-resolution Risk of Flooding from Surface Water Mapping.

Summary of existing and proposed development

The Site is currently used within a commercial capacity as a plant nursery and café, complete with gardens, an area of car parking and associated access.

Development proposals comprise a two storey extension to the south and a single storey extension to the east to create additional storage space, a kitchen, café dining area, retail space and an exterior terrace with storage below. Existing access and landscaping will be retained. Site plans are included within Appendix A.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

The Site is located immediately adjacent to the Mear Gill River, but does not benefit from the presence of flood defences.

According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located partially within a fluvial Flood Zone 3 (High probability).

In the absence of detailed modelling of the watercourses in the area of the Site, it has been recognised that the mapped Flood Zones from the EA are outdated as they rely on generalised modelling of the country conducted in 2004. The outdated modelling methodology limits the accuracy of the mapping. Consequently, the EA's 2014 modelled surface water extents have been used in this report as a more realistic proxy for the fluvial Flood Zones in the area of the Site.

- These extents have located the Site partially in the 1 in 1000 year surface water flood extent, a proxy for Flood Zone 2.

According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a Very Low-High risk of flooding from Rivers and the Sea. However, this risk is based on modelled EA Flood Zones and consequently a more realistic risk rating of the Site, using the modelled surface water extents, defines the risks as Very Low to Low.

A maximum "design" flood level has been estimated by comparing the modelled EA surface water flood extents with EA elevation data obtained for the area around the Site to a 1 m resolution with a vertical accuracy of ±0.15 m.

- During a 1 in 100 year plus 36% climate change allowance event the flood level at the Site would be 105.6 mAOD. During this event, the area proposed for development would not experience flooding.

Emergency evacuation routes are available within the Site, to the south west. In the event of a flood, safe refuge can be taken on the 1st floor level office in a worst case scenario.

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to Low.

- An area at Low risk is located in the north east of the Site.
- The rest of the Site is at Very Low risk of flooding.

Groundwater Flood Risk screening data indicates there is a Negligible risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.

The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:

- The EA's Risk of Flooding from Reservoir map confirms the Site is not at risk of reservoir flooding.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- A sewer flooding history search was undertaken using the Strategic Flood Risk Assessment (Ribble Valley Borough Council, 2010). This does not identify any incidences of sewer flooding at the Site

The risk of flooding from artificial sources is considered to be Negligible.

Recommendations

Recommendations for mitigation are provided below, based upon the proposed development and the flood risk identified at the Site.

- As there is a risk of flooding from fluvial sources, where flood depths could be up to 0.4 m in the 1 in 1000 year event in the area proposed for development, Finished Floor Levels (FFL) of the proposed development should be set to 105.9 mAOD[3]. Standard flood resilient design measures should be incorporated. Finished floor levels of the proposed buildings are 107.79 mAOD, however, and consequently exist above the recommended FFL.
- A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff over the lifetime of the proposed development.
- The regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer should be undertaken to reduce the flood risk.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

[3] 0.3 m above the 1 in 100 year plus climate change flood level of 105.6mAOD.

2. Introduction

Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2021) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2021) and NPPG (2014).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied*" (NPPF, 2021).

The NPPF (2021) and NPPG (2014) promote a sequential, risk based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

"*This general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high risk flood areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible*" (NPPG, 2014).

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

Report scope

In accordance with the requirements set out within NPPG 2014 (Paragraph: 030 Reference ID: 7-030-20140306), a thorough review of a commercially available flood risk report and EA supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from the EA and a review of the Ribble Valley Borough Council Strategic Flood Risk Assessment (Ribble Valley Borough Council, 2017) is used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2021).

The existing and future flood risks to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation

measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the Site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale, however the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Datasets

The following table shows the sources of information that have been consulted as part of this report:

Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency (Appendix B)	United Utilities	OS Data
Historical	X	X	X		
River (fluvial) / Sea (tidal/coastal)	X	X	X		
Surface water (pluvial)	X	X	X		

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency (Appendix B)	United Utilities	OS Data
Groundwater	X	X			
Sewer		X		X	
Culvert/bridges		X			X
Reservoir		X	X		

*Local guidance and policy, referenced in Section 6, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

3. Site analysis

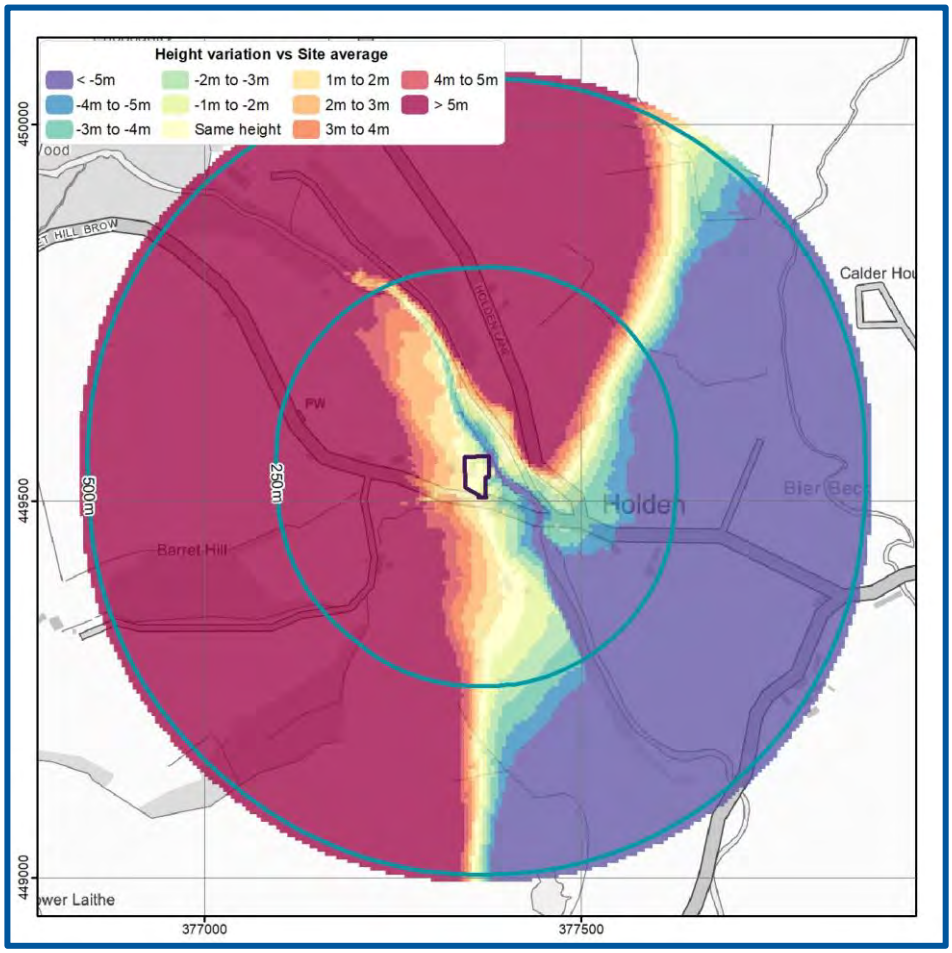
Site information

The Site is located in Bolton-by-Bowland in a setting of commercial and residential land use at National Grid Reference SD 77384 49484. Site plans and drawings are provided in Appendix A.

According to OS data, using a 500 m buffer around the Site, the area is on a steep slope (Figure 1). It is noted that to the north land rises to c. 133.7 m above Ordnance Datum (AOD). To the west land rises to c. 165.0 mAOD, to the east land falls to c. 94.4 mAOD and to the south falls to c. 96.9 mAOD.

The general ground levels on the Site are between 105.01and 107.57 mAOD with the Site falling gradually in a north easterly direction. This is based on a Sit specific topographic survey included within the Site plans (Holden Limited, 2020) (Appendix A).

Figure 1. Site Location and Relative Elevations (GeoSmart, 2022).



Development

The Site is currently used in a commercial capacity as a plant nursery and café, complete with gardens, an area of car parking and associated access.

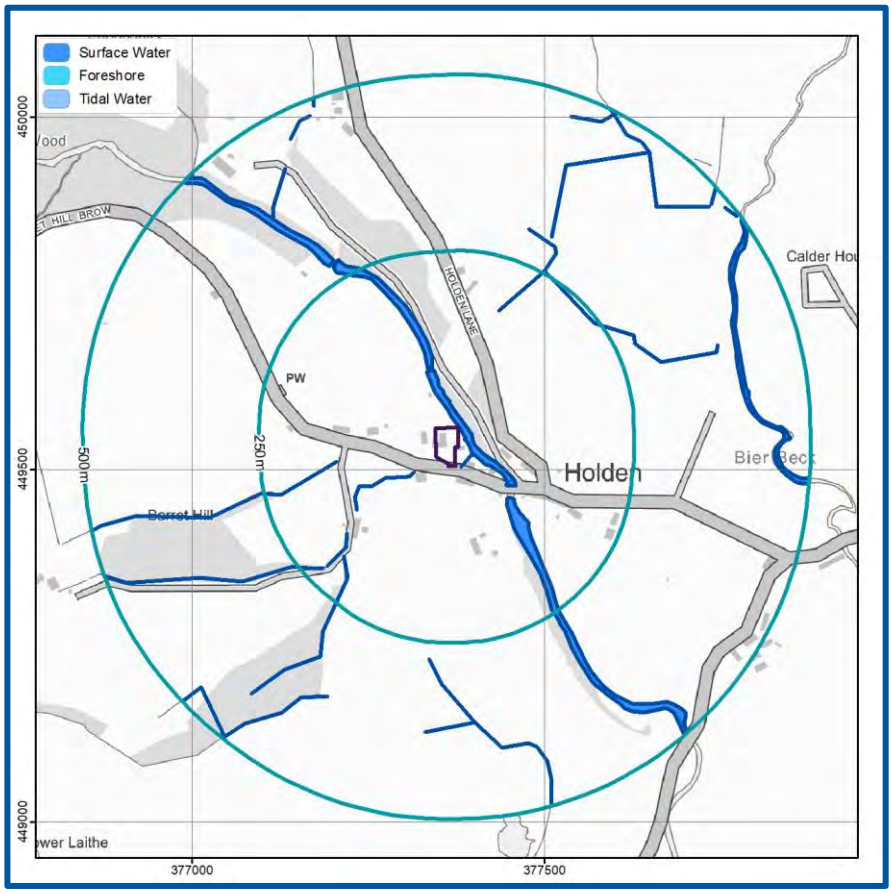
Development proposals comprise a two storey extension to the south and a single storey extension to the east to create additional storage space, a kitchen, café dining area, retail space and an exterior terrace with storage below. Existing access and landscaping will be retained. Finished floor levels of the proposed buildings are 107.79mAOD. Site plans are included within Appendix A.

The effect of the overall development will not result in an increase in number of occupants and/or users of the building and will not result in the change of use, nature or times of occupation. According to Table 2 of the NPPG (2014), the vulnerability classification of the existing development is Less Vulnerable and proposed development is Less Vulnerable. The estimated lifespan of the development is 60 years.

Hydrological features

According to Ordnance Survey (OS) mapping included in the following figure, there are numerous surface water features within 500 m of the Site.

Figure 2. Surface water features (EA, 2022)



The Mear Gill River is located immediately adjacent to the north east of the Site at a lower elevation. The Scarloom waterfall has been identified approximately 90m to the south east of the Site.

The Bier Beck River is located approximately 450m to the east of the Site at a lower elevation.

Multiple drainage ditches are located to the north east of the Site, with the closest approximately 180m away at a higher elevation than the Site.

Multiple drainage ditches are located to the south and south west of the Site, with the closest approximately 40m away at a higher elevation that the Site.

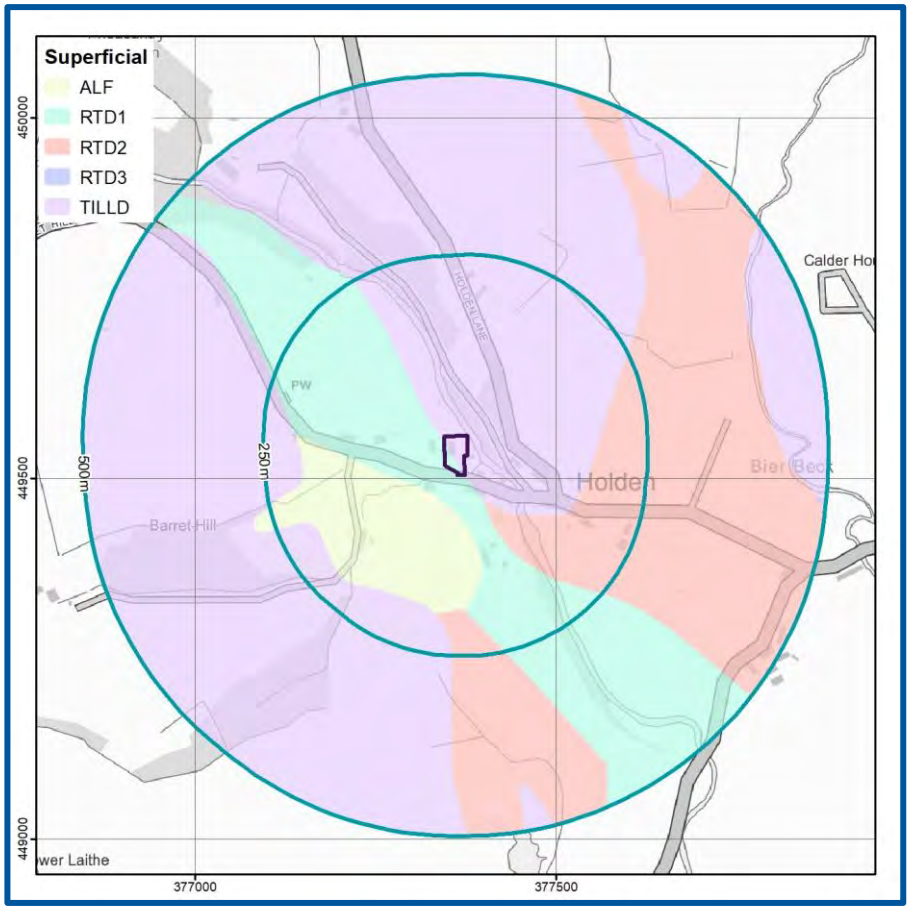
Proximity to relevant infrastructure

A bridge on Holden Lane, over the Mear Gill River, is located approximately 65m to the south east of the Site

Hydrogeological features

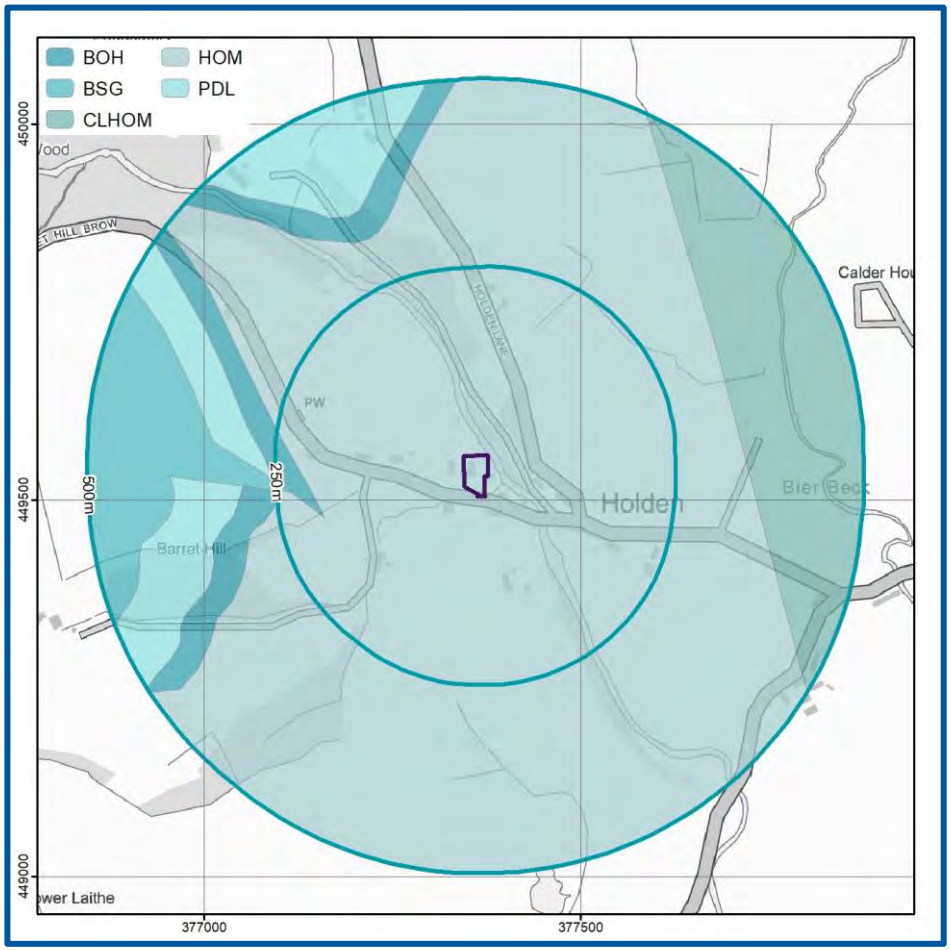
British Geological Survey (BGS) mapping indicates the underlying superficial geology (Figure 3) consists of River Terrace deposits (RTD1) and Devensian Till (TILLD) (BGS, 2022) and is classified as a Secondary (A) Aquifer (EA, 2022).

Figure 3. Superficial Geology (BGS, 2022)



BGS mapping indicates the underlying bedrock geology (Figure 4) consists of the Hodder Mudstone Formation (HOM) (BGS, 2022) and is classified as a Secondary (A) Aquifer (EA, 2022).

Figure 4. Bedrock Geology (BGS, 2022)



The Site does not lie within a groundwater Source Protection Zone (SPZ) (EA, 2022).

A review of the BGS borehole database (BGS, 2022) indicates there are no relevant boreholes within the vicinity of the Site from which the mapped geology can be confirmed.

The hydrogeological characteristics suggest there is potential for a groundwater table beneath the Site.

Groundwater levels may rise in the bedrock and superficial aquifer in response to high riverevents subject to hydraulic continuity between the driving water level, the groundwater system and the Site.

Groundwater levels may rise in the bedrock and superficial aquifer in response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years, subject to hydraulic continuity between the groundwater system and the Site.

4. Flood risk to the development

Historical flood events

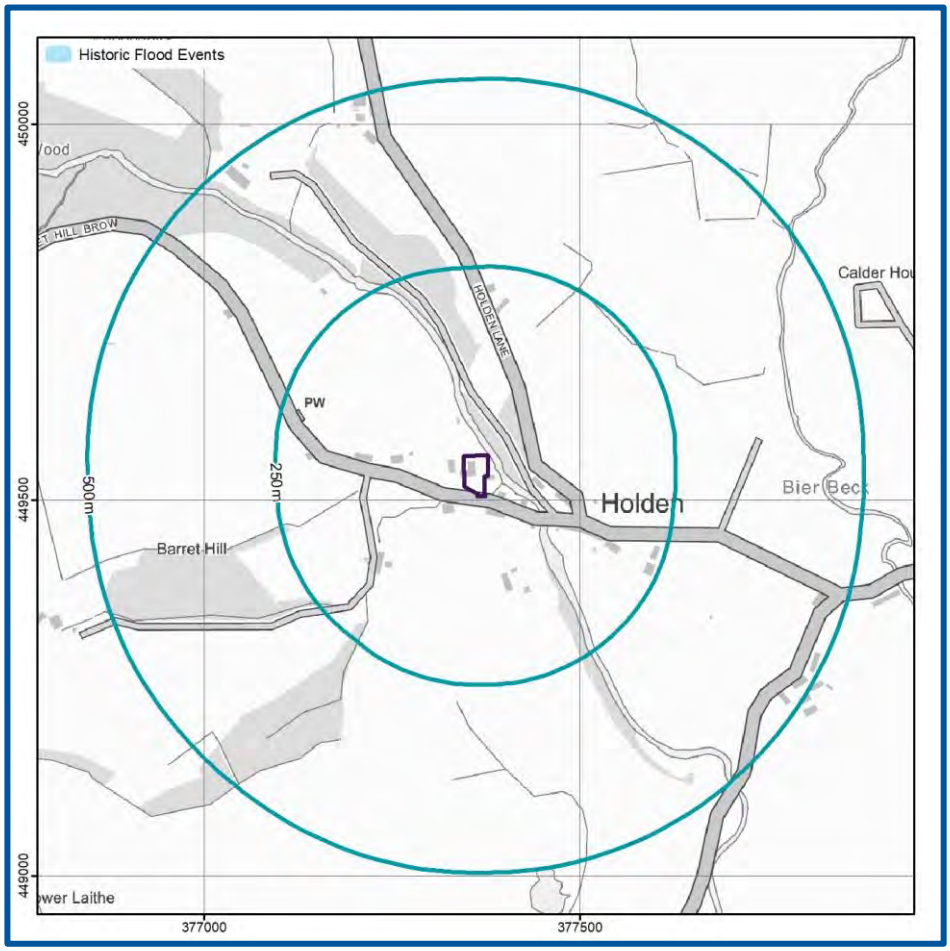
According to the EA's historical flood map (Figure 5) no historical flood events have been recorded at the Site (EA, 2022).

According to Table 1 of the SFRA, there is one record of historical flooding in the Bolton-by-Bowland area, occurring in 1963 and originating from the Ribble, Hodder and Calder rivers. The report does not confirm whether the flooding affected the Site (Ribble Valley Borough Council, 2017).

It is understood the current Site owner has not experienced any instances of flooding at the Site since their family took over the land in 1978.

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 5. EA historic flood map (EA, 2022)



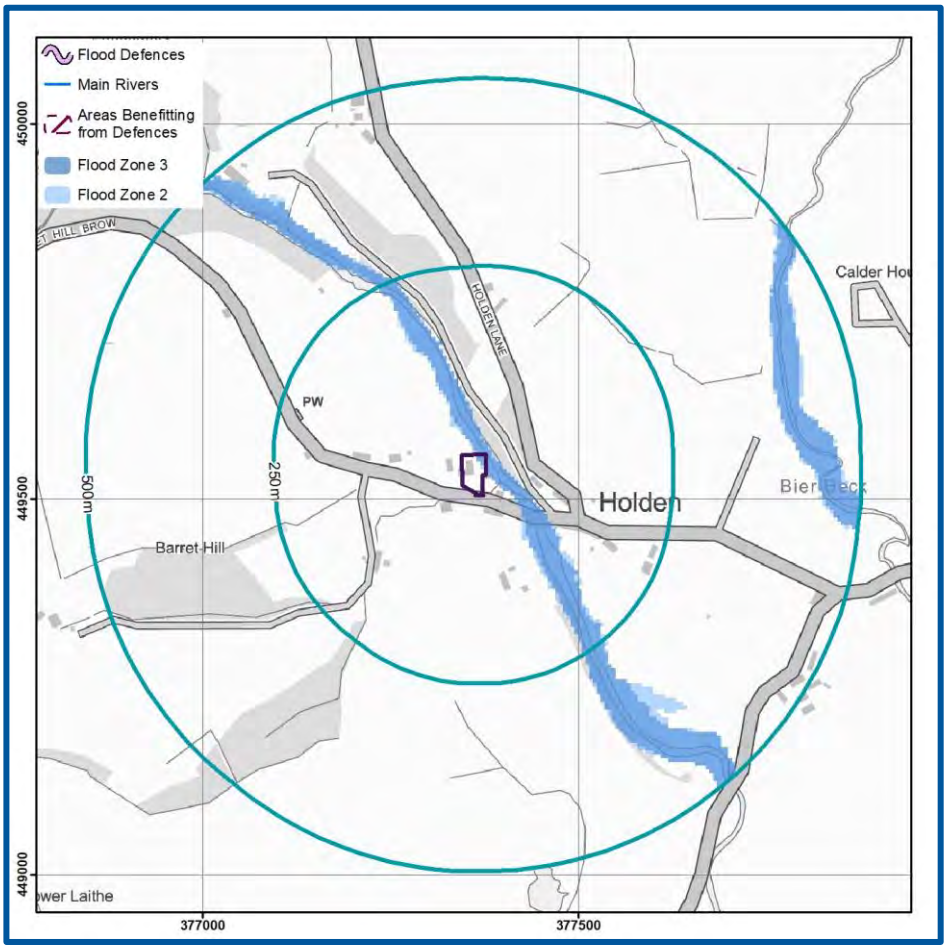
Rivers (fluvial) flooding

The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Negligible.

River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

According to the EA's Flood Map for Planning Purposes (Figure 6), an area (approximately 10%) in the north east of the Site is located within fluvial Flood Zone 3 and is therefore classified as having a High probability of fluvial flooding from the Mear Gill River. A further area of the Site in the north east (approximately 2%) is located in Flood Zone 2. The rest of the Site (approximately 88%) is located within Flood Zone 1.

Figure 6. EA Flood Map for Planning Purposes (EA, 2022)



The mapped Flood Zones from the EA rely on generalised modelling of the country conducted in 2004. The outdated modelling uses low resolution data and the accuracy of the mapping is questionable, due to the outdated methods used in its creation.

In 2014, the EA undertook comprehensive surface water flood mapping of the country, using more up to date methods. This model is often similar in extent to detailed fluvial models and therefore it is considered to provide a more realistic extent of flooding, compared to the Flood Zones identified in 2004.

Consequently, the modelled surface water extents have been used in this report as a more realistic representation of Flood Zones in the area of the Site. According to this modelling the Site is located within the 1 in 1000 year surface water flood event (a proxy for Flood Zone 2) and is therefore classified as having a Medium probability of fluvial flooding from the Mear Gill River.

Guidance

As defined in the NPPF (2021):

Ignoring the presence of any defences, land located in a Flood Zone 2 is considered to have a Medium probability of flooding, with between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding or between a 1 in 200 and 1 in 1000 annual probability of coastal flooding in any one year.

Development of "Water-Compatible", "Essential Infrastructure", "Less Vulnerable" and "More Vulnerable" land uses are suitable for this zone with "Highly Vulnerable" land uses requiring an Exception Test to be passed prior to development taking place (see glossary for terminology).

Flood defences

Guidance

Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FRA subject to local topography.

The Site is not in an area which benefits from flood defences.

There are no proposed flood defences within 500 m of the Site.

Model data

The EA were approached to obtain product 4 data for the area of the Site. However, no detailed modelling was available for the area.

JFLOW Modelling

The modelled fluvial flood depth data was created for the 1% and 0.1% annual chance of flooding situations and was produced as a by-product from the 2004 generalised modelling project in 2004, using JFLOW modelling. The purpose of the generalised modelling project was to fill the gaps where there was no detailed local modelled data in 2004, in order to define the extents of Flood Zones for spatial planning. A two-dimensional hydrodynamic model called JFLOW was used to produce this modelled fluvial flood depth data on a 5x5m grid.

Since 2004, local detailed modelling has been used to replace this generalised modelling in many areas to define the extents of Flood Zones. However, the JFLOW dataset in this location has not been updated.

JFLOW was used to produce flood maps for the whole of England and Wales for all catchments greater than 3 sq km in a consistent manner. The method is therefore very generalised and therefore cannot take account of information that may be very significant locally. This might include:

1. Effects of bridges and other structures including flood defences are not taken into account.
2. Errors in the DTM, caused by trees and buildings for example.
3. The effect of reservoirs and urban drainage and other man made influences on the flow regime can only be taken into account in a very general sense in JFLOW.
4. The channel is assumed to be able to take the 2 year flow. This may not be true especially in those modified by man.
5. Hydraulic roughness is assumed to be the same everywhere in JFLOW, but of course it is not.

In light of this and as there is no detailed modelling included within the SFRA, to estimate flood levels at the Site, the EA's 1m LiDAR data has been compared with the EA's Risk of Flooding from Surface Water extents.

The EA's 1m LiDAR data has been classified against the highest elevation along the extent of the EA's 100 and 1000 year surface water flood extents, used to form the basis for the fluvial 1 in 100 year and 1 in 1000 year flood events respectively (Figure 7)[4].

[4] As the calculated flood elevation is based on LiDAR the accuracy of the calculated level is +/- 0.15m.

In light of the data available and as there is no detailed modelling included within the SFRA, to estimate flood levels at the Site, the EA's 1m LiDAR data has been compared with the EA's risk of flooding from surface water mapping.

Figure 7. Surface water flood zone mapping (EA, 2022)

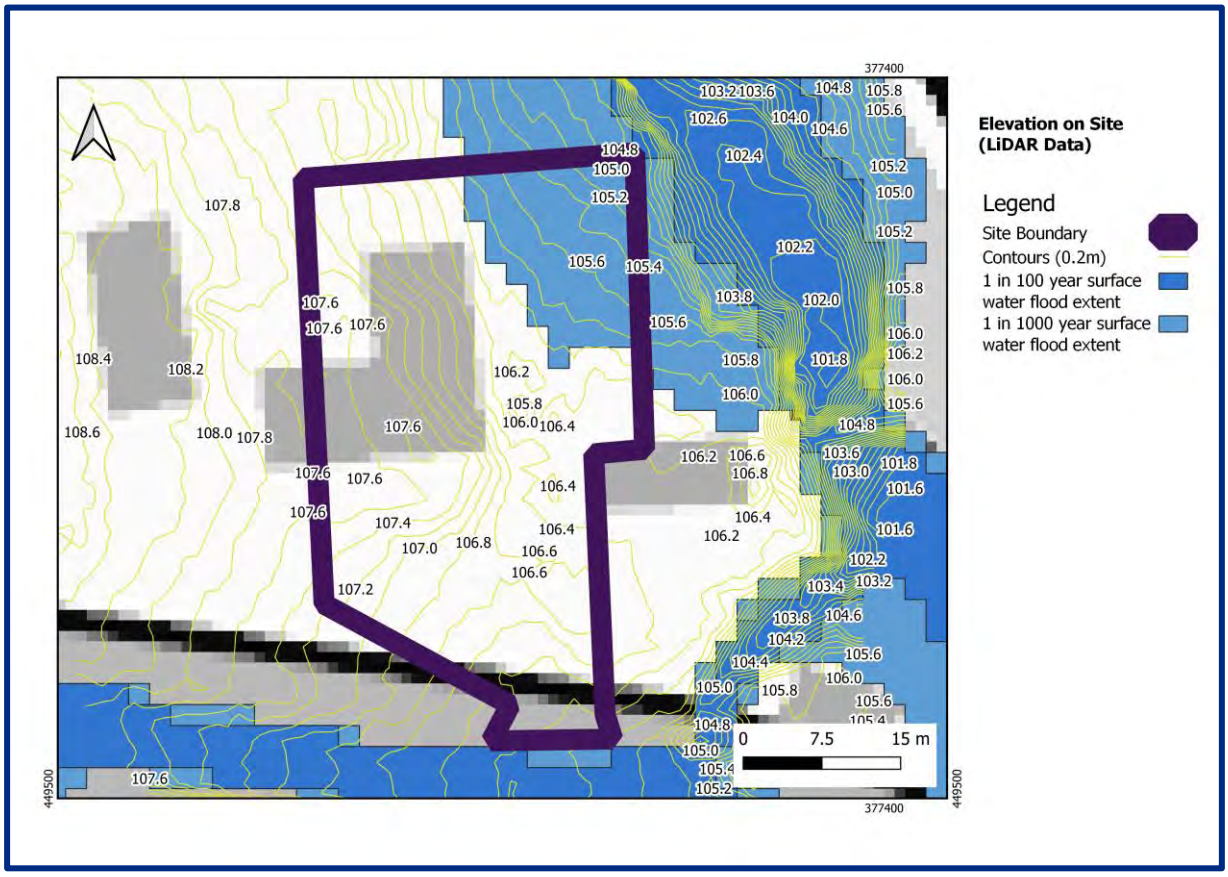


Figure 8. Map showing the identified maximum elevation for the 1 in 100 year surface water event (EA, 2022)

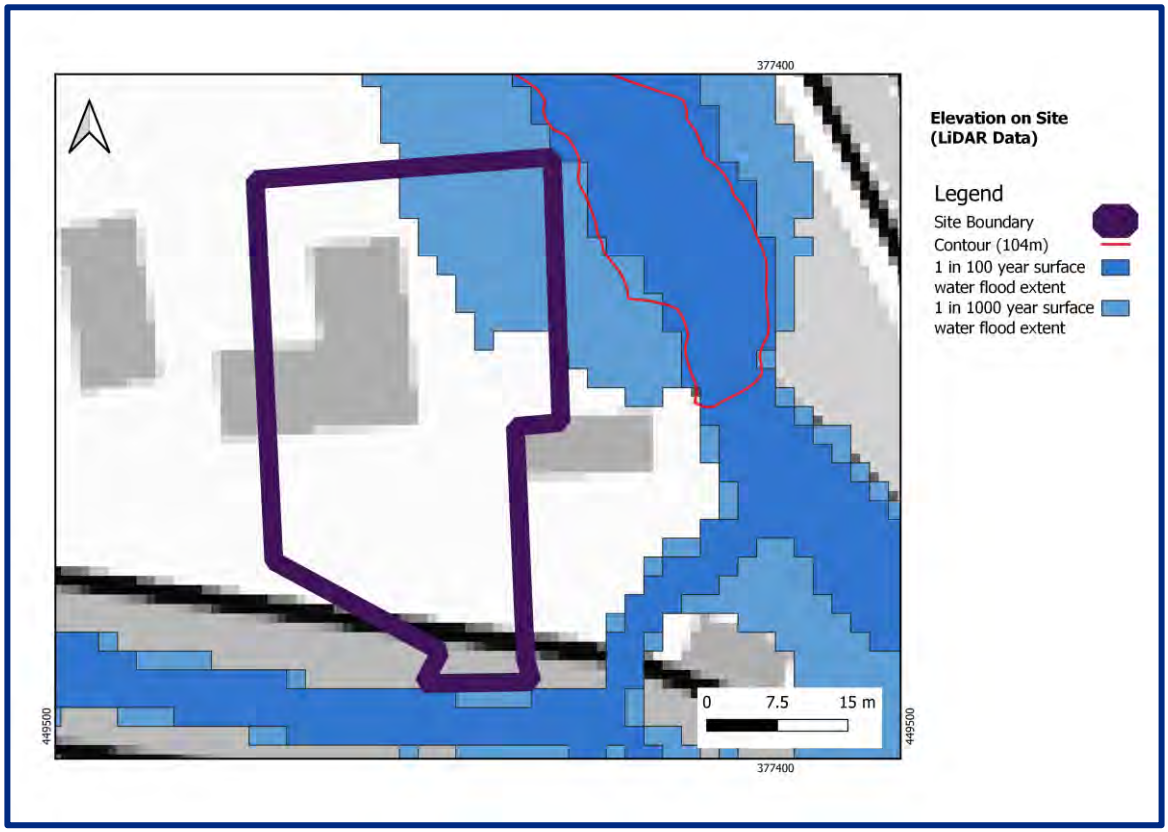
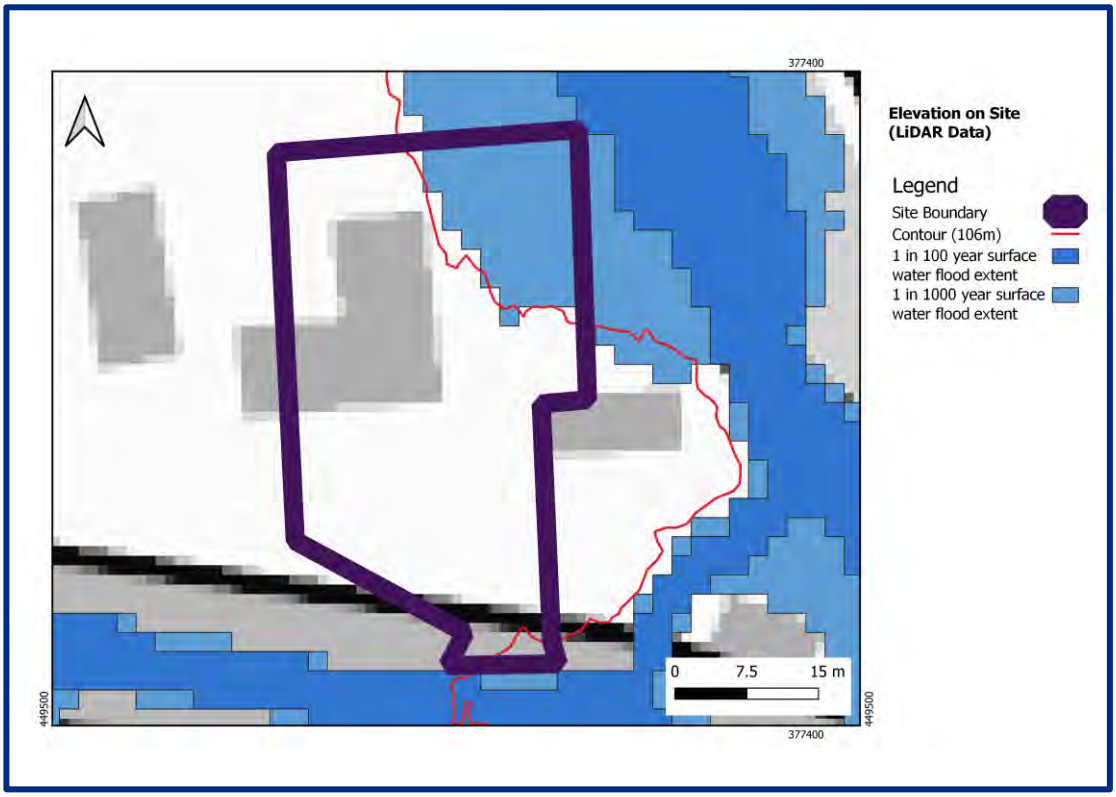


Figure 9. Map showing the identified maximum elevation for the 1 in 1000 year surface water event (EA, 2022)



The following flood levels have been estimated for the Site, using the method described above:

Table 2. Estimated flood levels using 1m LiDAR data

Ground levels in the area proposed for development (mAOD)	Modelled Flood Levels (mAOD)	
	1 in 100 year	1 in 1000 year
105.6 to 107.4	104.0	106.0
Flood depths (m)	N/A	0-0.4

Climate change factors

The EA's *Flood risk assessments: climate change allowances* guidance (Published 19 February 2016 and updated October 2021) has been used to inform a suitable increase in peak river flows for the proposed development.

The updated guidance confirms 'Less Vulnerable' developments are required to undertake a Basic assessment approach. As the Site is located within the North West River Basin and the proposed development is classed as Less Vulnerable, where the proposed lifespan is approximately 60 years, the Central (36%) allowance has been used to determine a suitable climate change factor to apply to river data.

A stage graph has been produced (Appendix B) using the estimated flood level data. The climate change allowances have been derived as a proportion of the 100 year peak flow to the 1 in 1000 year event, using the Flood Studies Report (1975) growth curves. In the Ribble Region, the 1 in 1000 year event flow is approximately 46% greater than the 1in 100 year flow, therefore the following flood levels apply:

Table 3. Flood levels plus climate change allowances

Ground levels in the area proposed for development (mAOD)	Modelled Flood Levels (mAOD)
	1 in 100 year plus 36% climate change allowance
105.6 to 107.4	105.6
Flood depths (m)	N/A

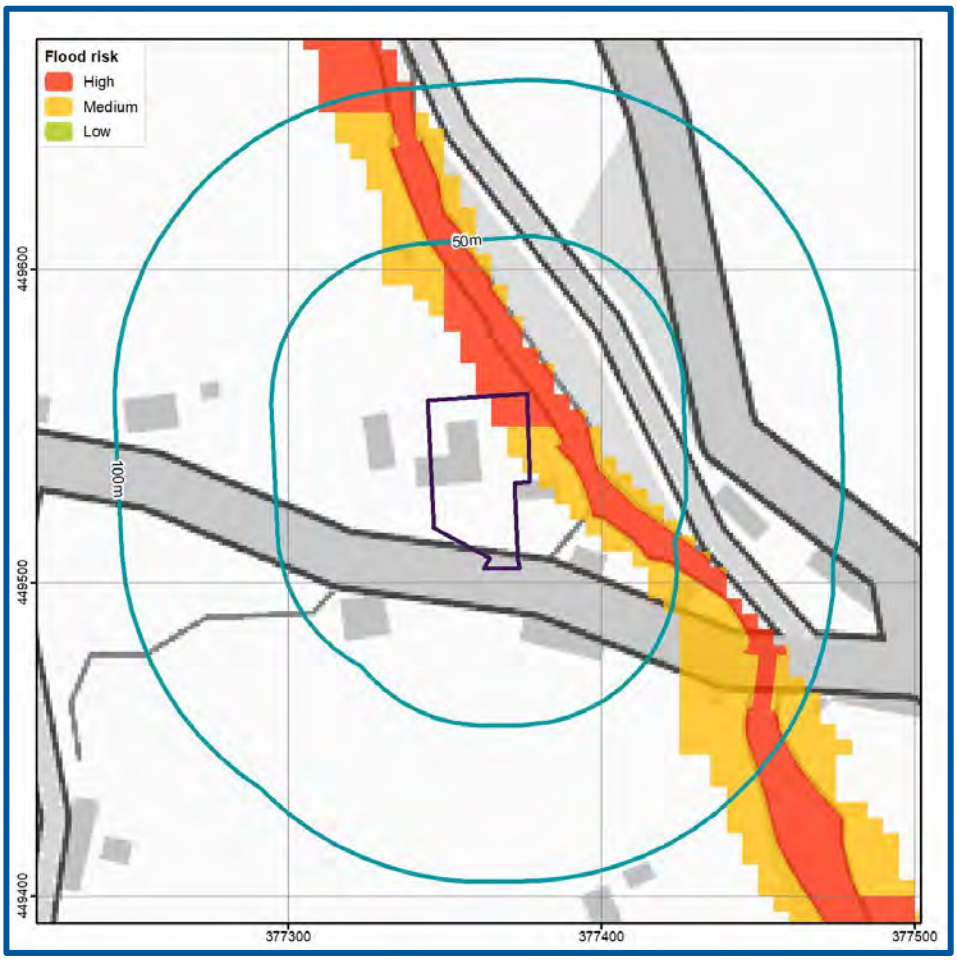
Flood risk including the benefit of defences

The type and condition of existing flood defences influence the 'actual' risk of fluvial flooding to the Site, albeit the long-term residual risk of flooding (ignoring the defences) should be considered when proposing new development.

According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) mapping (Figure 10, overleaf), which considers the crest height, standard of protection and condition of defences, the flood risk from Rivers and the Sea is Very Low to High.

However, this risk is based on modelled EA Flood Zones and consequently a more realistic risk rating of the Site, using the modelled surface water extents, indicate the risks are Very Low to Low.

Figure 10. Risk of Flooding from Rivers and Sea map (EA, 2022)



Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to Low.

- An area at Low risk affects the north east of the Site.
- The rest of the Site is at Very Low risk of flooding.

Guidance

According to EA's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between a 1 in 1000 & 1 in 100 (0.1% and 1%).

Figure 11 confirms the extent and depth of flooding during a 1% AEP (1 in 100 year - medium risk) event. This confirms the Site is not at risk of flooding in this scenario. An area of surface water flooding is located to the south of the Site where flood depths could be up to 0.3m, however it is likely that flooding would be contained by the highway of Holden Lane and would consequently not pose a risk to the Site.

Figure 11. EA Medium surface water flood risk map (EA, 2022)

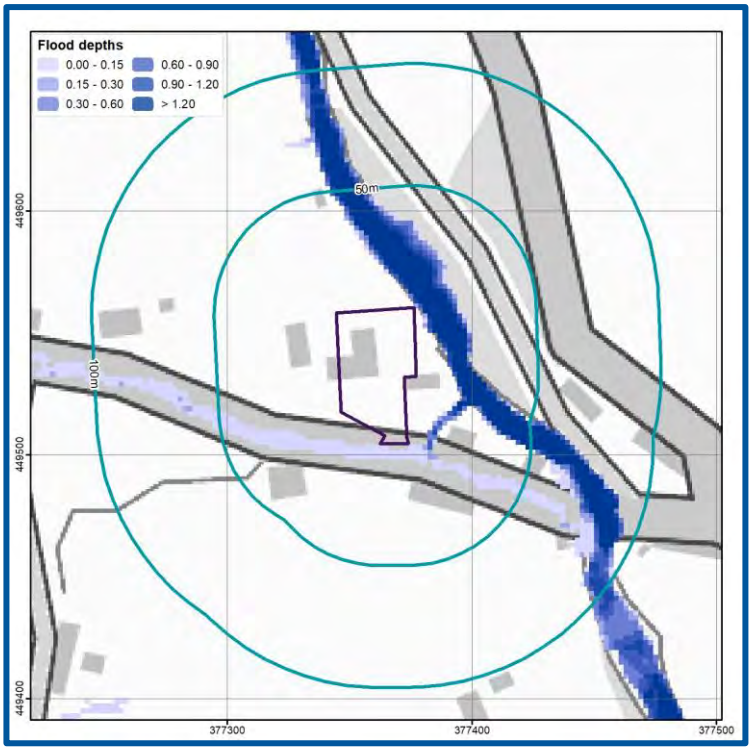
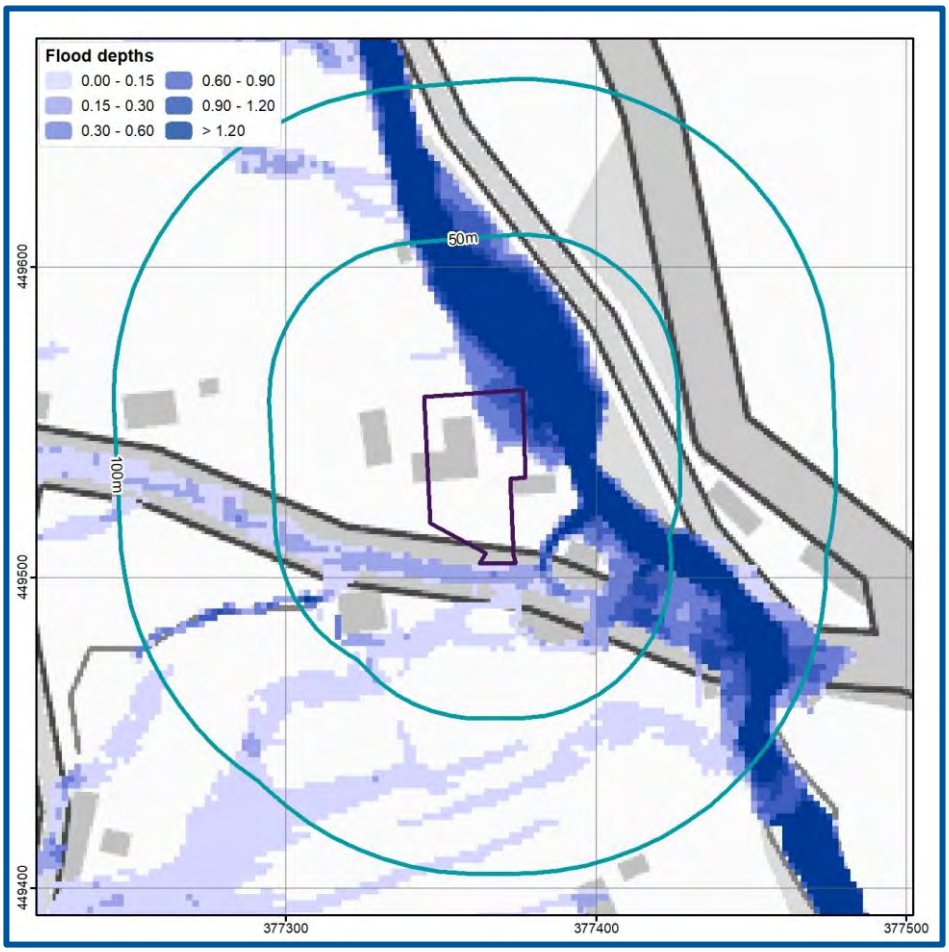


Figure 12 confirms the extent and depth of flooding during a 0.1% AEP (1 in 1000 year - low risk) event. This confirms an area in the north east of the Site at risk of flooding.

Flood depths in the north east could be between 0 and 1.2m in depth although would occur across a non-essential area of the Site and are unlikely to affect the proposed development.

Figure 12. EA Low surface water flood risk map (EA, 2022)



Guidance

According to EA's surface water flood risk map the following advisory guidance applies to the Site during a 1 in 1000 year (Low risk) event:

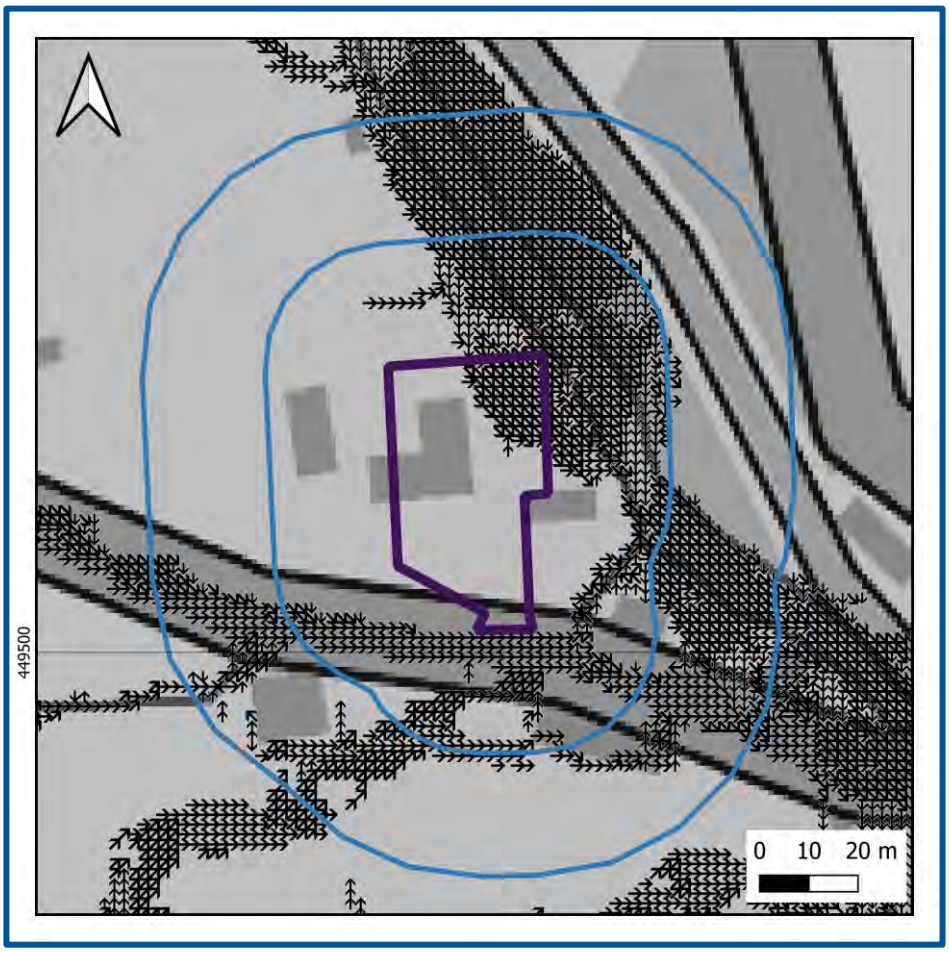
Flood Depth

- 0.15 to 0.3 m - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas
- 0.3 to 0.9 m - Flooding is likely to exceed average property threshold levels and cause internal flooding. Resilience measures are typically effective up to a water depth of 0.6 m above floor level.

- >0.9 m Very likely to exceed the maximum flood depth where property-level flood resilience measures are still effective.

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year event confirms the Site is located on a potential overland flow route during a Low risk scenario. Figure 13 illustrates the extent of the flow.

Figure 13. EA Low surface water flood risk map (EA, 2022)



During this event some of flow velocities are greater than 0.25 m/s. The flows could potentially affect the proposed buildings in the north east of the Site. The Site may potentially transmit overland flows off-Site in a south east direction.

A review of the Site plans, topography and the EA's Risk of Flooding from Surface Water Direction mapping indicates any overland flows on the Site would not be obstructed by the proposed development and occur across non-essential areas of the Site.

The SFRA does not indicate any reported incidents of historical surface water flooding within 100 m of the Site (Ribble Valley Borough Council, 2017). The SFRA does not confirm

whether the Site is located within a Critical Drainage Area (CDA)[5] (Ribble Valley Borough Council, 2017).
The Site is susceptible to overland flow and surface water flooding which may be increased as a result of climate change.

On-Site surface water drainage systems should be designed appropriately to manage the run-off.

[5] A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF, 2021). CDA's are specific to Flood Zone 1, defined as areas where runoff can and may have historically contributed to flooding downstream, although they are not necessarily areas where flooding problems may occur. Where a Site is located in Flood Zone 1 and within a CDA, a Flood Risk Assessment (FRA) is required and the Council may also request Sustainable Drainage Scheme (SuDS) features to be included within the proposed development.

Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 14) indicates there is a Negligible risk of groundwater flooding at surface in the vicinity from permeable superficial deposits during a 1 in 100 year event.

Figure 14. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2022)

Mapped classes combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-

specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) and the EA's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

The SFRA does not indicate any reported incidents of historical ground water flooding within 20 m of the Site (Ribble Valley Borough Council, 2017).

Spring lines can give rise to groundwater seepage and overland flow through the Site. Whilst a spring line has not been identified, the contact between the River Terrace deposits and the Devensian Till deposits is located on Site, and as such, the potential for a spring line would depend on the local differences in hydraulic conductivity.

The groundwater below the Site is likely be in continuity with the fluvial system, due to the presence of permeable superficial deposits. Consequently, a variable groundwater flood risk exists on Site.

- In the north east of the Site, within the extent of the 1 in 100 year surface water flood extent the risk is Moderate
- In the north east of the Site, within the 1 in 1000 year surface water flood extent the risk is Low
- The rest of the Site is at a Negligible risk of groundwater flooding.

On the basis of the site-specific assessment, the groundwater flood risk is considered to be Negligible-Moderate.

Guidance

Negligible Risk - There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Low Risk - There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Moderate Risk - There will be a significant possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in both peak river levels and the variation in rainfall recharge which is uncertain.

Based on the available evidence the resulting increase to groundwater flood risk is not considered significant.

Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.)

Sewer flooding

Page 54 of the SFRA has not identified the Upper Ribble area to have a significant sewer flooding problem; however, the report does not confirm whether any incidences of sewer flooding have occurred on the Site (Ribble Valley Borough Council, 2017).

The local water company, United Utilities were approached as part of this flood risk assessment to confirm instances of sewer flooding within the vicinity of the Site however a response was not received within the timeframe of this report.

Guidance

Properties classified as “at risk” are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

Culverts and bridges have been identified within 500 m of the Site. A highway bridge on Holden Lane over the Mear Gill River is located approximately 65m to the southeast of the Site.

The Site lies upstream of the infrastructure and could potentially be affected by flooding as a result of blockage. Further assessment of local elevation data indicates the Site lies above adjacent land and the bridge structure is likely to be surcharged. An additional assessment is therefore not required.

Initial investigation suggests that the Local authority is responsible for maintenance of the infrastructure. The SFRA has not identified any historic drainage issues within the Site area (Ribble Valley Borough Council, 2017).

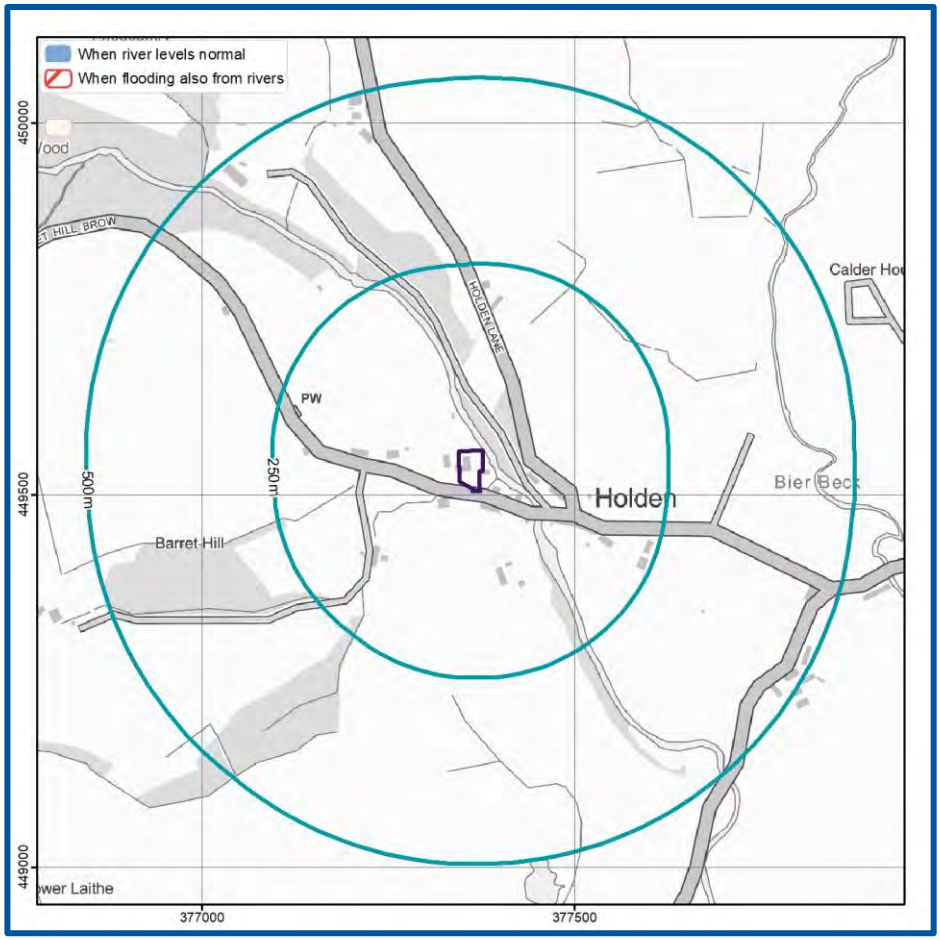
Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is not at risk of flooding from reservoirs (Figure 15) (EA, 2022).

Figure 15. EA Risk of Reservoir Flooding (EA, 2022)



The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m^3 of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2022).

Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier, United Utilities.

5. Flood risk from the development

Floodplain storage

The development is located within a fluvial Flood Zone and involves an increase in building footprint and raising of ground levels but the area proposed for development would not be impacted by the 1 in 100 year plus 36% climate change event as ground levels are between 105.6 and 107.4mAOD in this area and the flood level is 105.6 mAOD.

As such, there would be no losses in floodplain storage in the 1 in 100 year plus 36% climate change event and the proposed development would not displace flooding.

Drainage and run-off

The proposed development involves an increase of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective Site water management and prevent any increase in flood risk to off-Site receptors from the Site.

The potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated, using FEH 2013 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016).

The NPPF (2021) recommends the effects of climate change are incorporated into FRA's and the recently updated climate change guidance (published in 2016 and updated in 2021) confirms the requirements for inclusion within FRA's.

As the proposed development is commercial, the lifespan of the development and requirements for climate change should allow up to the 2060-2115 scenario.

Table 4. Climate change rainfall allowances

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Sustainable Drainage System (SuDS)

It is recommended that attenuation of run-off is undertaken on-Site to compensate for proposed increases in impermeable surface areas. Attenuation may comprise the provision of storage within a Sustainable Drainage System (SuDS). SuDS can deliver benefits from improving the management of water quantity, water quality, biodiversity and amenity. Potential SuDS options are presented in the table below, subject to further investigation:

Table 5. SuDS features which may be feasible for the Site

Option	Description
Rainwater harvesting	Rainwater harvesting can collect run-off from the roofs for use in non-potable situations, using water butts for example.
Green roof	Having part/all of the roof as a green roof covered in vegetation can intercept and store a proportion of the rainfall to result in an overall reduction in the amount of surface water run-off generated from a building structure. They comprise a substrate (growth medium) layer which can be seeded with specially selected plants suitable for the local climatic conditions. Beneath the growth medium is a geotextile filter layer which filters out the substrate from entering the aggregate/geo-composite drainage layer below. At the very bottom of the green roofing, a waterproof membrane protects the roof structure below.
Permeable paving	Permeable pavements can be used for driveways, footpaths and parking areas to increase the amount of permeable land cover. Suitable aggregate materials (angular gravels with suitable grading as per CIRIA, 2007) will improve water quality due to their filtration capacity. Plastic geocellular systems beneath these surfaces can increase the void space and therefore storage but do not allow filtration unless they are combined with aggregate material and/or permeable geotextiles.
Soakaways	An excavation filled with gravel within the Site. Surface water run-off is piped to the soakaway.
Attenuation basins/pond	Dry basin or a permanent pond that is designed to hold excess water during a rainfall event.

It is assumed that any changes to the existing drainage system will be undertaken in accordance with best practice and that care will be taken to ensure the new development does not overload/block any existing drainage or flow pathways to/from the Site. Based on the topography and Low surface water flood risk in the vicinity interference with overland flow paths is considered unlikely.

6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

National policy and guidance

The aims of the national planning policies are achieved through application of the Sequential Test and in some cases the Exception Test.

Guidance
Sequential test: The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2021). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered.
Exception test: In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that 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.

Suitability of the proposed development, and whether the Sequential and Exception Tests are required, is based on the Flood Zone the Site is located within and the flood risk vulnerability classification of the existing and proposed development. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

This report has been produced to assess all development types, prior to any development. The vulnerability classification and Flood Zones are compared within Table 6 overleaf (Table 3 of the NPPG (2014)).

As the Site is located within Flood Zone 3a and the proposed development is defined as Less Vulnerable; the proposals would be acceptable, but may be subject to the Sequential Test.

Where the Sequential Test is required it must be demonstrated that there are no alternative reasonably available Sites at lower risk of flooding within the area of the Site. For a site to be considered to be reasonably available it must be 'deliverable' and 'developable' as defined by the NPPF (2021).

Table 6. Flood risk vulnerability and flood zone 'compatibility (taken from NPPG, 2014)

Flood risk vulnerability classification		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone	Zone 1 – low probability	✓	✓	✓	✓	✓
	Zone 2 – medium probability	✓	✓	Exception test required	✓	✓
	Zone 3a - high probability	Exception test required	✓	X	Exception test required	✓
	Zone 3b – functional flood plain	Exception test required	✓	X	X	X

EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

Surface water management;

Access and evacuation; and

Floor levels.

Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

Surface water management plan where available; OR

Strategic flood risk assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than $5m^2$.

Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;

Basement rooms have clear internal access to an upper level, e.g. a staircase;

Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

Floor levels

The following should be provided:

Average ground level of the building; and

Finished floor level of the lowest habitable room in the building.

Ground floor levels should be a minimum of whichever is higher of:

0.3 m above the general ground level of the Site; OR

At least 0.6 m above the estimated river or sea flood level[6].

If you cannot raise floor levels above the estimated flood level, you need to consider extra flood resistance and resilience measures.

Extra flood resistance and resilience measures

Follow the extra flood resistance and resilience requirements for developments in flood risk areas where ground floor levels are lower than the estimated flood level for the Site.

Water depth up to 0.3 m

The design of the building or development should keep water out as much as possible. You should use materials that have low permeability (materials that water cannot pass through, for example, impermeable concrete).

[6] This is 0.6 m above the 1 in 100 year fluvial or 1 in 200 year tidal flood events. The 0.6 m is split into a 0.3 m freeboard allowance for climate change and 0.3 m allowance for the inaccuracies in the EA's flood modelling. Where the climate change flood level is known, a 0.3 m allowance should be added to the climate change flood level to allow for the inaccuracies in the EA's flood modelling.

Water depth from 0.3 m to 0.6 m

The design of the building or development should keep water out (unless there are structural concerns) by:

using materials with low permeability to at least 0.3 m

using flood resilient materials (for example lime plaster) and design (for example raised electrical sockets)

making sure there's access to all spaces to enable drying and cleaning

Water depth above 0.6 m

The design of the building or development should allow water to pass through the property to avoid structural damage by:

using materials with low permeability to at least 0.3 m

making it easy for water to drain away after flooding

making sure there's access to all spaces to enable drying and cleaning

Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

Ribble Valley Core Strategy (Ribble Valley Borough Council, 2008):

POLICY DME6: WATER MANAGEMENT

10.17 development will not be permitted where the proposal would be at an unacceptable risk of flooding or exacerbate flooding elsewhere.

Applications for development should include appropriate measures for the conservation, protection and management of water such that development contributes to:

- Preventing pollution of surface and / or groundwater
- Reducing water consumption
- Reducing the risk of surface water flooding (for example the use of sustainable drainage systems (SuDS)

As a part of the consideration of water management issues, and in parallel with flood management objectives, the authority will also seek the protection of the borough's water courses for their biodiversity value.

All applications for planning permission should include details for surface water drainage and means of disposal based on sustainable drainage principles. The use of the public sewerage system is the least sustainable form of surface water drainage and therefore development

proposals will be expected to investigate and identify more sustainable alternatives to help reduce the risk of surface water flooding and environmental impact.

Ribble Valley Strategic Flood Risk Assessment (Ribble Valley Borough Council, 2017):

- 2.5 The main watercourses in the RVBC part of the catchment are the Ribble, Hodder, and Calder along with their tributaries. The upper Ribble and Hodder both drain the northern half of the catchment.
- Major historical floods recorded in the Ribble catchment and RVBC communities worst hit (Source Ribble CFMP)
    - …1936 Ribble, Hodder, Calder: (affected) Slaidburn, Whalley, Clitheroe, Bolton-by- Bowland…
    - Of the major historical flood events recorded there appears to have been a concentration of floods in July and August, many associated with short-lived but very intensive convectional rainstorms, often over built-up areas (for example Preston, Burnley, Blackburn) which produced rapid runoff. The months of March, April and May did not experience any major floods.
- (The Upper Ribble and Hodder) does not have a significant sewer flooding (DG5) problem, although actual theoretical risk of such flooding is unclear

Ribble Valley Surface Water Management Plan (Ribble Valley Borough Council, 2008):

- Upper Ribble & Hodder: This sparsely populated area has a generally low risk of flooding considering its very large size. Any properties that are at risk of flooding are dispersed in nature. The sub-area is very rural and the rivers tend to be natural channels without flood defences. We estimate there are 230 properties at risk of flooding in a 1% annual probability event (APE) and this could rise to 350 due to the effects of climate change by 2100.
- The vision and preferred policy
    - Policy option 1:
        - Areas of little or no flood risk where we will continue to monitor and advise. Because of the generally low flood risk throughout this sub-area, significant engineering works are unlikely to be economically justifiable to the isolated properties which are at risk of flooding. Flood resilience measures within these properties are the preferred method of managing flood risk. Due to the sub-area's rural nature, there are possibilities for targeted natural flood storage and associated creation of new habitats. Our current flood risk management activities in this sub-area are minimal, and any increase in flood risk as a result of climate change is unlikely to be significant enough to change this approach.

- Proposed actions to implement the preferred policy
    - The essential actions to achieve our policy aim are listed below:
        - Promote the application and use of flood resilience measures to those properties in the sub-area currently at risk of flooding.
        - Promote land use/land management projects by landowners via Higher Level Stewardship (HLS).

Guidance

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2021).

Environment Agency response:

The EA (2022) responded to the original application for planning on 18/05/2021. Their response is shown below (full response letter is included in Appendix C):

'In the absence of an acceptable Flood Risk Assessment (FRA) we object to this application and recommend that planning permission is refused.

Reason(s)

The submitted FRA does not comply with the requirements for site-specific flood risk assessments, as set out in paragraphs 30 to 32 of the Flood Risk and Coastal Change section of the planning practice guidance. The FRA does not therefore adequately assess the development's flood risks. In particular, the FRA fails to:

- Take the impacts of climate change into account
- Consider how people will be kept safe from the identified flood hazards
- Consider how a range of flooding events (including extreme events) will affect people and property
- Consider the requirement for flood emergency planning including flood warning and evacuation of people for a range of flooding events up to and including the extreme event.

Detailed comments

The proposed development to the east side of the building will be at risk of fluvial flooding, it is understood from information submitted, the ground floor will not be habitable (used for storage) with a terrace associated to the business on the first floor. Whilst not mentioned in the FRA, the proposed and existing elevations appear to show that there will be ground level raising within the 1% AEP plus climate change allowance extent, the impact of this has not been assessed.'

7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

Sea (coastal/tidal) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

Rivers (fluvial) flood mitigation measures

The Site is located within an area which is affected by flooding from rivers, the following table confirms the flood depths associated with the area proposed for development.

Table 7. Flood levels compared to ground levels in the area proposed for development

Ground levels in area proposed for development (mAOD)	Modelled Flood Levels (mAOD)		
	1 in 100 year plus (mAOD)	1 in 100 year plus 36% CC (mAOD)	1 in 1000 year (mAOD)
105.6-107.4	104.0	105.6	106.0
Flood depths (m)	N/A	N/A	0-0.4

Raising minimum floor levels

The vulnerability classification of the Site and the Flood Zone means proposals for the Site fall under the EA's Flood Risk Standing Advice (FRSA) for more vulnerable developments.

In this instance, in line with the EA's FRSA the recommended minimum Finished Floor Level (FFL) should be set at least 0.3m above the 1 in 100 year plus 36% allowance for climate change flood level of 105.9mAOD. Finished floor levels of the proposed buildings are 107.79mAOD, and consequently exist above the recommended FFL.

If finished floor levels are able to be raised this could reduce the flood risk to the development from Medium to Low.

Additional Mitigation

Where it is not possible to raise the minimum finished floor levels to the recommended elevation, it may be appropriate to adopt a water exclusion strategy for flood depths up to 0.3 m in line with the EA's Standing Advice. A water exclusion strategy, using avoidance and resistance measures, is appropriate where floods are expected to last for short durations. Potential water exclusion strategies include:

- Passive flood door systems;
- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Construction of local bunds;
- Landscaping to divert water away from the property;
- Sustainable Drainage Systems (SuDS) to store/intercept flood water;
- Boundary walls/fencing;

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered.

Flood resilient materials and designs:

- Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
- Hard flooring and flood resilient metal staircases;
- The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
- Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
- Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

Where flood depths are expected to be between 0.3-0.6 m both water exclusion and water entry strategies should be adopted depending on a structural assessment of the building. A structural engineer should be consulted to confirm this would be a suitable water entry strategy for the proposed development, to ensure flood flows would not impact the structural integrity of the building. Potential strategies include:

- Ground floors designed to permit water passage at high flood depths;
- Hard flooring and flood resilient metal staircases;
- Heating systems, electrical sockets and utility meters should be raised above the predicted flood level where possible; and
- Sump and pump.

If these mitigation measures are implemented this could reduce the flood risk to the development from High to Low.

Surface water (pluvial) flood mitigation measures

A Low surface water (pluvial) flooding risk has been identified at the Site. In order to ensure the development includes sufficient flood mitigation measures to reduce the risk of pluvial flooding over its lifetime, the flood depths, levels and appropriate mitigation measures are summarised below:

Flood event	Flood depth on Site (m)	Flood depths in the developed area of the Site (m)	Flood level (mAOD)
1 in 30	N/A	N/A	N/A
1 in 100	N/A	N/A	N/A
1 in 1000	Up to 1.2	Up to 0.6	Up to 106.2

Finished floor levels of the proposed development should be set at least 0.3 m above the maximum 1 in 100 year event flood level. As the Site does not experience flooding in this Medium risk event, Finished Floor Levels are not recommended to be raised.

Where Finished floor levels cannot be set at the recommended elevation, the floor levels should be set as high as possible and flood resilience measures included:

The regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff from the proposed development.

If these mitigation measures are implemented this could reduce the flood risk to the development from Low to Very Low.

Groundwater flood mitigation measures

It is likely the flood mitigation measures recommended for river and surface water (pluvial) risk will be sufficient to reduce the groundwater flood risk at the development. However specific groundwater measures that may also be considered for the Negligible-Moderate risk identified include:

- Waterproof tanking of the ground floor;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

If these mitigation measures are implemented this could reduce the flood risk to the development from Negligible-Moderate to Negligible-Low.

Reservoir flood mitigation measures

The Site is not a risk of flooding from reservoirs; therefore, mitigation measures are not required.

Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'more vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

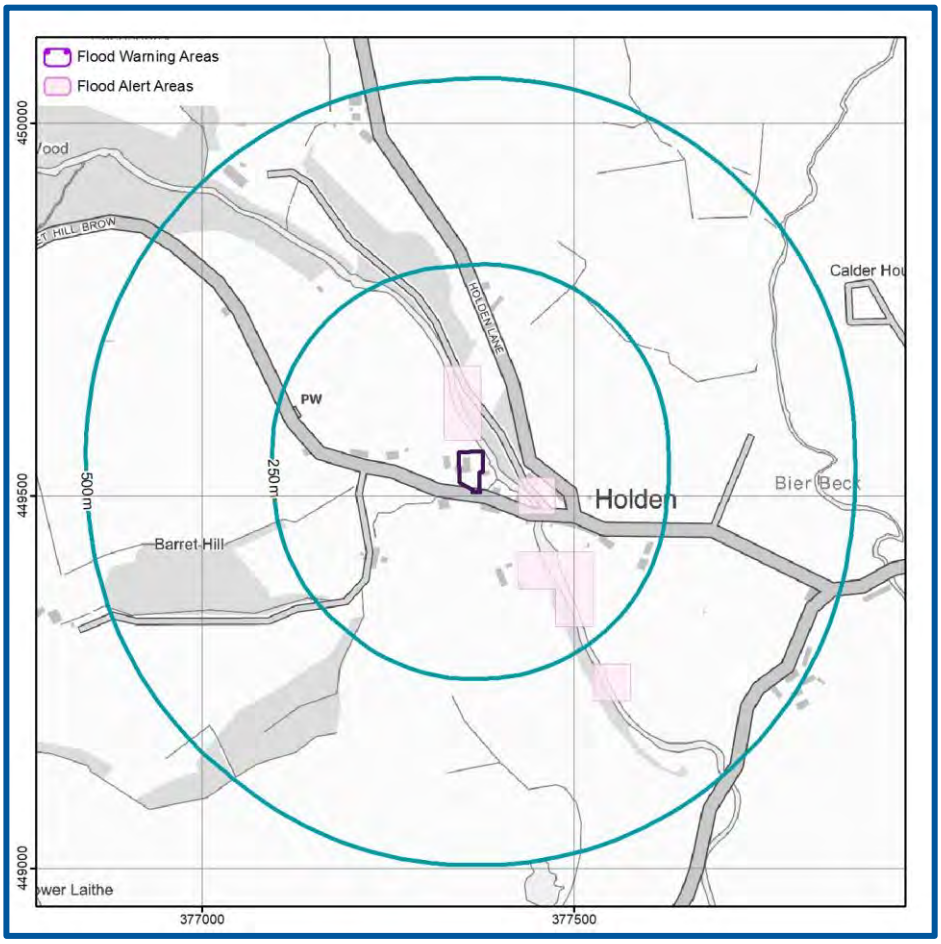
Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

Flood warnings

The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

The EA aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Figure 16. EA Flood Warning Coverage for the local area (EA, 2022).



Emergency evacuation

Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the EA's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is within the Site in the south and west. It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents

prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

On-Site refuge

Evacuation should be the primary action in preference, however safe refuge could be sought at first floor level in a worst-case scenario as an office area is situated on the first floor.

Other relevant information

A business continuity plan is recommended to reduce risks to people, property and profit.

Registration to the Environment Agency's flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

8. Conclusions and recommendations

Table 8. Risk ratings following implementation and subsequent maintenance of mitigation measures

Source of Flood Risk	Baseline[7]	After analysis[8]	After Mitigation
River (fluvial) flooding	Very Low-High	Very Low-Low	Low
Sea (coastal/tidal) flooding	N/A	N/A	N/A
Surface water (pluvial) flooding	Very Low-Low	Very Low-Low	Very Low
Groundwater flooding	Negligible	Negligible-Moderate	Negligible-Low
Other flood risk factors present	Yes	Yes	Yes

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

Table 9. Summary of responses to key questions in the report

Key sources of flood risks identified	River (fluvial), surface water (pluvial) and groundwater (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).

[7] Based upon the EA's outdated national generalised modelling

[8] Based upon the EA's high-resolution risk of flooding from surface water mapping

Is any further work recommended?	Yes (See Section 7 and executive summary for full details)

9. Further information

The following table includes a list of additional products by GeoSmart:

Additional GeoSmart Products			
✓	Additional assessment: SuDSmart Report		The SuDSmart Report range assesses which drainage options are available for a Site. They build on technical detail starting from simple infiltration screening and work up to more complex SuDS Assessments detailing alternative options and designs. Please contact info@geosmartinfo.co.uk for further information.
✓	Additional assessment: EnviroSmart Report		Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

10. References and glossary

References

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Environment Agency [EA] (2022). Flood map for planning. Accessed from https://flood-map-for-planning.service.gov.uk/ on 26/04/2022.

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Ministry of Housing, Communities & Local Government (2014). Planning Practice Guidance (NPPG). Flood Risk and Coastal Change. Accessed from http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/ on 26/04/2022.

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Ribble Valley Borough Council (2017). Strategic Flood Risk Assessment. Accessed from: ribblevalley.gov.uk/downloads/file/2029/strategic-flood-risk-assessment-level-1-revised-2017. Accessed on 26/04/2022.

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GeoSmart Information

Glossary

General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.

SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council
SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

NPPF (2021) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that 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.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.

Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.
Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2022 BlueSky copyright and database rights 2022
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2022) Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2022
Topographic Data	OS LiDAR/EA

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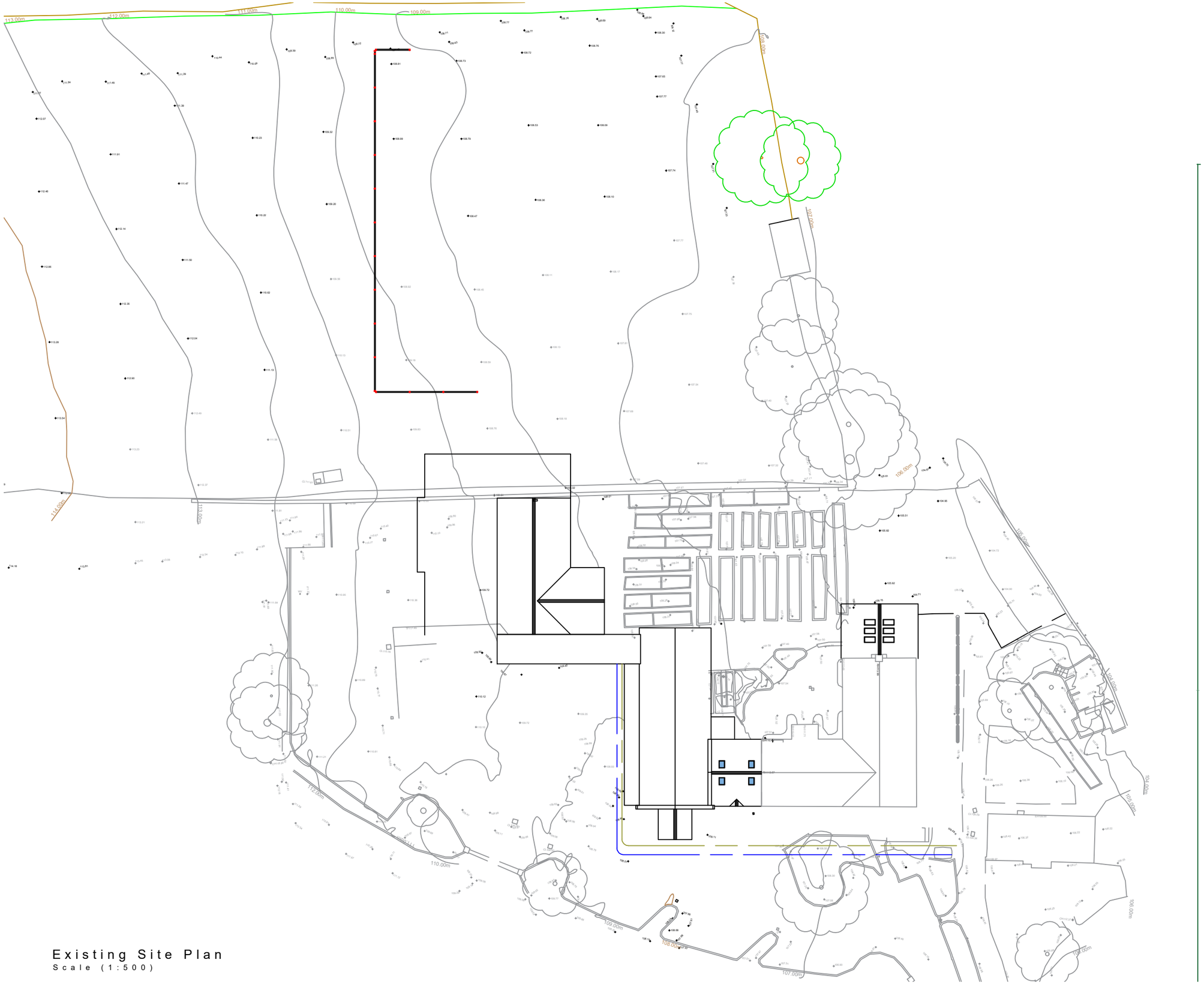
11. Appendices

GeoSmart Information

Appendix A

Site plans



Existing Site Plan

Scale (1:500)

Revision Date

HOLDEN Lancashire LIMITED

83 Blackburn Road,
Rishton, BB1 4ER

Mob: 07738162386
Email : james@holdenlancs.com
Web: www.holdenlancs.com

Drawing Title:
Proposed Plan

Site Location:
Holden Clough Nurseries, Holden Lane, Holden, Bolton by Bowland, BB7 4PF

Drawing Status:
Existing Site Plan

Date: 07/07/20

Drawn by: JHolden

Scale: 1:500@ A3

Ref: 20-03

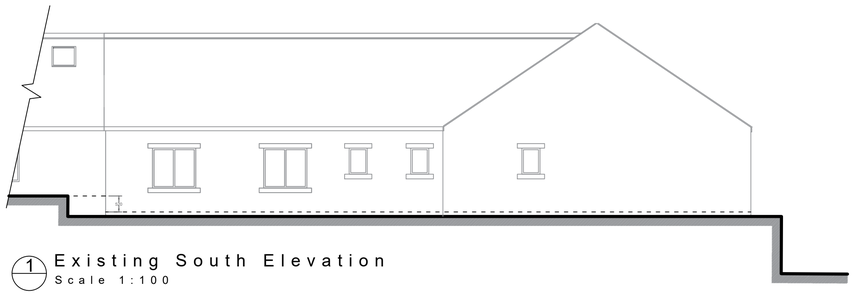
Revision: -.

Client:
Mr J. Foley

1

2

Existing Ground Floor Plan
Scale 1:50



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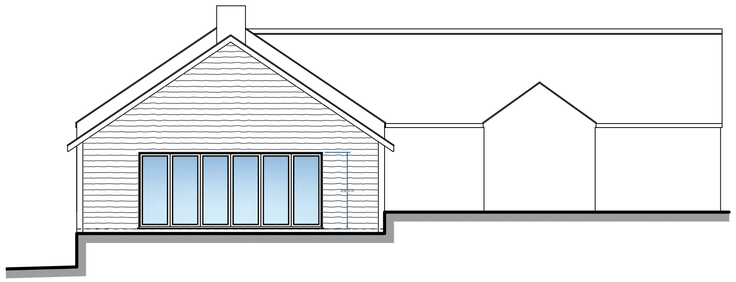
Scale 1:100



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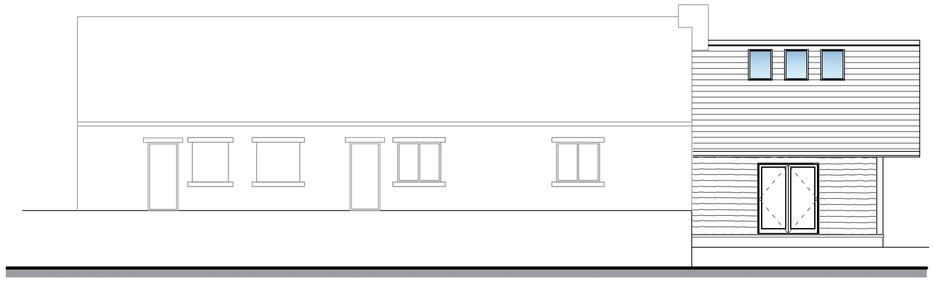
Scale 1:100



2 Existing East Elevation
Scale 1:100

IMPORTANT NOTES

ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE BUILDING REGULATION, ALL RELEVANT BRITISH STANDARD SPECIFICATION, CODES OF PRACTICE, LOCAL AUTHORITY BYLAWS, AND IN COMPLIANCE WITH THE LOCAL AUTHORITY APPROVALS.
CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK OR MAKING ANY SHOP DRAWINGS.
WHERE WRITTEN DIMENSIONS ARE PROVIDED THESE SHOULD BE TAKEN IN PREFERENCE TO SCALED OFF MEASUREMENTS BUT THEY MUST BE STILL CHECKED ON SITE OR BY REFERENCE TO THE AGENT.

THE PARTY WALL ACT CAN APPLY TO CERTAIN KINDS OF DEVELOPMENT WHERE YOU ARE BUILDING EXTENSIONS OR ALTERING BUILDINGS CLOSE TO YOUR NEIGHBOUR'S PROPERTY.
PLEASE NOTE, THAT IN CERTAIN SITUATIONS YOU WILL NEED TO ENGAGE A PARTY WALL SURVEYOR. FOR FURTHER INFORMATION AS TO WHETHER THE PARTY WALL ACT WOULD APPLY TO THE WORKS DESCRIBED ON THESE PLANS, YOU CAN VISIT THE OFFICE OF THE DEPUTY PRIME MINISTER WEBSITE AT : WWW.ODPM.GOV.UK.
PLEASE NOTE THAT THIS LEGISLATION IS NOT ENFORCED BY THE LOCAL AUTHORITY AND/OR THE BUILDING INSPECTOR AND UNLESS SEPARATELY INSTRUCTED, WE DO NOT GET INVOLVED WITH PARTY WALL MATTERS.

IF THE PROPOSED WORKS ARE TO BE CARRIED OUT BY MORE THAN ONE CONTRACTOR THEN THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 WILL APPLY. DOR FURTHER INFORMATION PLEASE SPEAK TO THE AGENT OR LOOK ON www.hse.gov.uk

Revision	Date

HOLDEN Lancashire LIMITED
83 Blackburn Road,
Rishton, BB1 4ER
Mob: 07738162386
Email : james@holdenlancs.com
Web:www.holdenlancs.com

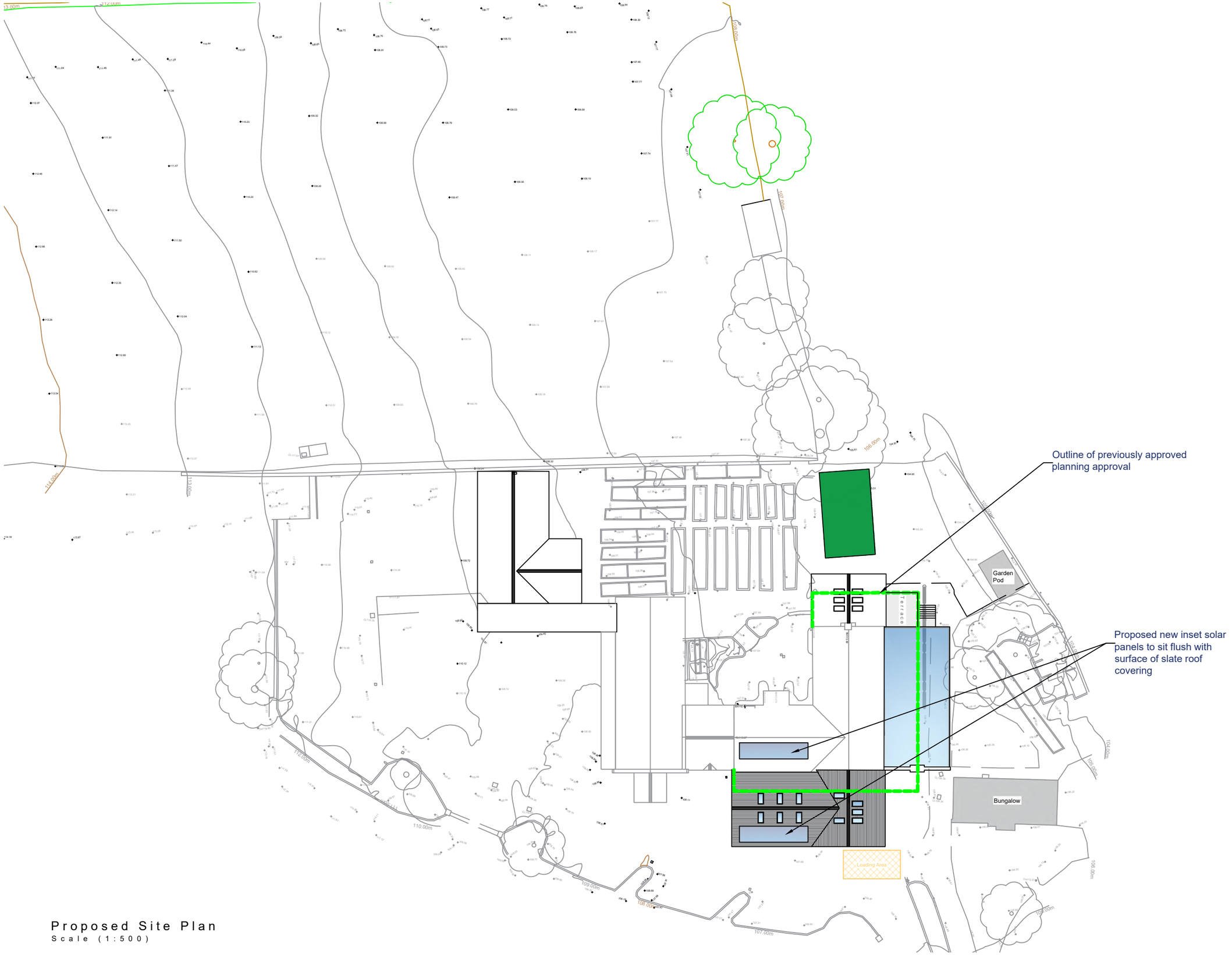
Drawing Title:
Proposed New Development Works

Site Location:
Holden Clough Nursery, Holden

Drawing Status:
Existing Plan

Date: 22/06/2020
Drawn by: JHolden
Scale: 1:100 @ A1
Ref: 20-04
Revision: -.

Client:
Holden Clough Nuersey



Proposed Site Plan

Scale (1:500)

D.	Amended at the request of the client	23/03/21
C.	Amended at the request of the client	02/03/21
B.	Additional information noted on plan	10/12/21
A.	Position of Glass extension relocated	27/10/21
Revision		Date

HOLDEN Lancashire Limited

83 Blackburn Road,
Rishton, BB1 4ER

Mob: 07738162386
Email : james@holdenlancs.com
Web: www.holdenlancs.com

Drawing Title:
Proposed Plan

Site Location:
Holden Clough Nurseries, Holden Lane, Holden, Bolton by Bowland, BB7 4PF

Drawing Status:
Proposed Site Plan

Date: 07/07/20

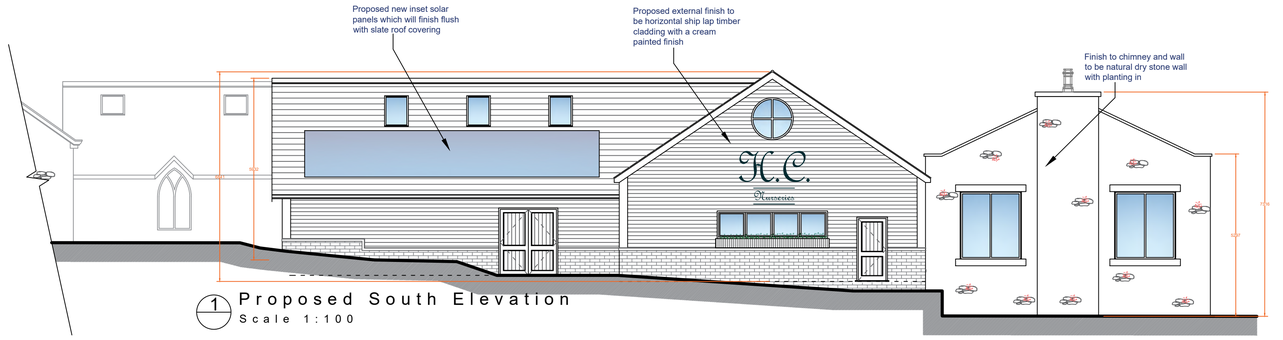
Drawn by: JHolden

Scale: 1:500@ A3

Ref: 20-02

Revision: D.

Client:
Mr J. Foley



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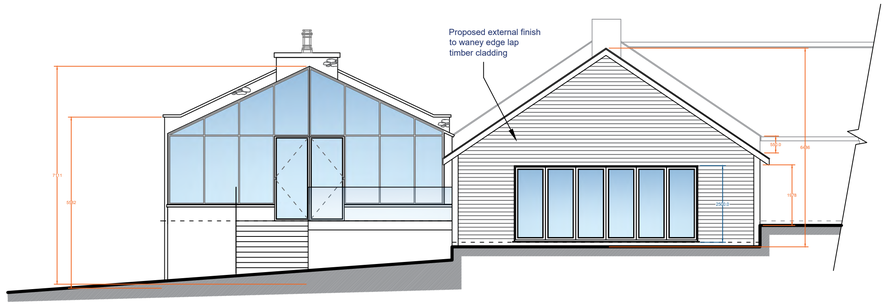
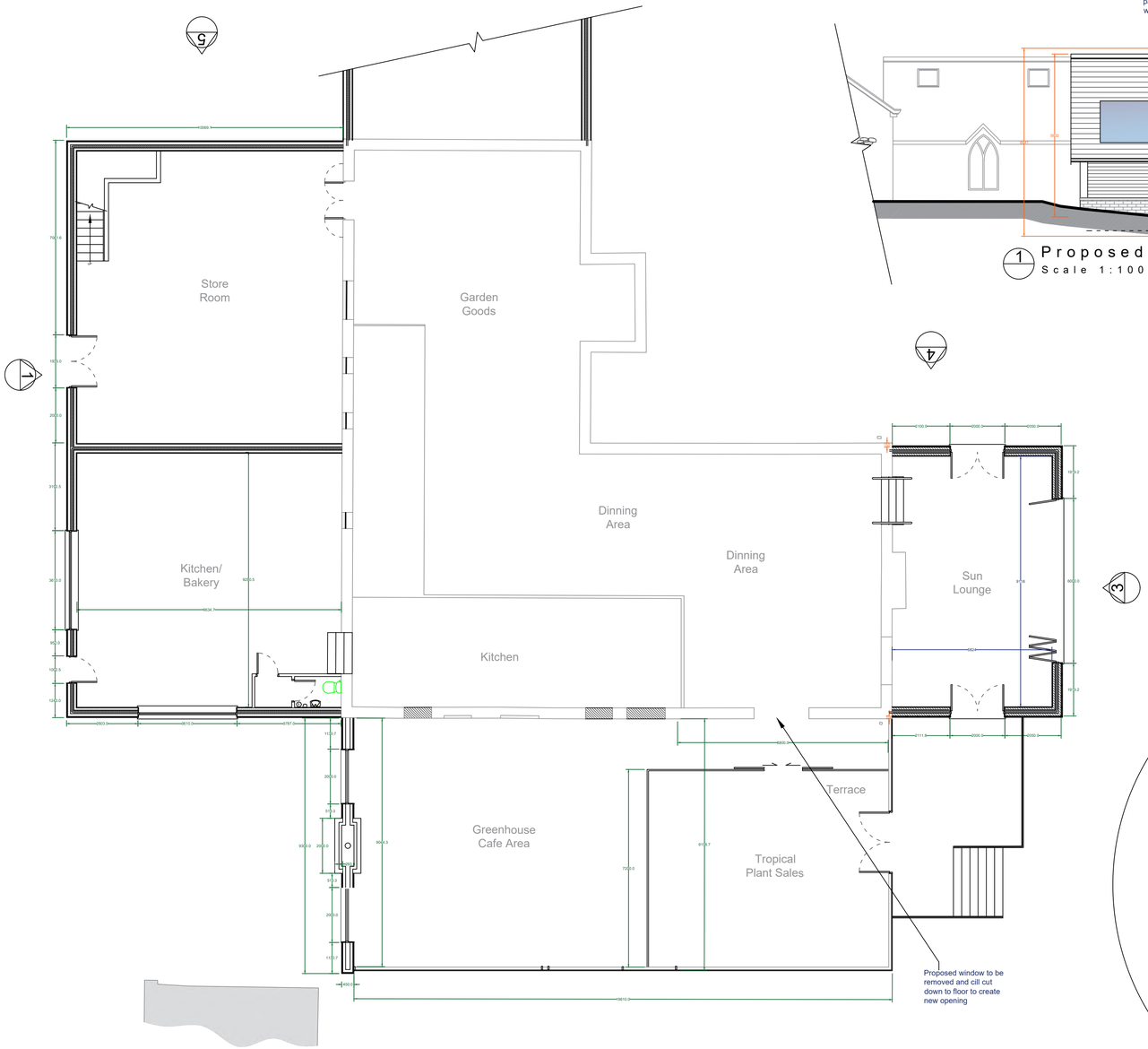
Scale 1:100



3 Proposed North Elevation
Scale 1:100



Proposed Ground Floor Plan
Scale 1:50

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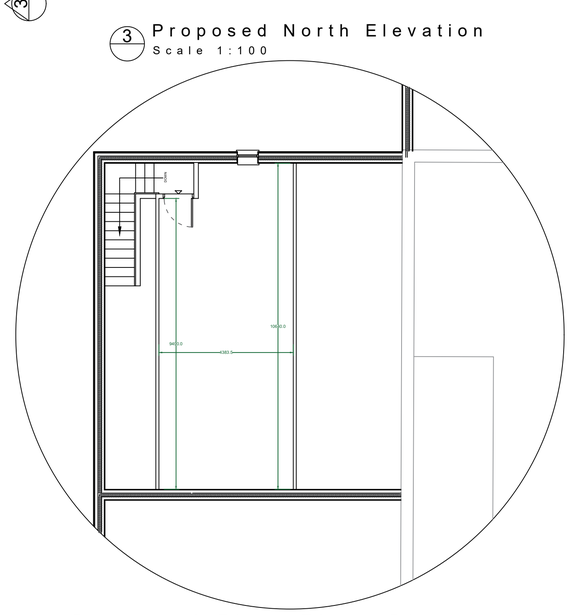
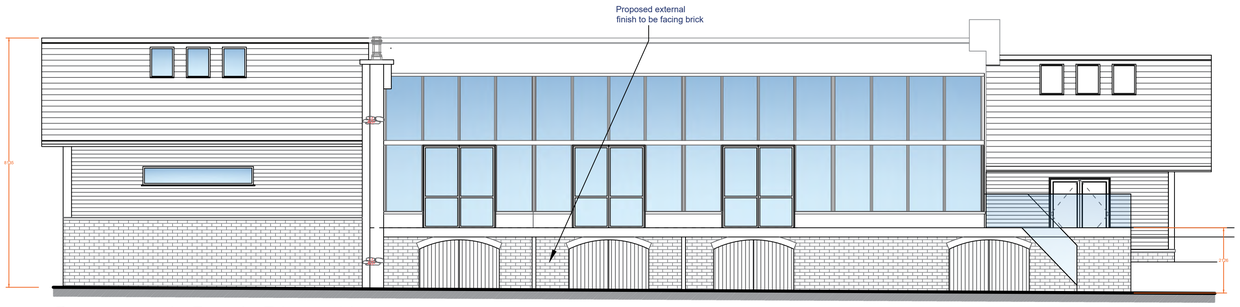


Proposed First Floor Plan
Scale 1:50

4 Proposed West Elevation
Scale 1:100



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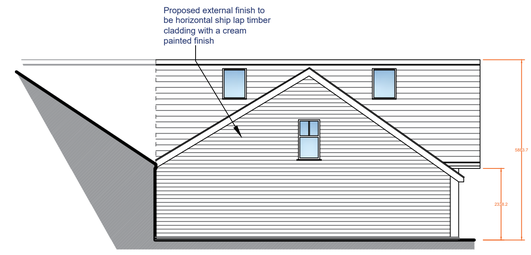

5 Proposed West Elevation
Scale 1:100

IMPORTANT NOTES

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J.	Altered at the request of the client	23/03/22
I.	Altered at the request of the client	02/03/22
H.	Additional dimensions noted on plan	09/02/22
G.	Terrace shown on plan	17/12/21
F	Position of Glass extension relocated	27/10/21
E.	Amended at the request of L.A.	19/02/21
D.	Store room & first floor area amended	03/02/21
C.	Additional dimensions noted on plan	07/08/20
B.	Amended at the request of client	09/07/20
A.	Amended at the request of client	26/06/20
Revision		Date

HOLDEN Lancashire LIMITED
83 Blackburn Road,
Rishton, BB1 4ER
Mob: 07738162386
Email : james@holdenlancs.com
Web:www.holdenlancs.com

Drawing Title: Proposed New Development Works

Site Location: Holden Clough Nursery, Holden

Drawing Status: Proposed Plan

Date: 22/06/2020 | Drawn by: JHolden

Scale: 1:100 @ A1 | Ref: 20-01 | Revision: J.

Client: Holden Clough Nursery

GeoSmart Information

Appendix B

Environment Agency data

Ribble climate change allowance flood level

GeoSmart Information

Appendix C

EA planning response

Ribble Valley Borough Council
Development Control
Council Offices Church Walk
Clitheroe
Lancashire
BB7 2RA

Our ref: NO/2020/112925/02-L01
Your ref: 3/2020/0602

Date: 18 May 2021

Dear Sir/Madam

CREATION OF ADDITIONAL DINING SPACE, A BAKERY DELI FOOD SALES AREA WITH STORAGE AND OFFICE FACILITIES. ADDITIONAL TERRACE DINING WITH STORAGE BELOW.
HOLDEN CLOUGH NURSERY, BOLTON BY BOWLAND ROAD, BOLTON BY BOWLAND, BB7 4PF

Thank you for consulting us on the above application which we received 28 April 2021.

Environment Agency position

In the absence of an acceptable Flood Risk Assessment (FRA) we object to this application and recommend that planning permission is refused.

Reason(s)
The submitted FRA does not comply with the requirements for site-specific flood risk assessments, as set out in paragraphs 30 to 32 of the Flood Risk and Coastal Change section of the planning practice guidance. The FRA does not therefore adequately assess the development's flood risks. In particular, the FRA fails to:

- take the impacts of climate change into account
- consider how people will be kept safe from the identified flood hazards
- consider how a range of flooding events (including extreme events) will affect people and property
- consider the requirement for flood emergency planning including flood warning and evacuation of people for a range of flooding events up to and including the extreme event.

Detailed comments;
The proposed development to the east side of the building will be at risk of fluvial flooding, it is understood from information submitted, the ground floor will not be habitable (used for storage) with a terrace associated to the business on the first floor. Whilst not mentioned within the FRA, the proposed and existing elevations appear to show that there will be ground level raising within the 1% AEP plus climate change allowance extent, the impact of this has not been assessed.

The FRA submitted is inadequate and does not comply with guidance within the PPG and NPPF. In order to be acceptable the FRA should contain the following additional information;

- Flood risk must be assessed for the lifetime of the development. This means that climate change must be considered in line with Planning Practice Guidance. As such, the North West river basin district climate change allowances, for the vulnerability class and design life of the development must be considered. Currently the correct climate change levels have not been considered in the FRA, which detailed sea level allowances. These are not relevant in this location as the watercourse is not tidally influenced.
- The proposed and existing elevations show that there is likely to be ground level alterations within the 1% AEP plus climate change extent which have not been assessed. Raising of ground levels within the flood plain would result in loss of flood plain storage which is likely to increase flood risk elsewhere. This would be contrary to Paragraph 155 of the NPPF. Please confirm whether ground levels will be raised, if so, this must be assessed within the FRA, including the extent and impact of any loss of flood plain storage. If this is proposed, compensatory storage must be provided on a level-for-level basis for the 1% AEP plus allowance for climate change extent.
- Safe access and egress to the development must be detailed.

Overcoming our objection
To overcome our objection, the applicant should submit a revised FRA which addresses the points highlighted above.
If this cannot be achieved, we are likely to maintain our objection. Please consult us on any revised FRA and we will respond within 21 days of receiving it.

Advice to applicant- compensatory storage
For your given location the flood risk mapping is derived from modelling produced in 2004 (known as JFLOW) which was the first year of publication for our Flood Zones mapping. The underlying topographic data utilised in the 2004 mapping study was coarse (low resolution). The accuracy of the underlying terrain data has improved greatly since the early 2000s. Due to the coarse nature of the available modelling, the compensatory storage assessment is likely to need to be supported by detailed hydraulic modelling to inform the level-for-level assessment of replacement of flood storage.

Advice to LPA/Applicant
Due to the risk of flooding, it is strongly recommended that an emergency evacuation plan is prepared by the applicants and reviewed by relevant planning consultees.

Advice to applicant
The FRA details that flooding has not been observed at the site in living memory, please note, this does not eradicate the potential risk of flooding to the site and building for flood events of a greater magnitude than has been experienced in the past.

Advice to LPA/Applicant
The proposed site plan shows a line indicating incorrect flood zones, please refer to our previous comments dated 21st September 2020 for further detail.

Cont/d..

Yours faithfully

Carole Woosey
Planning Advisor

E-mail clplanning@environment-agency.gov.uk

End

Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil, groundwater, flood risk and drainage specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by GeoSmart solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to GeoSmart at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, GeoSmart may, by prior written agreement, agree to such release, provided that it is acknowledged that GeoSmart accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. GeoSmart accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against GeoSmart except as expressly agreed with GeoSmart in writing.

For full T&Cs see http://geosmartinfo.co.uk/terms-conditions

Important consumer protection information

This search has been produced by GeoSmart Information Limited, Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU.

Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

GeoSmart Information Limited is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.

sets out minimum standards which firms compiling and selling search reports have to meet.

promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.

enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

display the Search Code logo prominently on their search reports.

act with integrity and carry out work with due skill, care and diligence.

at all times maintain adequate and appropriate insurance to protect consumers.

conduct business in an honest, fair and professional manner.

handle complaints speedily and fairly.

ensure that products and services comply with industry registration rules and standards and relevant laws.

monitor their compliance with the Code.

GeoSmart Information

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk.

Please ask your search provider if you would like a copy of the search code

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

Acknowledge it within 5 working days of receipt.

Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.

Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.

Provide a final response, in writing, at the latest within 40 working days of receipt.

Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

12. Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/