

FLOOD RESILIENCE MEASURES

AGAINST POTENTIAL FLOODING

95 MAINE STREET, READING, RG2 6AZ

PROPOSAL: SINGLE STOREY REAR EXTENSION.

APPLICANT: MR CLARENCE YEUNG

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OPS Chartered Surveyors

17 Garvin Avenue, Beaconsfield, Buckinghamshire, HP9 1RD

M: 07881 457903 | E: info@ops-surveyors.co.uk



INTRODUCTION

This proposed flood resilience measures is prepared for the property located at:

95 Maine Street, Reading, RG2 6AZ

FLOOD PROTECTION MEASURES

The following measures are to be provided to mitigate the potential flood risk and reduce the impacts.

BUILDING FLOODING MITIGATION MEASURES

WATER EXCLUSION STRATEGY: emphasis is placed on minimising water entry whilst maintaining structural integrity, and on using materials and construction techniques to facilitate drying and cleaning. This strategy is favoured when low flood water depths are involved (up to a possible maximum of 0.6m). According to the definitions adopted in this Guidance, this strategy can be considered as a resistance measure but it is part of the aim to achieve overall building resilience

WATER ENTRY STRATEGY: emphasis is placed on allowing water into the building, facilitating draining and consequent drying. Standard masonry buildings are at significant risk of structural damage if there is a water level difference between outside and inside of about 0.6m or more. This strategy is therefore favoured when high flood water depths are involved (greater than 0.6m).

As such **WATER EXCLUSION STRATEGY** is recommended on this site to provide redundancy against future flood risk and the impacts of climate change. At predicted depths of less than 0.3m and for short-duration floods, the strategy is to adopt a “resistant” approach and try to keep water out of a building. Under this strategy, the aim would be to build walls and floors with low permeability materials associated with minimal (or no) damage or deformation. The following materials are recommended (in line with the CLD Guidance 2007).

MASONRY WALLS:

Ensure mortar joints are thoroughly filled to reduce the risk of water penetration. If frogged bricks are used, they should be laid frog up so that filling becomes easier and coverage more certain. Bricks manufactured with perforations should not be used for flood-resilient design. Where possible, use engineering bricks up to the predicted flood level plus one course of bricks to provide a freeboard (up to a maximum of 0.6m depth above floor level); this will increase resistance to water penetration. Blocks (and dense-facing bricks) have much-improved performance when covered with render.

Aircrete blocks allow less leakage than typical concrete blocks but concrete blocks dry more quickly. Therefore, the design of blockwork walls needs to take into account these two opposite types of behaviour and consider whether drying or resistance to water is most relevant in each situation. For a “water exclusion strategy”, the expected amount of leakage is minimal and therefore, Aircrete blocks are recommended, although they may retain moisture for longer than concrete blocks, compared with heavier blocks, Aircrete may offer less restraint to floor/slab edges which under the action of uplift forces could promote the opening up of floor/wall junctions.

Do not use highly porous bricks such as handmade clay bricks. Solid masonry walls are a good option but will need to be fitted with internal or external wall insulation in order to comply with Building Regulations.

Clear cavity walls, i.e. with no insulation in the cavity, have better flood resilience characteristics than filled or part-filled cavity walls as they dry more quickly. The requirements for insulation can be satisfied by external insulated renders or internal thermal boards.

There is evidence that thin-layer mortar construction (or thin joint, as it is also commonly known) is a good flood resilience option.

FRAMED WALLS: Avoid timber framed walls containing construction materials that have poor performance in floods, for example, oriented strand board and mineral fibre insulation. Timber-framed walls are not recommended in a “water exclusion strategy”. Steel framed walls may offer a suitable alternative option but specialist advice needs to be sought on how to incorporate resilient materials/construction methods in the design, in particular with regard to the insulation.

REINFORCED CONCRETE WALL/FLOOR CONSTRUCTION: Reinforced concrete wall/floor construction should be considered for flood-prone areas, i.e. where the frequency of flooding is predicted to be high (see Chapter 4). This form of construction is effective at resisting forces generated by floodwater and will provide an adequate barrier to water ingress (provided service ducts and other openings into the building are adequately sealed). Design details for this type of construction are beyond the scope of this document.

External renders are effective barriers to water penetration and should be used with blocks (or bricks) at least up to the predicted flood level plus the equivalent of a course of bricks as freeboard. Structural checks may be necessary to ensure stability, because of the external water pressures that could occur for design flood depths above 0.3m. External cement renders with lime content (in addition to cement) can induce faster surface drying.

INSULATION: External insulation is better than cavity insulation because it is easily replaced if necessary. Cavity insulation should preferably incorporate rigid closed-cell materials as these retain integrity and have low moisture take-up. Other common types, such as mineral fibre batts, are not generally recommended as they can remain wet for several months after exposure to flood water which slows down the wall drying process. Blown-in insulation can slump due to excessive moisture uptake, and some types can retain high levels of moisture for long periods of time (under natural drying conditions).

INTERNAL LININGS: Internal cement renders (with good bonds) are effective at reducing flood water leakage into a building and assist in rapid drying of the internal surface of the wall. The extent to which render prevents drying of other parts of the wall is not currently clear. This may be important, particularly for solid wall construction. This applies also to external renders.

Avoid standard gypsum plasterboard as it tends to disintegrate when immersed in water. Splashproof boards do not necessarily offer protection against flood waters, which may remain for some time and exert pressure on the board.

Anecdotal evidence suggests that internal lime plaster/render can be a good solution. Lime plaster depends on contact with the air to set and harden. Because of this, full-strength lime plaster, which typically requires over 6 months, was not possible to test. Consequently, no assurance can be given for its performance. Tests performed when young showed that it crumbles very easily under high water pressure.

PIPEWORK: Closed-cell insulation should be used for pipes which are below the predicted flood level.

DRAINAGE SERVICES: Non-return valves are recommended in the drainage system to prevent back-flow of diluted sewage in situations where there is an identified risk of foul sewer surcharging. Maintenance of these valves is important to ensure their continued effectiveness.

WATER, ELECTRICITY AND GAS METERS: Should be located above the predicted flood level.

ELECTRICAL SERVICES: Electrical sockets should be installed above flood level for ground floors to minimise damage to electrical services and allow speedy re-occupation (see Figure 6.13. Note a dado rail, which provides a limit for the replacement of any wall covering. Electric ring mains should be installed at the first-floor level with drops to ground-floor sockets and switches.

HEATING SYSTEMS: Boiler units and ancillary devices should be installed above the predicted flood level and preferably on the first floor of two-storey properties. Underfloor heating should be avoided on ground floors, and controls such as thermostats should be placed above flood level. Conventional heating systems, e.g. hot water pipes, are unlikely to be significantly affected by flood water unless it contains a large amount of salts. The less common, hot air duct heating would remain effective provided it is installed above the design flood level.

FITTINGS: The main principle is to use durable fittings that are not significantly affected by water and can be easily cleaned (e.g. use of plastic materials or stainless steel for kitchen units). The cost of these units may need to be balanced against the predicted frequency of flooding.

Place fittings (e.g. electrical appliances, gas oven) on plinths as high as practicable above the floor so that they are out of reach of flood water. Ensure adequate sealing of joints between kitchen units and surfaces to prevent any penetration of water behind fittings. Ensure high-quality workmanship in the application of fittings

COMMUNICATIONS WIRING: Wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage. Any proposed design solution for flood insulation on all potentially vulnerable wiring should be discussed with the relevant service providers.

DOORS: Raising the threshold as high as possible, while complying with level access requirements, should be considered as the primary measure. In addition, sealed PVC external framed doors should be used and, where the use of wooden doors is a preferred option, all effort should be made to ensure a good fit and seal to their frames.

Hollow core timber internal doors should not be used where the predicted frequency of flooding is high. Where sufficient flood warning is given, butt hinges, that allow internal doors to be easily removed and stored in dry areas prior to a flood, should be used. Where the frequency of predicted flooding is low or where there is no warning (e.g. overland or sewer flooding) it may be necessary to replace the doors after the flood.

WINDOWS/PATIO DOORS: Windows and patio doors are vulnerable to flood water and similar measures to those used for doors should be taken. Special care should be taken to ensure adequate sealing of any PVC window/door sills to the fabric of the house. Of particular concern would be excessive water pressure on the glazing of patio doors. Double glazing conforming to the relevant standards would, in principle, adequately resist the pressures generated by flood waters; debris-carrying flows may cause damage.

AIR VENTS: Special designs of air vents are available in the market to prevent water ingress in circumstances where the predicted flood depth is low (i.e. < 0.3m); e.g. periscopic air vents. Careful consideration should be given to effectively sealing any associated joints.

In addition to the above-recommended measures from the CLG guidance 2007. The following measures will also be proposed to provide additional resistance measures to any potential flooding.

Although the risk of flooding affecting this property is low based on the above assessment outcome, the following measures are proposed to provide resistance measures to any potential flooding.

MANUAL RESISTANCE MEASURES

Product	Product Details	Description
Door barrier	Floor barriers up to 1.0m in height	Provides a temporary barrier to water at property thresholds
General – toilet bung	Inflatable toilet bung	Fitted by hand into the toilet U-tube to prevent backing up

AUTOMATIC RESISTANCE MEASURES

Product	Product Details	Description
Non-return valve – waste	2x50mm non-return valves at locations as necessary	Prevents floodwater from backing up up through the waste system
Non-return valve -	Push-fit non-return valves at locations as necessary	Prevents water from backing up through the foul/sewage system

Foul		
General –water proof to the external walls, sealant, etc (delete/add to as necessary)	Waterproof coating applied to all external walls to height of 0.6m Sealant around all pipe/cable entry points	Makes property walls more resistant to seepage

Maintenance and installation of products: All products are to be fitted and maintained by professionals and in accordance with the manufacturer's instructions.

CONCLUSIONS

As the proposal does not involve an increase in impermeable surfaces, there will be no additional groundwater or surface water runoff generated. Consequently, the existing surface water drainage network in the surrounding area will not face any increased risk of flooding due to this development.

In summary, the proposed development poses no heightened risk of flooding to the site. Furthermore, the inclusion of resilience measures will provide added protection for the site and its occupants.