



Flood Risk Assessment for Planning

Prepared for:



Location:

34 Pier Road
Littlehampton
West Sussex
BN17 5LW

January 2020

Our reference:

89447-Broadhurst-PierRd



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Client: [REDACTED]
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Location: 34 Pier Road, Littlehampton, West Sussex, BN17 5LW
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1. Key Facts

1.1 Flood Risk Posed:

- EA Flood Zone 3a (High Risk).
- Tidal flood risk from the River Arun.
- Risk of pluvial flooding would appear to be medium to low.
- Risk of sewer surcharge flooding would appear to be low.
- No records of groundwater flooding at the site.
- Two EA recorded historic flood events at the site.

1.2 Flood Risk Mitigation:

- Application is for a minor extension which does not exceed 250m². In addition, the outdoor building /home office acts as an extension to the existing house.
- Access maintained from the ground floor to the above floor of the building.
- No additional or separate residential units will be created as part of the development.
- Flood proofing of the ground floor extension and outdoor building /home office will be incorporated as appropriate.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

2. Introduction

Unda Consulting Limited have been appointed by Tai Broadhurst (hereinafter referred to as “the applicant”) to undertake a Flood Risk Assessment for the proposed development at 34 Pier Road, Littlehampton, West Sussex, BN17 5LW (hereinafter referred to as “the site”). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) July 2018 and the associated technical guidance.

The purpose of the study is to support a planning application for the proposed development. This report presents our findings based on the readily available information and data relating to the site and surrounding drainage area.

The site appears to be located within Flood Zone 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

3. Existing Situation

3.1 Site Usage:

The site is currently occupied by an existing residential terraced property, over three storeys with a detached garage.

The site is understood to have lawful planning permission for residential use.

A map showing the site location is presented below in Figure 1. Existing site plans are provided in the report Appendix.



Figure 1: Aerial photograph of site and surrounding area (Source: Google Earth)

3.2 Geography and Topography:

149,518 people live in Arun District. The district covers approximately 22,100 hectares of land and is characterised by attractive countryside, varied landscapes and historic and diverse settlements. The Borough includes the towns of Littlehampton, Bognor Regis, Angmering and Arundel. The district is divided between a broad rural area in the north, associated with Arundel and the southern section of the South Downs National Park, and an urban coastal strip that includes Bognor Regis and Littlehampton.

The borough is split by high land in the north associated with the South Downs National Park and lower land towards the south of the district. The River Arun bisects the centre of the district flowing in southerly direction and converges with the English Channel adjacent west to the civil parish of

Littlehampton. There are a number of ordinary watercourses within the district including Black Ditch. Ordinary watercourses are any watercourses that are not designated Main River. These watercourses can vary in size considerably and can include rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

Littlehampton is a seaside resort, with an associated pleasure harbour, and civil parish in the Borough of Arun, West Sussex, England. Situated on the banks of the River Arun and long the southern coast, it is located 19 miles (31 km) west of Brighton and 51.5 miles (83 km) south south-west of London.

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +/-5cm to 15cm with spatial resolutions ranging from 25cm to 2 metres. This dataset is derived from a combination of the EA's full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 0.5m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

Environment Agency 2m LiDAR DTM data shows that topographic levels across the site vary between approximately 3.01mAOD and 2.10mAOD, with the site sloping generally down to the east away from the River Arun.

3.3 Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated) - Chalk. Sedimentary Bedrock formed approximately 72 to 94 million years ago in the Cretaceous Period.

Superficial deposits recorded on the site are Raised Beach Deposits, 1 - Sand and Gravel. Superficial Deposits formed up to 3 million years ago in the Quaternary Period.

The soil type taken from the UK Soil Observatory website is relatively deep soils from Quaternary Marine/Estuarine Sand soil parent material, with a sand to sandy loam texture.

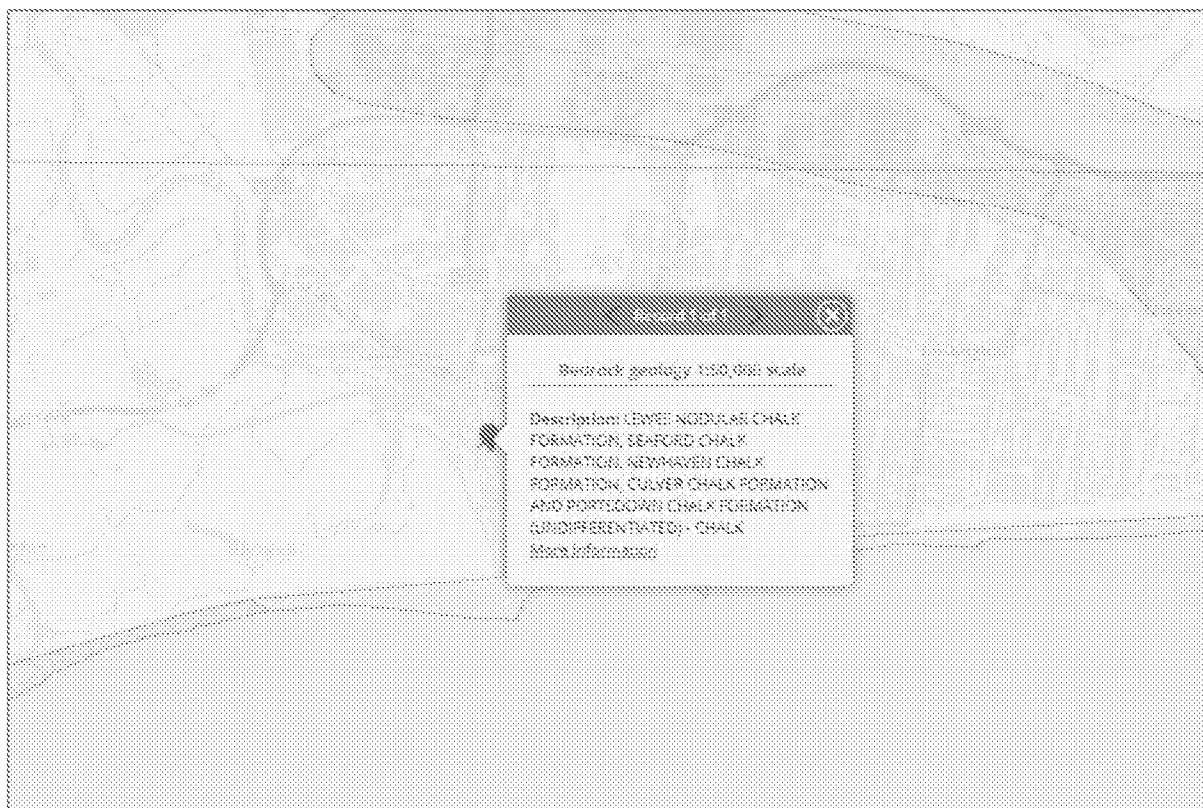


Figure 2: Local bedrock geology (Source: BGS)

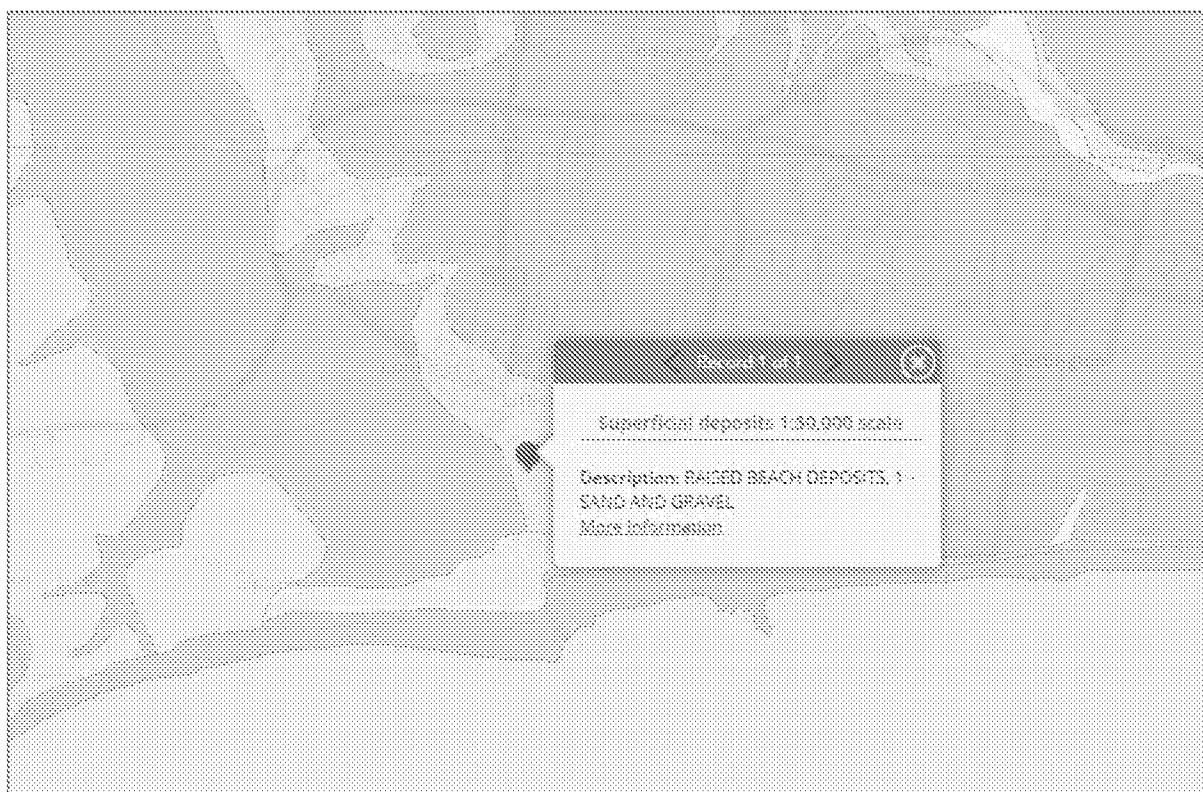


Figure 3: Local Superficial Deposits (Source: BGS)



Figure 4: Local soil types (Source: UKSO)

4. Development Proposal

Demolition of the existing rear conservatory and construction of a rear extension (with a 4.65m² increase in built footprint), and demolition of the existing detached garage and construction of an outdoor building /home office. No separate or additional residential units will be created as part of the development.

Proposed site plans are provided in the report Appendix.

5. Assessment of Flood Risk

5.1 Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's website.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

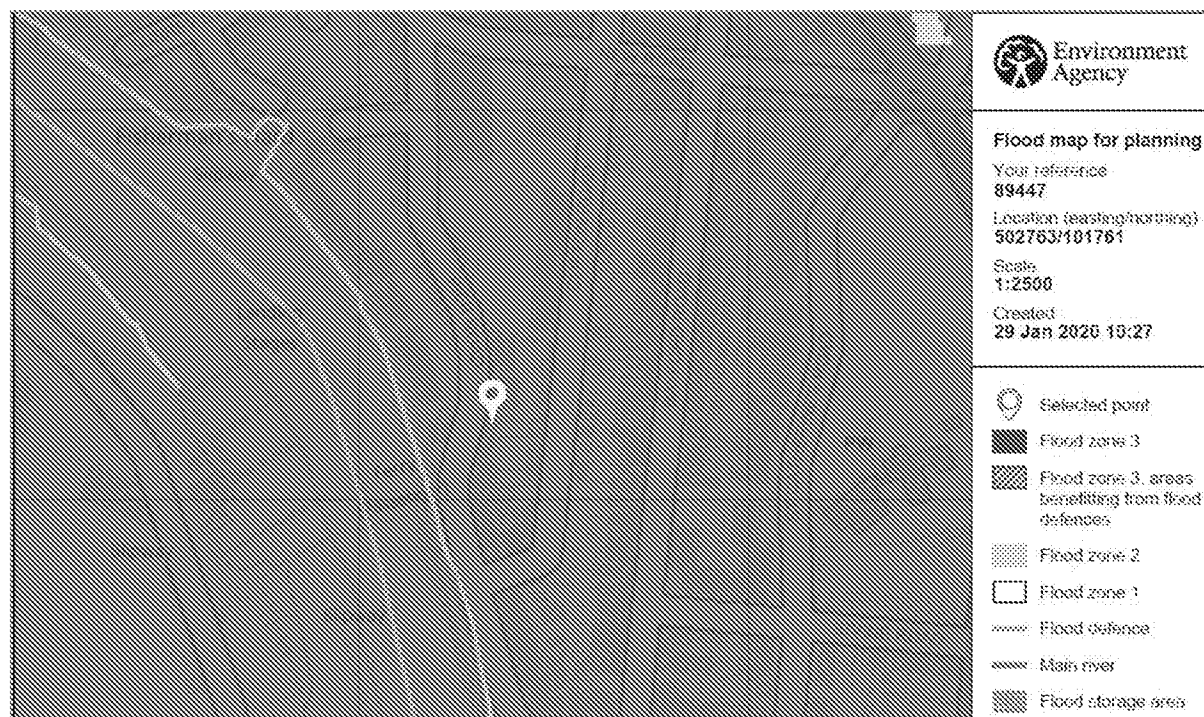


Figure 5: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having a greater than 1 in 100 annual probability of river flooding; or land having a greater than 1 in 200 annual probability of sea flooding.

The risk would appear to be predominantly tidal, and originate from the River Arun approximately 20m west of the site boundary.

5.2 Tidal (English Channel, River Arun)

The River Arun is a river in West Sussex. At 60km long, it is the longest river entirely in Sussex and one of the longest in Sussex after the River Medway, River Wey and River Mole. From the series of small streams that form its source in the area of St Leonard's Forest in the Weald, the Arun flows westwards through Horsham to Nowhurst where it is joined by the North River. Turning to the south, it is joined by its main tributary, the western River Rother, and continues through a gap in the South Downs to Arundel to join the English Channel at Littlehampton. It is one of the faster flowing rivers in England, and is tidal as far inland as Pallingham Quay, 41km upstream from the sea at Littlehampton.

The English Channel is the body of water that separates southern England from northern France, and joins the southern part of the North Sea to the Atlantic Ocean. It is about 560km long and varies in width from 240km at its widest to 33.1km in the Strait of Dover. It is the smallest of the shallow seas around the continental shelf of Europe, covering an area of some 75,000km².

Uniquely, The Channel acts as a funnel that amplifies the tidal range from less than a metre as observed at sea to more than 6m as observed in the Channel Islands, the west coast of the Cotentin Peninsula and the north coast of Brittany. The time difference of about 6 hours between high water at the eastern and western limits of the Channel are indicative of the tidal range being amplified further by resonance. Some areas along the south coast are particularly vulnerable to severe storms moving from the Atlantic eastwards along the English Channel.

5.2.1 Modelled flood levels and extents:

The EA has provided modelled flood levels from the Arun to Adur Flood Model completed by JBA Consulting in 2012.

An undefended 1:200 year present day level of 3.73mAOD and 2115 level of 4.93mAOD have been provided. It should be noted that the site is entirely outside of the defended 1:20 year extent, but within the defended 1:200 year and 1:1000 year extents.

Comparison of the modelled undefended flood levels with topographic site levels (3.01mAOD and 2.10mAOD), indicates that the site is below the modelled flood levels and could be inundated with up to 0.72m for the present day and 2.83m for the 2115 events.

5.2.2 Flood Storage Areas:

Flood Storage Areas are areas that act as a balancing reservoir, storage basin or balancing pond. Their purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer time interval. Flood storage areas do not completely remove the chance of flooding and can be overtopped or fail in extreme weather conditions.

According to Environment Agency data, there are no Flood Storage Areas located in close proximity to the site.

5.2.3 Functional Floodplain:

This zone comprises land where water is required to flow or be stored in times of flood. The functional floodplain designation encompasses land which would flood with an annual probability of 1 in 20 (5%) or greater in any year; and includes areas of land required for water conveyance routes.

5.2.4 Flood Defences

According to EA data, there are defences in the form of steel piled walls lining the eastern bank River Adur, 20m west of the site. The steel piled walls extend 523m north along the bank of the River Adur and range in crest height from 3.39mAOD (20m west of the site) to 3.94mAOD. These are recorded as offering the area a 1 in 75 year standard of protection.

Additionally, a flood wall with a concrete capping beam lines the lower section of the eastern bank of River Adur, 25m south west of the site. The flood wall extends 401m south and ranges in crest height from 4.80mAOD (25m south west of the site) to 4.76mAOD. The concrete wall is recorded as offering a 1 in 300 year standard of protection.

The performance of a flood defence asset is recorded as the condition of the asset. EA asset inspectors subjectively assess the conditions of assets (during visual inspection site visits) with reference to a national standard template. Each asset is given a rating between one and five with one being very good condition and five being very poor. A condition rating of 3, or 'fair' is the minimal acceptable standard for a critical asset, such as a defence wall that protects properties. The EA are striving to improve all assets below 'fair' to an acceptable standard. Both flood defence assets have been assigned a condition rating of 3.

Asset inspections are undertaken on average every six months, although some critical assets are assessed on a more regular basis. It is possible that adjacent assets are inspected on different dates, which may result in two assets of a similar state of repair having different condition ratings. It is unclear when both assets were last inspected.

Condition ratings of assets may also be affected by the time of year the surveys are conducted, as vegetation may obscure the asset in the summer months, or accessibility may be an issue during winter months. These factors would not usually affect the recorded condition rating of an asset unless the asset is on a borderline between two ratings.

5.2.5 Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

A raised flood defence is located from 25m south west, in the form of a flood wall with concrete capping beam. Whilst this defence is recorded to offer a 1 in 300 year standard of protection, the 1:200 year 2115 modelled flood level of 4.93mAOD exceeds the recorded crest heights (4.76mAOD to 4.80mAOD). Therefore the site is considered to be at residual risk from breach and overtopping of flood defences. The site is shown to be within the defended 1:200 year and 1:1000 year modelled flood extents (but outside of the modelled defended 1:20 year defended extent).

5.2.6 Historical flood events:

According to EA records historical flooding affected the site in February 1983 and April 1985 as a result of the River Adur overtopping defences. Arun District Council's Level 1 Strategic Flood Risk Assessment (August 2016) confirms that 150 properties were inundated in Littlehampton following a tidal surge in February 1983.

5.2.7 Internal Drainage Boards:

Each internal drainage board (IDB) is a public body that manage water levels in an area, known as an internal drainage district, where there is a special need for drainage. IDBs undertake works to reduce flood risk to people and property, and manage water levels for agricultural and environmental needs within their district.

The site is not located within an Internal Drainage Board (IDB) area.

5.3 Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the postcode. Please note that the EA to not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area of “Low” to “Medium” risk of flooding from surface water.

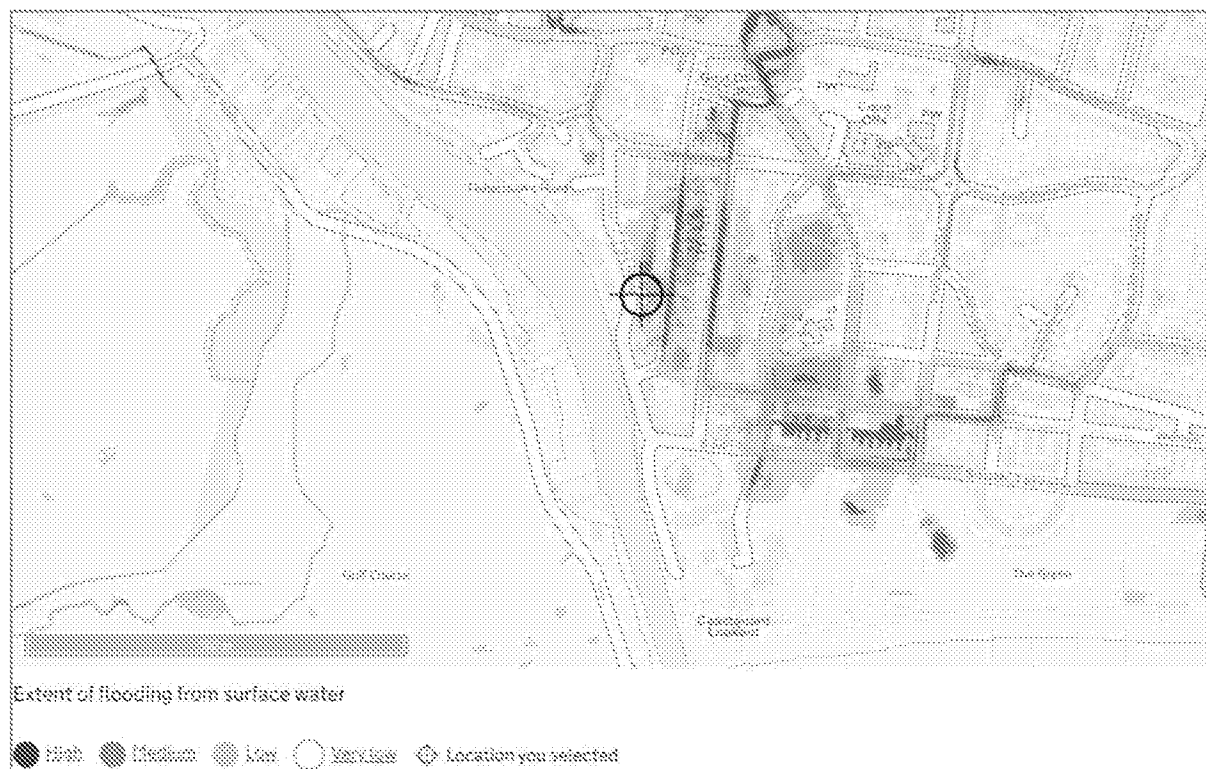


Figure 6: Extract from EA Surface Water Flood Map (Source: EA)

5.4 Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

According to the Level 1 Strategic Flood Risk Assessment for Arun District Council (August 2016), significant groundwater flooding was observed across Sussex in 1993/94, 2000/01 and 2002/03. Areas subject to flooding during these events were mainly located in the upper reaches of chalk catchments, in areas of localised low topography, and in areas of drift cover absence. No reported incidents have been recorded at the site by the Environment Agency and the Local Authority.

No additional records have been provided to suggest that the site has flooded from this source previously.

The Environment Agency has defined Source Protection Zones for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area.

The zones are used in conjunction with the EA Groundwater Protection Policy to set up pollution prevention measures in areas that are at a higher risk, and to monitor the activities of potential polluters nearby.

The published Environment Agency Groundwater Vulnerability map shows the site to be located outside a Source Protection Zone.

5.5 Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

No information has been provided to suggest that the site itself is susceptible to sewer surcharge flooding, however the SFRA shows that there has been 22 recorded flood incidents in the BN17 5 postcode area.

5.6 Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site is located outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major

reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

No further information has been provided to suggest the site is susceptible to from the failure of canals or other artificial infrastructure from the risk of flooding.

6. Flood Risk Management

6.1 Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site is a residential property, and the proposed extension will not introduce any separate or additional residential units.

In addition, the demolition of the existing detached garage and the construction of an outdoor building /home office is an extension of the existing site usage, and there will be no introduction of additional or separate residential units to the site.

The existing and proposed usage is classified as "more vulnerable" under the NPPF.

There will therefore be no increase in vulnerability post development.

6.2 EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m². It should not be applied if an additional dwelling is being created, e.g. a self-contained annexe or additional commercial unit.

The proposed rear extension will have an additional built footprint of approximately 4.65m², while the outdoor building /home office will have an additional ground footprint of 27.75m².

The proposed development is considered to fit within the EA's standing advice for domestic extensions.

6.3 Physical Design Measures:

The NPPF requires new residential floor levels be set at least 300mm above suitable modelled 1:200 year plus allowance for climate change flood levels. Given that the proposed application is for an extension to the existing property (and will not introduce any additional or separate residential units), finished floor levels will be set no lower than existing floor levels, no new bedrooms are proposed on the ground floor, and internal access will be maintained from the ground floor to the first floor of the property.

In addition, the finished floor level to the outdoor building/home office will be set no lower than the existing property.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures, in consultation with the Local Authority building control department. These measures can include the following where possible:

- Closed-cell foam used in wall cavities;
- Waterproof ground floor internally;

- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Kitchen units of solid, water resistant material;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided.

The applicant should also consider the use of demountable flood defence barriers to defend ground level doorways and low windows.

6.4 Safe Escape and Flood Action Plan:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.

However, it should be noted that the proposed application is for the demolition of the existing rear conservatory and construction of a rear extension, and demolition of the existing detached garage and construction of an outdoor building /home office. No additional or new units or dwellings will be created as part of the development. Safe escape is not a requirement under the EA Standing Advice guidance is for domestic extensions.

Owners, occupants and tenants should follow the warning and evacuation procedure detailed in the following section.

6.5 Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The EA issue flood warnings/alerts to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings/Alert Direct service at www.gov.uk/sign-up-for-flood-warnings to receive flood warnings by phone, text or email. The flood warning service has three types of warnings that will help you prepare for flooding and take action:

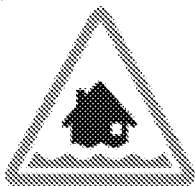
Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 2: EA Flood Warning Service

6.6 Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood.
- Know how to turn off electricity and water supplies to the site.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.

During a flood:

- Activate the evacuation plan and evacuate the site.
- Remove cars from the site if there is sufficient warning and the water levels are not rising rapidly.
- Switch off water and electricity for the site.

- Tune into your local radio station on a battery or wind-up radio.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics and water checked by qualified engineers before switching them back on.

6.7 Off-Site Impacts:**6.7.1 Fluvial floodplain storage:**

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zone 3a when using the Environment Agency Flood Map for Planning (Rivers and Sea) but the application is for a minor extension and outdoor building/home office which does not exceed 250m². The site is situated within an area of predominantly tidal flood risk.

Post development, there will be no unacceptable loss of floodplain storage or increase in run-off from the site.

6.7.2 Surface Water Drainage:

The development will utilise Sustainable drainage systems (SuDS) design in accordance with the NPPF for Planning Applications and the drainage hierarchy as follows:

1. Store rainwater for later use;
2. Infiltration techniques;
3. Attenuate rainwater by storing in tanks for gradual release;
4. Discharge rainwater direct into watercourse;
5. Discharge rainwater into surface water sewer;
6. Discharge rainwater into a combined sewer;
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local watercourse.

Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning. However, SuDS features will be incorporated into the development where practically possible or will utilise the existing arrangement on site.

As such, any change in surface water runoff from the site will likely be negligible.

7. Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

Post development, the site will remain “more vulnerable”, as the application is for an extension to the existing residential property and the construction of an outdoor building /home office

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	X	Exception Test required	✓	✓
Zone 3b	Exception Test required	X	X	X	✓

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Using the table above, the proposed application is considered to be suitable within Flood Zone 3a, following implementation of the Exception Test. The Sequential and Exception Tests do not need to be applied to minor developments and changes of use (this application is for ‘minor development’ – a residential extension and construction of an outdoor building/home office).

8. Discussion and Conclusions

Unda Consulting Limited have been appointed by Tai Broadhurst (hereinafter referred to as “the applicant”) to undertake a Flood Risk Assessment for the proposed development at 34 Pier Road, Littlehampton, West Sussex, BN17 5LW (hereinafter referred to as “the site”). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) July 2018 and the associated technical guidance.

The purpose of the study is to support a planning application for the proposed development.

The existing site is a residential property, and the proposed extension will not introduce any separate or additional residential units.

In addition, the demolition of the existing detached garage and the construction of an outdoor building /home office is an extension of the existing site usage, and there will be no introduction of additional or separate residential units to the site. The existing and proposed usage is classified as “more vulnerable” under the NPPF. There will therefore be no increase in vulnerability post development.

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having a greater than 1 in 100 annual probability of river flooding; or land having a greater than 1 in 200 annual probability of sea flooding. The risk would appear to be predominantly tidal, and originate from the River Arun approximately 20m west of the site boundary.

The EA has provided modelled flood levels from the Arun to Adur Flood Model completed by JBA Consulting in 2012. An undefended 1:200 year present day level of 3.73mAOD and 2115 level of 4.93mAOD have been provided. It should be noted that the site is entirely outside of the defended 1:20 year extent, but within the defended 1:200 year and 1:1000 year extents. Comparison of the modelled undefended flood levels with topographic site levels (3.01mAOD and 2.10mAOD), indicates that the site is below the modelled flood levels and could be inundated with up to 0.72m for the present day and 2.83m for the 2115 events.

The Environment Agency have records of historical flooding from rivers for this location.

The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area of “Low” to “Medium” risk of flooding from surface water.

No information has been provided to suggest that the site is susceptible to groundwater or sewer surcharge flooding.

The published Environment Agency Groundwater Vulnerability map shows the site to be located outside a Source Protection Zone.

The site is not located within an Internal Drainage Board (IDB) area.

The site is not located within a groundwater vulnerability zone.

Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

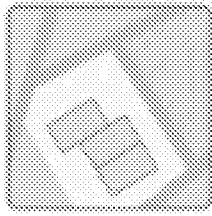
In summary:

- EA Flood Zone 3a (High Risk).
- Tidal flood risk from the River Arun.
- Risk of pluvial flooding would appear to be medium to low.
- Risk of sewer surcharge flooding would appear to be low.
- No records of groundwater flooding at the site.
- Two EA recorded historic flood events at the site.
- Application is for a minor extension which does not exceed 250m². In addition, the outdoor building /home office acts as an extension to the existing house.
- Access maintained from the ground floor to the above floor of the building.
- No additional or separate residential units will be created as part of the development.
- Flood proofing of the ground floor extension and outdoor building /home office will be incorporated as appropriate.
- The applicant will register with the free Environment Agency Floodline Warnings Direct service.

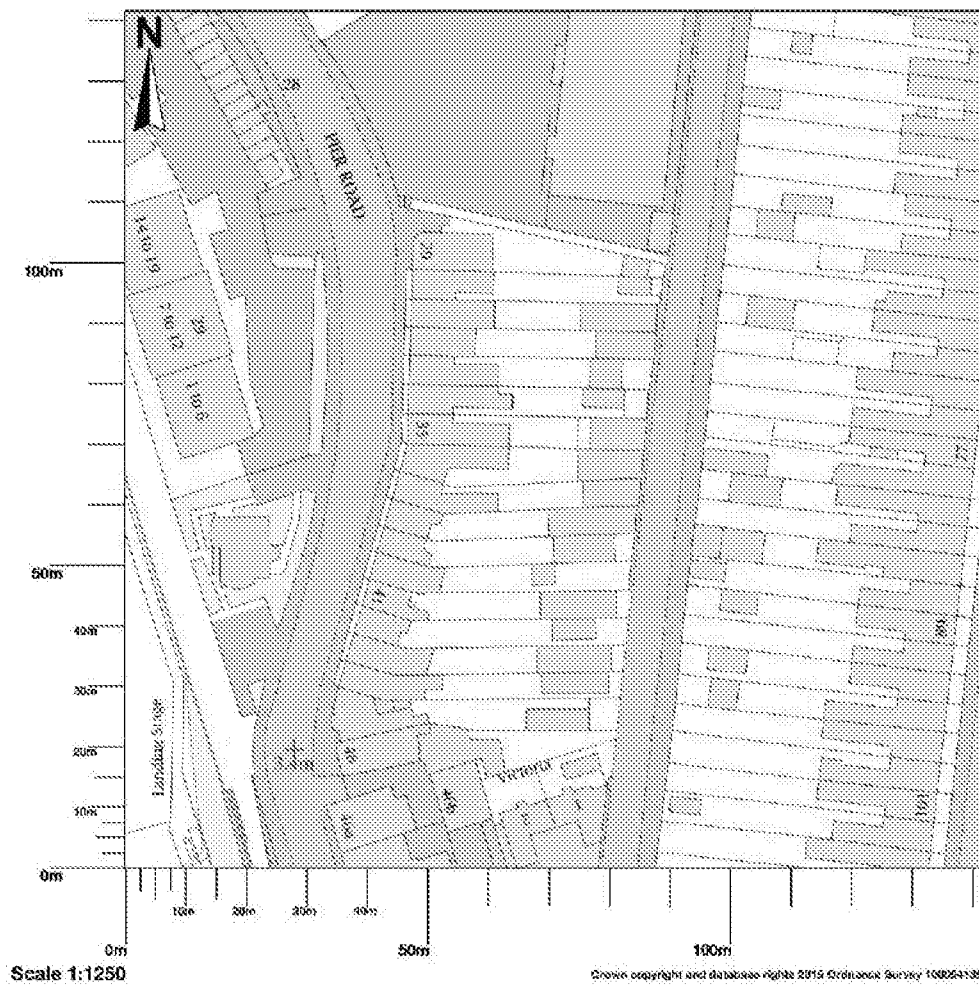
Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix

- Existing and Proposed Site Plans;



34 Pier Road, Littlehampton, BN17 5LW



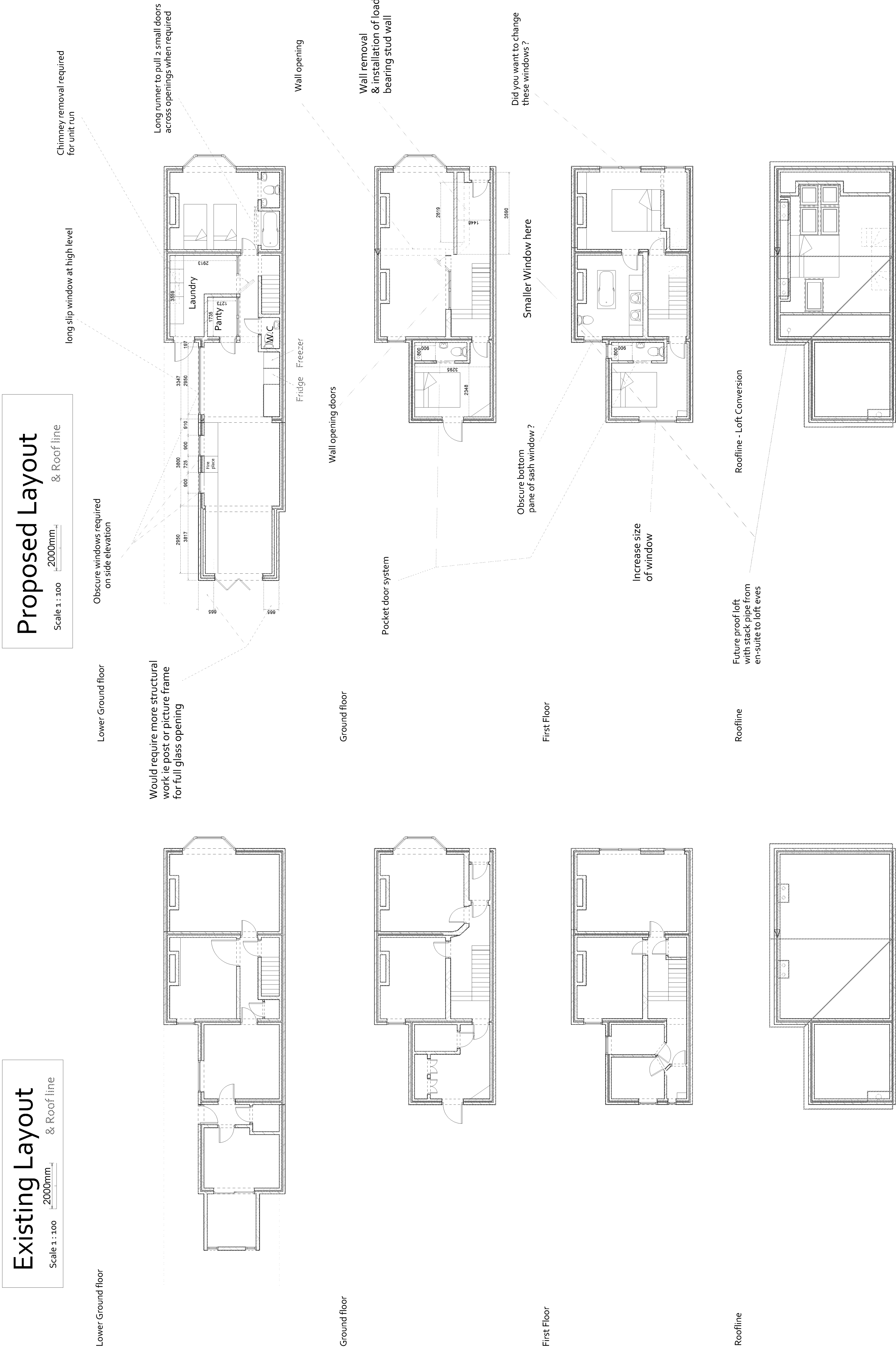
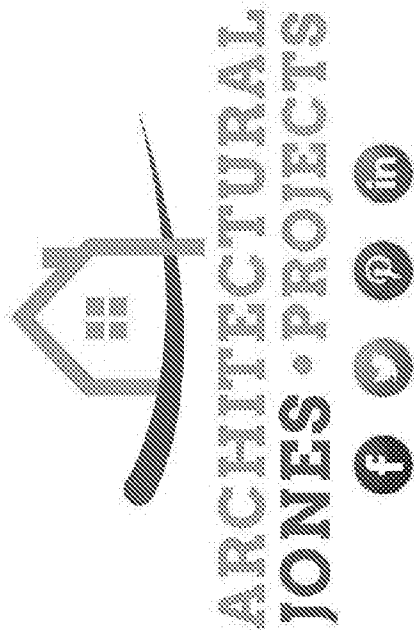
Map area bounded by: 502713,101704 502855,101846. Produced on 09 January 2020 from the OS National Geographic Database. Reproduction in whole or part is prohibited without the prior permission of Ordnance Survey. © Crown copyright 2020. Supplied by UKPlanningMaps.com a licensed OS partner (100054135). Unique plan reference: p2buk/417345/565998



Client - [REDACTED]

Address - 34 Pier Road,
Littlehampton,
BN17 5LW

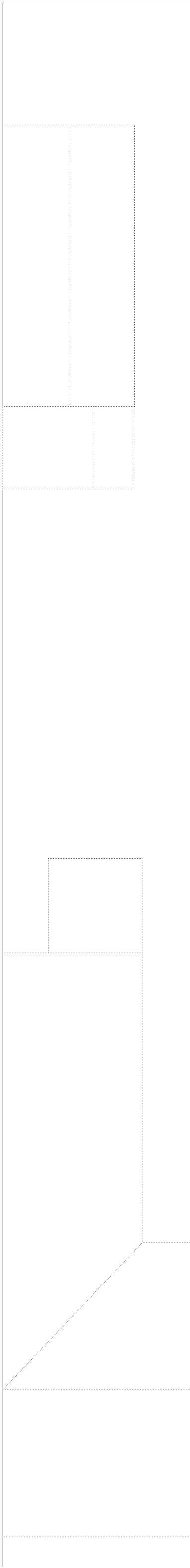
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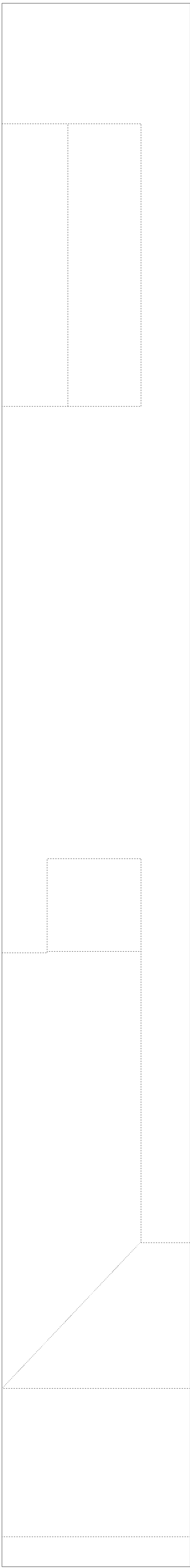
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Proposed Layout

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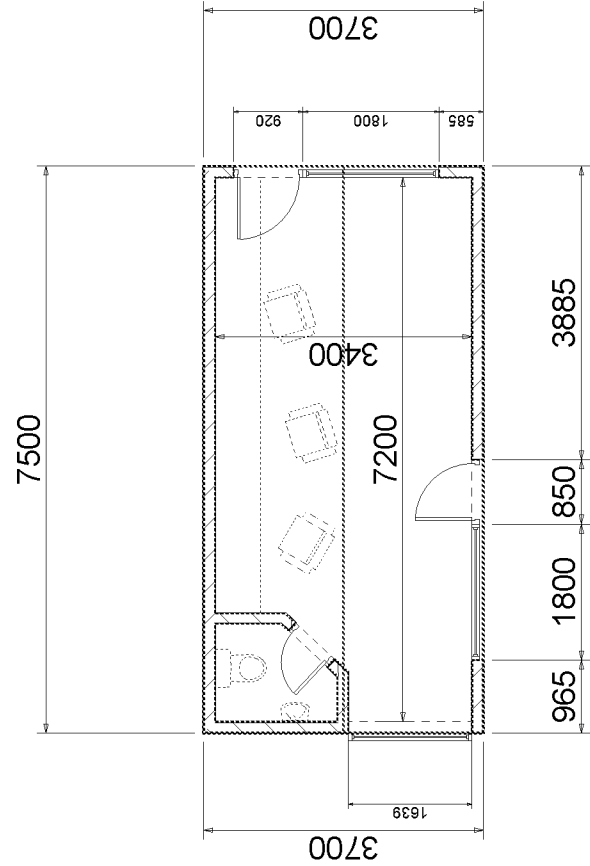
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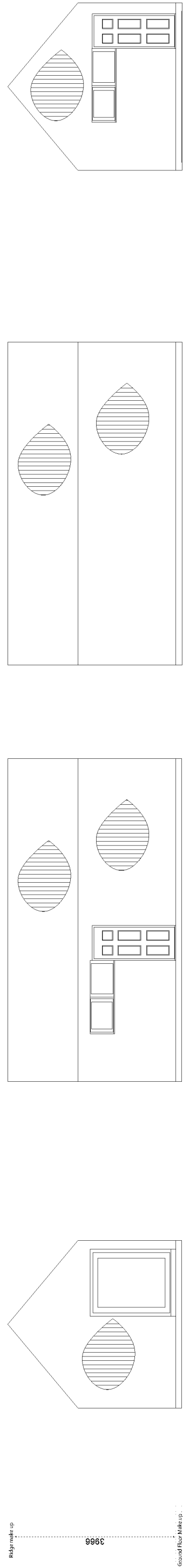
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Proposed Elevations

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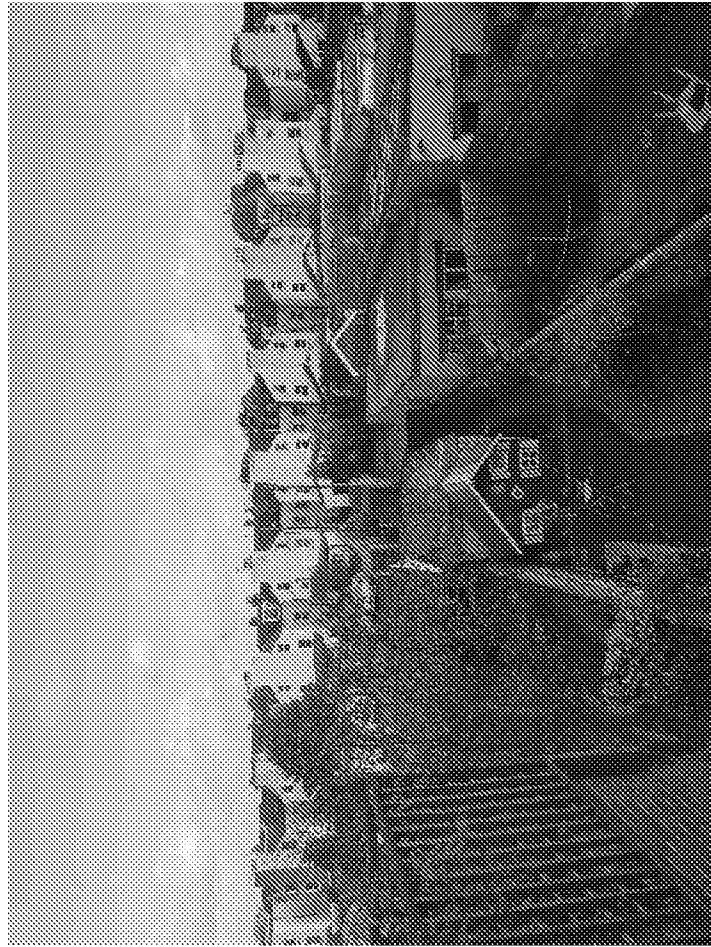
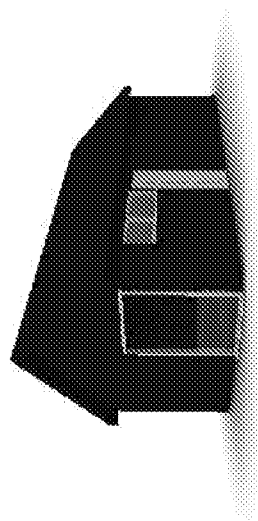
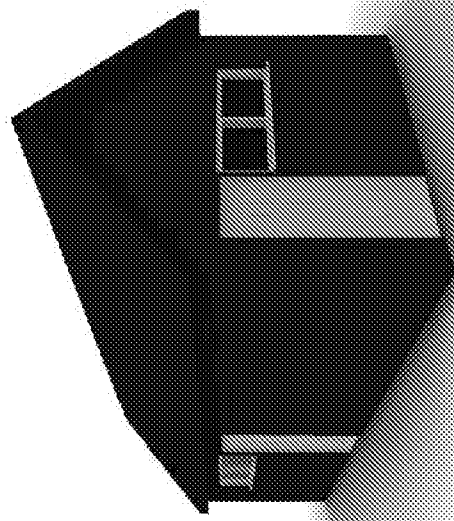
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Materials Schedule

Walls - Charred larch wood
Windows - Upvc White or black

Concepts



Client

Address - 34 Pier Road,
Littlehampton,
BN17 5LW

Page Size - A1

