FLOOD MITGATION MEASURES

Permanent measures to reduce flood damage to existing buildings.

The following measures will be incorporated into the conversion scheme in respect of protection against flooding. Professional advice should be obtained before any improvement measures recommended below are instigated.

Some of the flood control measures highlighted below will require Building Regulations consent.

Flood defence earth bank

The following external alterations within close vicinity of the building are to be undertaken.

Formation of a low level earth bank to the West side of the building. Bank to be constructed outside of the 1000 year flood zone (refer to the Preliminary Flood Consequence Assessment undertaken by Waterco - October 2008, appendix E).

Construction of the earth bank will require consultation with a Structural Engineer and the Environment Agency.

External walls

There are two methods for providing protection from flooding, either from the external or internal face. The preferred approach below is suggested to inner face of the wall allowing the external face to breathe following a flood and allow evaporation of moisture to the outside. The application would be as follows -

- Raking out defective mortar joints, cutting out defective or spalled brickwork to a height of 500mm above the flood line.
- Replacing defective brickwork with good quality re-claimed items matching in size, texture and appearance.
- Remedial repointing work to all brickwork below the floodline. As provision, use cement:lime:sand 1:1:6 to limit moisture ingressing the wall structure.
- Provision of a drill and inject damp course to the external wall, installed in compliance with the manufacturers recommendations. The damp course will tie with the damp proof membrane in the floor with these being sufficiently joined.

  A sealed fillet at the wall/floor junction will be provided, further reference should be made to the floor section.
- External ground levels should be altered to be at least 150mm below the damp proof course and the internal floor level.
- To the internal face of the external walls, the preferred approach would be to apply a proprietary waterproofer (i.e. sealant or tanking product used for basements). The sealer should be applied to at least 500mm above the anticipated flood line.

  A sand and cement render with a proprietary waterproofer or sealant, in compliance with the manufacturers instructions/ recommendations.

  The walls should be finished with a lime based plaster to a smooth finish. The use of gypsum based plaster or products should be strongly avoided.

  Following immersion in flood water, a lime based plaster applied over a waterproofed render will dry out quickly and not deteriorate even after repeated exposure to floodwater.
- To the kitchen and ground floor toilet areas, ceramic tiling will be installed using a waterproof grout and providing an impermeable surface finish. This will help reduce the volume of floodwater being able to penetrate the walls.

  Where areas of tiling are present, these should be laid directly over the sand and cement render with the lime plaster being omitted from these areas.
- The preferred approach would not comply with the insulation and u-value standards set out in under the Building Regulations. A compromise should be sought with respect to increasing insulation levels of other key elements over and above that required by the Regulations (such as first floor walls, floors (ground and first) and roof structure.

  Insulation to ground floor walls can be provided, although the time for such an installation to dry out would be longer.

Internal walls

All walls at ground floor level whether load bearing or acting as partitions will be raised in solid lightweight aggregate blockwork. There will be no timber or metal stud partitions at this level. Internal walls will incorporate a plastic based damp proof course which will be tied into the damp proof membrane incorporated in the floor. A fillet at the floor/wall junction as previously described will be fitted to the perimeter of each room.

For all internal walls, the same principles should be adopted for the external walls.

Were internal walls separate residential units in the conversion the approach would be to generally thicken the wall in order to increase both thermal and resistance to the passage of sound. The approach to providing tanking to the wall initially followed by sand and cement render with proprietary waterproofer should be taken.

Separating walls between units should comply with the requirements of approved document E of the Building Regulations 'Resistance to the passage of sound'. The intention would be to apply a sound board finish in two parts with a horizontal junction at say 500mm above the maximum flood level. As provision, use Soundbloc or approved equivalent board finish. The intention of this approach being that the lower panels can be removed if damaged and easily replaced after drying out of the wall structure.

Low level joinery-items

All internal joinery items will be formed from good quality tantalised softwood which will be prepared, primed and decorated with an oil based paint in order to reduce the risk of timbers warping and seal them from the effects of moisture. For timber skirtings, these will be boxed out from the wall structure in order to provide an air gap behind which will allow them to dry. Skirtings should ideally be fixed with adhesive rather than screw or mechanical fixings as the former will aid quicker removal if required.

Floors

The conversion of the buildings will use modern solid concrete floors incorporating a damp proof membrane and insulation as these are regarded as the most flood resistant of floor constructions.

The solid concrete floor will reduce the rate of seepage into the building, although will be designed to withstand the pressure of floodwater seeping up from the ground.

A new concrete floor incorporating a damp proof membrane and insulation in conjunction with the requirements set out under part C 'Resistance to moisture' and part L1A 'Conservation of fuel and power in New dwellings' will be allowed.

The floor build up will be as follows -

- Excavate and reduce levels;
- Excavate any soft spots and fill/compact with hardcore;
- Lay 150mm of clean stone consolidated sub base;
- Lay 100mm thick plain in-situ concrete floor;
- Lay 1200 gauge polythene DPM connecting with the dampcourse to both the internal and external walls;
- Joints to damp proof membrane to be adequately sealed and lapped;
- Lay rigid foam insulation boards (with low water absorption properties) over polythene membrane. Allow for slab edge board to the perimeter of each room to stop cold bridging. The gap created around the perimeter of the floors will also relieve any pressure of the water on the floor;
- Lay 1000 gauge isolation layer directly over the insulation ready to accept the floor screed;
- Form a sand and cement reinforced screed, laid to a nominal thickness of say 60mm - 75mm;
- Consideration to the provision of movement joints across the floor should be given, particularly in larger areas to reduce the effects of cracking;
- The screed should be covered to cure to avoid curling at the edges and defects related to drying out quickly.

The approach to laying the damp proof membrane between the concrete slab insulation/floor screed build (including the provision of an 1000 gauge isolation layer) will allow quicker drying out of the floor. Further advice should be sought before formation of the floor build up.

Consideration to providing low level steps up into the building from the external ground level should be given. Steps should incorporate low level sealed thresholds at door openings. Consideration of the requirements set out under approved document M 'Access to and the use of buildings' should be given.

As a primary precautionary measure, consideration should be given to installing flood guards. These are formed from simple marine ply sheets which can be slotted into pre-formed runners attached to either side of an opening on the structural reveals and then sealed round with amastic. Such an installation would be a front-line defence to flood protection.

The intention would be to avoid carpet finishes at ground floor level, as an alternative hard flooring finishes will be introduced, preferably traditional quarry tiles. Such finishes contribute towards the resistance for flood waters to penetrate into the structure, allowing the floor to dry out and be cleaned/repaired quickly following.

Fittings and building services

Fixtures and fittings

Were these are present, such as kitchen fittings, these should be raised off the floor by a minimum of between 100mm - 150mm. This can be achieved by means of installing plastic legs to prevent damage during shallow flooding events. Were fittings touch the floor such as end panels and kick boards, these should be sealed fittings inserted in a clear plastic channel to the edge in contact with the floor. Such panels should be easily removable in case of a flood occurring.

The kitchen will be made for convienient dismantling as access to the walls would be required in a more substantial flood. Consideration may also be given to the installation of free standing kitchen units which can be easily moved.

An alternative to the above would be a water resistant PVC-u based kitchen that can be cleaned and re-used following exposure to floodwater. Such specialist kitchens are available, although the installation of such is purely based on specification and personnel preference. All kitchens in the development will utilise separate hobs and built in ovens as opposed to free standing cookers which are floor mounted.

Building services

Electrics The ground floor electrical installation will be raised above the flood line, by approx. 1 metre, this will include plugs, ring main, fused spurs, light switches, TV aerial and BT sockets etc. The incoming mains supply, meters and distribution board (RCD/MCB boards) etc. will be located at high level close to the ceiling. This will enable occupation of the upper levels whilst the ground floor is flooded. Any electrical appliances that do come into contact with moisture should be inspected by a qualified engineer.

Gas or oil services - The incoming gas service and meter will be located at a height above the flood line. All gas services that come into contact with moisture should be inspected by a qualified engineer.

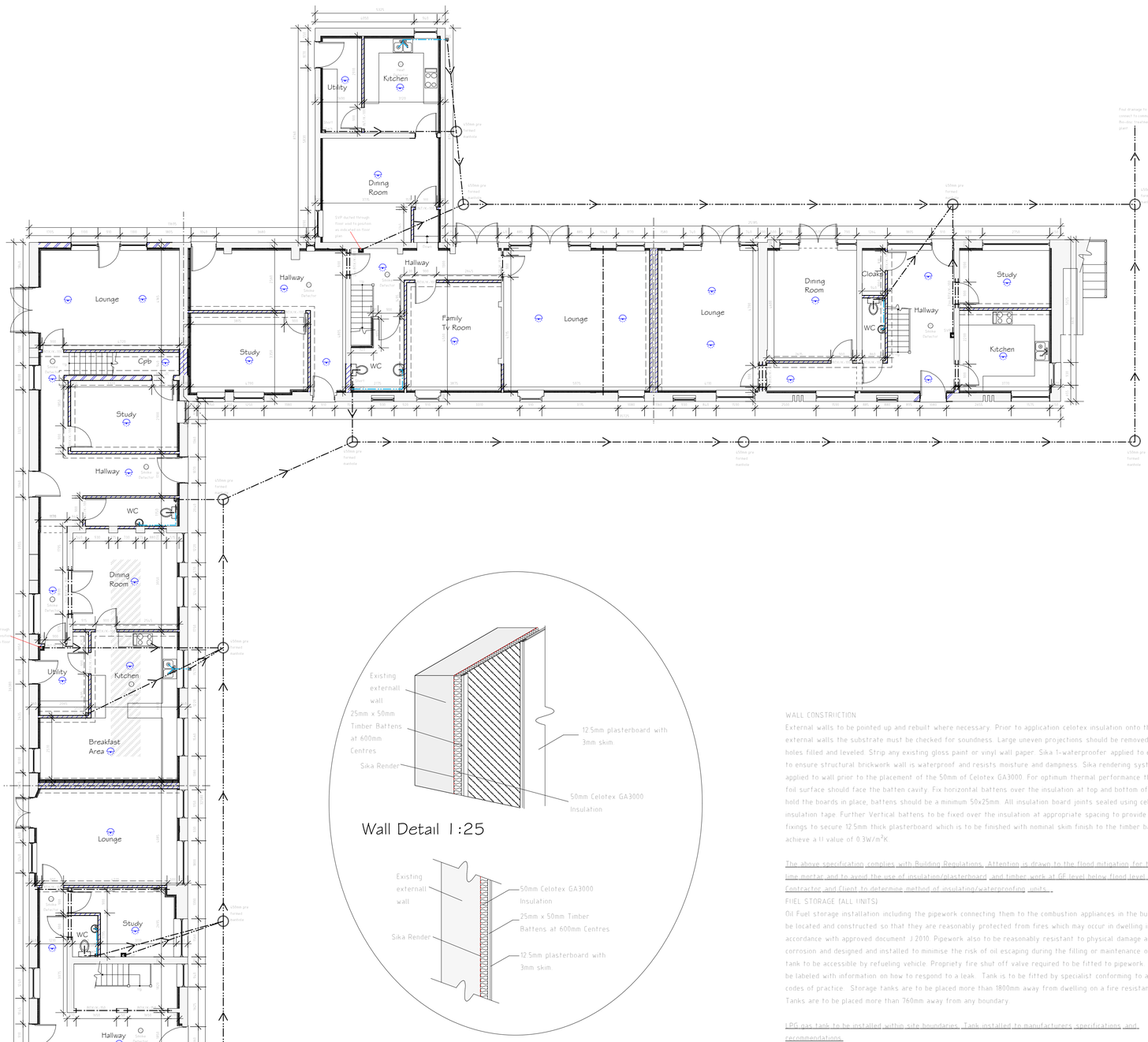
Water services - Depending on the water pressures available, the head of the incoming water main will be located as high as possible above the flood line. Following a flood, the water pipe installation should be inspected and the quality of the water tested before re-use.

Drainage - Foul drainage and sewers will be provided with temporary drain stops. These can be closed at the time of a flood to stop foul sewage being forced back into the property by the rising flood water. Such works would be in compliance with part H 'Drainage and waste disposal' of the Building Regulations.

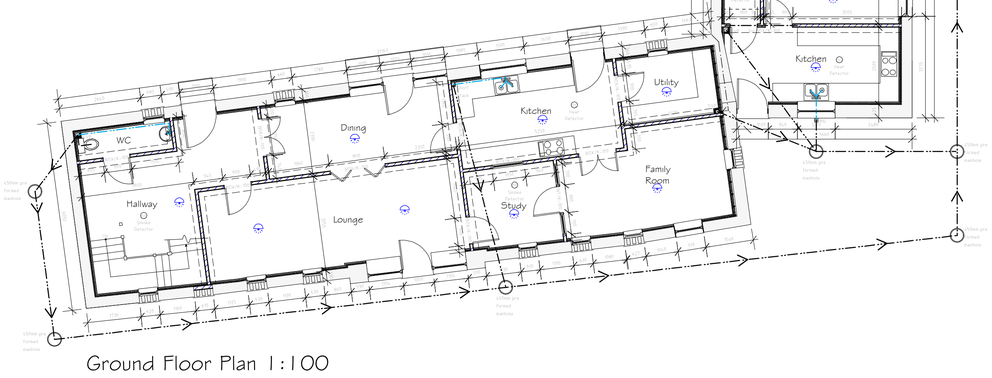
Plumbing and heating - Depending on the fuel source to be used (either butane gas or oil) will determine the positioning of the boiler. For oil boilers which are generally floor mounted, these should be raised off the floor on a plinth, although it should be noted that the higher the boiler the higher the oil tank in order to maintain a gravity feed.

For gas boilers, these can be wall or floor mounted (as previously described) although it is dependent on the pressure in the gas storage tank.

Further advice should be taken from a plumbing heating engineer with respect to the chosen fuel to be used.



Wall Detail 1:25



Ground Floor Plan 1:100

(for illustration purposes only)

UNDERPINNING

When on site and construction is to begin existing walls is to be inspected by a local authority building control officer to check for foundations and there adequacy. If it is found that underpinning is necessary contractor to ensure the following steps are followed:

1. Excavate first underpinning stages
2. Obtain approval for bearing strata
3. Clean underside of existing brick work
4. Form side shutters, place concrete and vibrate
5. When concrete has matured place non shrinkable grout packing where required and thoroughly consolidate
6. Excavate next stage in sequence and repeat
7. Prior to placing new concrete against previous pour wirebrush to achieve good bond
8. Allow 3 days minimum before underpinning adjoining sections

WALL CONSTRUCTION

External walls to be pointed up and rebuilt where necessary. Prior to application celotex insulation onto the existing external walls the substrate must be checked for soundness. Large uneven projections should be removed and all holes filled and leveled. Strip any existing gloss paint or vinyl wall paper. Sika 1-waterproofer applied to existing walls to ensure structural brickwork wall is waterproof and resists moisture and dampness. Sika rendering system is to be applied to wall prior to the placement of the 50mm of Celotex GA3000. For optimum thermal performance the unprinted foil surface should face the batten cavity. Fix horizontal battens over the insulation at top and bottom of the wall to hold the boards in place, battens should be a minimum 50x25mm. All insulation board joints sealed using celotex insulation tape. Further Vertical battens to be fixed over the insulation at appropriate spacing to provide adequate fixings to secure 12.5mm thick plasterboard which is to be finished with nominal skim finish to the timber battens to achieve a U value of 0.3W/m²K

The above specification complies with Building Regulations. Attention is drawn to the flood mitigation for the use of lime mortar and to avoid the use of insulation/plasterboard and timber work at GF level below flood level as specified. Contractor and Client to determine method of insulating/waterproofing units.

FUEL STORAGE (ALL UNITS)

Oil Fuel storage installation including the pipework connecting them to the combustion appliances in the building are to be located and constructed so that they are reasonably protected from fires which may occur in dwelling in accordance with approved document J 2010. Pipework also to be reasonably resistant to physical damage and corrosion and designed and installed to minimise the risk of oil escaping during the filling or maintenance of the tank. tank to be accessible by refueling vehicle. Propriety fire shut off valve required to be fitted to pipework. Tank is to be labeled with information on how to respond to a leak. Tank is to be fitted by specialist conforming to all relevant codes of practice. Storage tanks are to be placed more than 1800mm away from dwelling on a fire resistant base. Tanks are to be placed more than 760mm away from any boundary.

LPG gas tank to be installed within site boundaries. Tank installed to manufacturers specifications and recommendations.

HEATING (ALL UNITS)

New Oil or LPG boiler to be installed within dwellings specialist manufacturer to advice on best suited fuel for development. Boiler to be floor mounted oil fired combi-boiler or wall mounted LPG fired boiler with SEDBUK rating of at least 90% to power underfloor heating and radiators fitted with thermostatic control valves. No radiators to be fitted in positions which would reduce landings / walkways to less than 900mm wide. Ensure boiler will not discharge opposite boundaries where within 2.5m. Boiler is to be fitted by OFTEC/GAS SAFE registered engineer.

GROUND FLOOR CONSTRUCTION (ALL UNITS)

Existing concrete floor in barns to be excavated, contractor to ensure excavation does not undermine footings of masonry walls. New floor to consist 75mm screed with under floor heating within to manufacturers details. 1000G isolation layer installed above insulation. 75mm thick Celotex GA3000 rigid polyisocyanurate foam insulation (to ensure U-value ≤0.25 W/m²K). 100mm thick concrete slab with 1000mm wide A193 mesh to perimeter of slab. 25mm of insulation installed at wall junction of of slab as indicated to allow movement of slab in the event of flooding. 1200G visqueen DPM with all joints to have 300mm minimum overlap and be securely taped. 50mm sand blinding on 150mm minimum well consolidated hardcore. Contractor to provide depressurisation sump beneath slab to provide full radon protection, 100mm diameter uPVC pipe to run from sump to duct to outside air, outlet to be capped at finished ground level. Concrete slab to be thickened up below structural newels to provide support. FFL of each unit to be determined on site to provide the best head height at First Floor level as indicated on Sections.

DAMP PROOFING

Provide injected chemical damp-proof course to all existing ground floor masonary walls of barn in accordance with BS 6575. This work is to be carried out by a BBA approved specialist and must carry a 30 year insurance backed guarantee covering workmanship and materials. All drilling to external walls to be performed internally.

REMEDIAL WORK TO BE CARRIED OUT

The cracks in the existing barn should be repaired by raking out the mortar where cracks are evident and the joints re-pointed. Vertical joints should be stitched together by introducing brickwork across the joint of every other course. A nominated engineer is to confirm that the existing archways are adequate or need replacing. Where brickwork may need to be replaced, use brickwork to match existing barn.

All dimensions are taken from brickwork/blockwork face and plasterboard face of stud partitions.

Where lintels and foundations are to be subjected to additional loading they are to be exposed and checked by the Local Building Control Officer for there adequacy prior to introduction of new loads. Contractor to install lintels above existing openings as indicated where openings are subjected to additional loadings.

DUE TO BUILDINGS LOCATION CONTRACTOR TO REFER TO FLOOD MITIGATION MESURES AND DECIDE ON METHODS OF CONSTRUCTION.

DO NOT SCALE FROM DRAWINGS IF IN DOUBT ASK.

Please read in conjunction with Engineer's Specification

Rev	Date	Detail	Initial
D	12/24	Building regs amends	D.J.E
C	12/24	Window U-Value amends	SH
B	02/18	Design Amends	D.J.E
A	02/18	Design Amends	D.J.E

Project:
Proposed residential development at Bangor on Dee, Wrexham, LL13 0DA.

Title: Full GF Plan

Scale: (A1) 1:100

Drawn By: D.J.Edwards

Date: Jan 2018

Drawing No: 5064/003

Sheet: 11 of 13

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