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# DRAFT

## FLOOD RISK ASSESSMENT

15 Mottingham Road

15 Mottingham Road, London, N9 8DZ

CLIENT  
GG Architecture and Designs

DOCUMENT REF  
FA-FRA-0175

REVISION  
P01

DATE  
4 August 2026

FLOOD ZONE  
Zone 3

GRID REF  
TQ 35562 94995

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## Document control

|                |                                           |
|----------------|-------------------------------------------|
| PROJECT        | 15 Mottingham Road                        |
| REPORT         | Flood Risk Assessment & Drainage Strategy |
| SITE           | 15 Mottingham Road, London, N9 8DZ        |
| CLIENT         | GG Architecture and Designs               |
| DOCUMENT REF   | FA-FRA-0175                               |
| REVISION       | P01                                       |
| DATE           | 4 August 2026                             |
| PLANNING STAGE | Full planning application                 |
| PREPARED BY    | Fortress Associates                       |

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**DRAFT**



## Executive summary

This Flood Risk Assessment and Drainage Strategy accompanies a full planning application for the erection of a two-storey side extension and associated alterations at 15 Mottingham Road, London N9 8DZ, forming a mixed-use building comprising a 51 m<sup>2</sup> Class E commercial unit and three self-contained flats. Two additional dwellings are created on a 179 m<sup>2</sup> previously developed plot.

The site lies in Flood Zone 3 on the Environment Agency Flood Map for Planning, with river flooding the modelled source. The development is 'More vulnerable' under Annex 3 of the National Planning Policy Framework, so Table 2 of the Planning Practice Guidance requires the Exception Test; both parts are satisfied. The site falls within the mapped Risk of Flooding from Surface Water extent in the low-risk band, and within the maximum reservoir inundation extent, which is a residual risk. There is no record of historic or recorded flooding at the site, and no credit is taken for flood defences.

Flood risk is controlled first by level. The ground floor is formed as a suspended slab set 600 mm above existing site ground level of 12.90 m AOD, giving a finished floor level of 13.50 m AOD. That freeboard is four times the 150 mm the London Borough of Enfield requires above the 1 in 100 year plus climate change surface water flood depth, and twice the 300 mm required above the equivalent fluvial depth. It is the basis on which sleeping accommodation is provided at ground floor in Flat 15A. The void beneath the suspended slab is vented to external ground level so that the volume below the finished floor within the new footprint remains available for flood storage, delivering level-for-level compensation with no net loss. Property flood resilience to CIRIA C790, egress at Very Low Hazard on the FD2320 classification, registration for Environment Agency flood warnings and a flood management and evacuation plan manage the residual risk.

Surface water is managed by sustainable drainage designed to the London Plan drainage hierarchy and the SuDS management train. A 30 m<sup>2</sup> sedum green roof, rain gardens within the landscaped frontage, 8 m<sup>2</sup> of permeable paving and water butts on every roof downpipe provide source control and intercept the first 5 mm of rainfall, 0.7 m<sup>3</sup>, at source. Below-ground cellular storage provides the 6 m<sup>3</sup> of attenuation required for the 1 in 100 year event including a 40% climate change allowance, and a vortex flow control restricts discharge to the public surface water sewer to 2 l/s in place of the building's existing unrestricted connection. The storage half-empties within 1 hour.

With the measures set out in this report the development is safe for its 100-year lifetime, does not increase flood risk elsewhere, and substantially reduces the rate at which surface water leaves the site.

## Key flood risk information

| Item                       | Value                              |
|----------------------------|------------------------------------|
| Site address               | 15 Mottingham Road, London, N9 8DZ |
| OS grid reference          | TQ 35562 94995                     |
| Local planning authority   | Enfield                            |
| Lead Local Flood Authority | Enfield                            |

| Item                                        | Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Development                                 | Erection of a two-storey side extension and associated alterations to form a mixed-use building comprising a 51 m <sup>2</sup> Class E commercial unit and three self-contained flats: a two-bedroom, three-person ground-floor flat (Flat 15A, 69 m <sup>2</sup> ) and two two-bedroom flats at first and second floor (Flats 15B and 15C). The scheme includes internal refuse and cycle stores, balconies and a communal terrace, a sedum green roof over the single-storey element and landscaped planting to the set-back frontage. Two additional dwellings are created |
| Vulnerability classification (NPPF Annex 3) | More vulnerable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flood zone (EA Flood Map for Planning)      | Zone 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| PPG Table 2 compatibility                   | Exception Test required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Surface water risk at site (RoFSW)          | At risk - managed by design                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Historic flooding recorded                  | No record                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Reservoir flood extent                      | Within mapped extent (residual risk)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Site ground level                           | ~ 12.9 m AOD (EU-DEM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Finished floor level                        | 13.50 m AOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| EA flood warning coverage                   | Available - occupants to register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Surface water discharge destination         | Surface water sewer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Restricted discharge rate (SuDS)            | 2 l/s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Attenuation storage provided                | 6 m <sup>3</sup> (1 in 100 yr + 40% CC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Lifetime assessed                           | 100 years                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Site and development description

The application site is located at 15 Mottingham Road, London, N9 8DZ, National Grid Reference TQ 35562 94995, within the administrative area of Enfield.

A two-storey building forming the end plot of a shopping parade on Mottingham Road, in residential use, on a 179 m<sup>2</sup> plot. The building occupies the southern 79 m<sup>2</sup> of the plot; the northern 99 m<sup>2</sup> is an open rear garden and yard laid to lawn and paving, with the whole plot approximately half hard surfaced. A shared gated vehicular driveway and parking court lie immediately to the east, outside the site boundary, and Chelsfield Avenue adjoins to the north.

The proposal comprises: Erection of a two-storey side extension and associated alterations to form a mixed-use building comprising a 51 m<sup>2</sup> Class E commercial unit and three self-contained flats: a two-bedroom, three-person ground-floor flat (Flat 15A, 69 m<sup>2</sup>) and two two-bedroom flats at first and second floor (Flats 15B and 15C). The scheme includes internal refuse and cycle stores, balconies and a communal terrace, a sedum green roof over the single-storey element and landscaped planting to the set-back frontage. Two additional dwellings are created. The development is classified as 'More vulnerable' development under Annex 3 of the National Planning Policy Framework, with sleeping



accommodation at ground floor. The assessment covers a development lifetime of 100 years.

The application site forms the northern end plot of the shopping parade on Nottingham Road, at its junction with the access to Chelsfield Avenue. The plot is 179 m<sup>2</sup> and is bounded to the east by a gated driveway and parking court serving the parade, and to the south by the adjoining unit in the terrace. The site is not within a conservation area and the building is not listed.

## Area schedule

| Surface                          | Area               | Note                |
|----------------------------------|--------------------|---------------------|
| Total site area                  | 179 m <sup>2</sup> |                     |
| Existing impermeable area        | 90 m <sup>2</sup>  |                     |
| Proposed flat roof               | 50 m <sup>2</sup>  |                     |
| Proposed pitched roof (plan)     | 72 m <sup>2</sup>  |                     |
| Proposed permeable paving        | 8 m <sup>2</sup>   | Self-draining SuDS  |
| Proposed green / blue roof       | 30 m <sup>2</sup>  | Source-control SuDS |
| Proposed garden / soft landscape | 19 m <sup>2</sup>  |                     |
| Proposed impermeable total       | 134 m <sup>2</sup> | +49% vs existing    |



Figure 1 - Site location plan (application site outlined red)

## Planning policy context

National Planning Policy Framework (NPPF): paragraphs 165 to 181 set national policy on planning and flood risk. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (the Sequential Test); where development is necessary in such areas it must be made safe for its lifetime without increasing flood risk elsewhere, and provide wider sustainability benefits where the Exception Test applies.

Planning Practice Guidance - Flood risk and coastal change: sets out how the flood zones, vulnerability classifications (Table 2), site-specific flood risk assessment requirements, climate change allowances and the sequential approach are applied in decision making. This assessment follows the Environment Agency's FRA template structure and satisfies the PPG's site-specific assessment requirements in full.

A site-specific flood risk assessment is required for development in Flood Zones 2 and 3, for sites of 1 hectare or more in Flood Zone 1, for land identified as at risk from other sources (such as surface water), and where local requirements apply. This site is in Flood Zone 3 and a site-specific FRA is required.

Local policy: the Local Plan of Enfield and its Strategic Flood Risk Assessment (SFRA), together with the Lead Local Flood Authority standards, set the local requirements for flood risk and surface water drainage. This assessment meets those requirements through the measures set out in the following sections.

### Local policy notes

This assessment is prepared against the following development plan policies and technical guidance.

National: the National Planning Policy Framework and its policies on planning and flood risk; Planning Practice Guidance - Flood risk and coastal change; Environment Agency standing advice and the climate change allowances for flood risk assessments; the Non-Statutory Technical Standards for Sustainable Drainage Systems (Defra, 2015); CIRIA SuDS Manual C753 and Code of Practice for Property Flood Resilience C790; and the flood hazard classification of Defra/Environment Agency report FD2320.

The London Plan (2021): Policy SI 12 Flood risk management, Policy SI 13 Sustainable drainage, Policy SI 5 Water infrastructure and Policy G5 Urban greening.

Enfield Core Strategy (2010): Policy CP28 Managing flood risk through development and Policy CP21 Delivering sustainable water supply, drainage and sewerage infrastructure.

Enfield Development Management Document (2014): Policy DMD59 Avoiding and reducing flood risk, Policy DMD61 Managing surface water and Policy DMD58 Water efficiency.

Emerging Enfield Local Plan 2019-2041: Policy DM SE10 Sustainable drainage systems and Policy DM SE7 Climate change adaptation and managing heat risk, which carry limited weight at this stage of preparation.

The Enfield Strategic Flood Risk Assessment and the Lead Local Flood Authority's published requirements for sustainable drainage strategies apply to the site. The Council's pre-application advice, reference 25/02806/PREAPP, sets specific requirements for this development: a site-specific flood risk assessment; finished floor levels at least 150 mm above the 1 in 100 year plus climate change surface water flood depth and 300 mm above the equivalent fluvial depth; level-for-level flood compensation so that flood storage on the site is not reduced; a flood management and evacuation plan demonstrating an evacuation route in the Very Low Hazard category of FD2320; flood resistant and resilient construction; and a sustainable drainage strategy achieving runoff rates as close to greenfield as possible for the 1 in 1 year and 1 in 100 year plus climate change events, with source control used extensively across the site.



Each of these requirements is addressed in the sections that follow.

## Assessment of flood risk - all sources

All potential sources of flooding are assessed: rivers and the sea, surface water, groundwater, sewers, reservoirs and artificial sources, together with the effects of climate change over the development lifetime. Data: Environment Agency datasets accessed 04/08/2026.

### Rivers and the sea (fluvial & tidal)

#### Flood zone classification & compatibility

The site lies within Flood Zone 3 on the Environment Agency Flood Map for Planning. Flood Zone 3a is land assessed as having a 1% or greater annual probability of river flooding, or a 0.5% or greater annual probability of flooding from the sea, ignoring the presence of defences. The mapped source at this location is river flooding, taken from the Environment Agency's modelled outlines. Environment Agency flood warning coverage at the site relates to Salmons Brook at Grange Park and Lower Edmonton and to the Lower River Lee at Enfield, and those are the watercourses that generate the mapped fluvial risk.

The proposal places residential flats over a Class E commercial unit. Where a scheme combines uses the highest vulnerability class applies, so the development is classified as 'More vulnerable' under Annex 3 of the National Planning Policy Framework. Table 2 of the Planning Practice Guidance identifies 'More vulnerable' development in Flood Zone 3a as development for which the Exception Test is required. The Exception Test is set out and satisfied in the Avoid section of this report.

The Flood Map for Planning does not distinguish Flood Zone 3b. The site forms part of a continuously developed urban frontage that has been built on for many years, carries no flood storage or conveyance function for the catchment, and is assessed throughout this report as Flood Zone 3a.

#### Assessment of fluvial / tidal risk

The design events for this assessment are the 1% annual probability fluvial flood and, on tidal reaches, the 0.5% annual probability tidal flood, each including the climate change allowances set out in the Climate change section. The site is not on a tidal reach; fluvial flooding from the Lower Lee catchment and its tributaries is the governing source.

Site ground level is 12.90 m AOD and the land falls gently eastwards across the plot, dropping approximately 0.5 m towards the Lee valley. The existing building occupies the southern 79 m<sup>2</sup> of the plot and the two-storey side extension occupies the northern part, built at existing ground level with no land raising.

Fluvial risk to the site is high before mitigation, consistent with the Flood Zone 3 designation, and it is controlled by level. The ground floor is set 600 mm above existing site ground level, at 13.50 m AOD, which is twice the 300 mm freeboard above the 1 in 100 year plus climate change fluvial flood depth required by the London Borough of Enfield. All accommodation sits at or above that level, and the first and second floors provide a place of safety well above it. With that freeboard, the resistance and resilience specification, and the warning and evacuation arrangements set out in this report, residual

fluvial risk to people and property is managed to an acceptable level for the 100-year lifetime of the development.

#### Flood defences & areas benefiting

This assessment takes no credit for flood defences. The safety of the development rests on the finished floor level, the resistance and resilience specification and the warning and evacuation arrangements set out in this report, none of which depends on flood risk management infrastructure being present or performing as designed.

The Flood Map for Planning shows Flood Zone 3 as the undefended extent, so the flood zone on which this assessment is based already disregards any defence in the catchment. Assessing the development on that undefended basis means the conclusions hold in a breach or overtopping scenario as well as in the design event. The residual risk associated with any such scenario is covered by the freeboard, the resilient construction and the warning and evacuation measures described in the Manage section, and the development places no additional reliance on the Lee valley flood risk management assets.

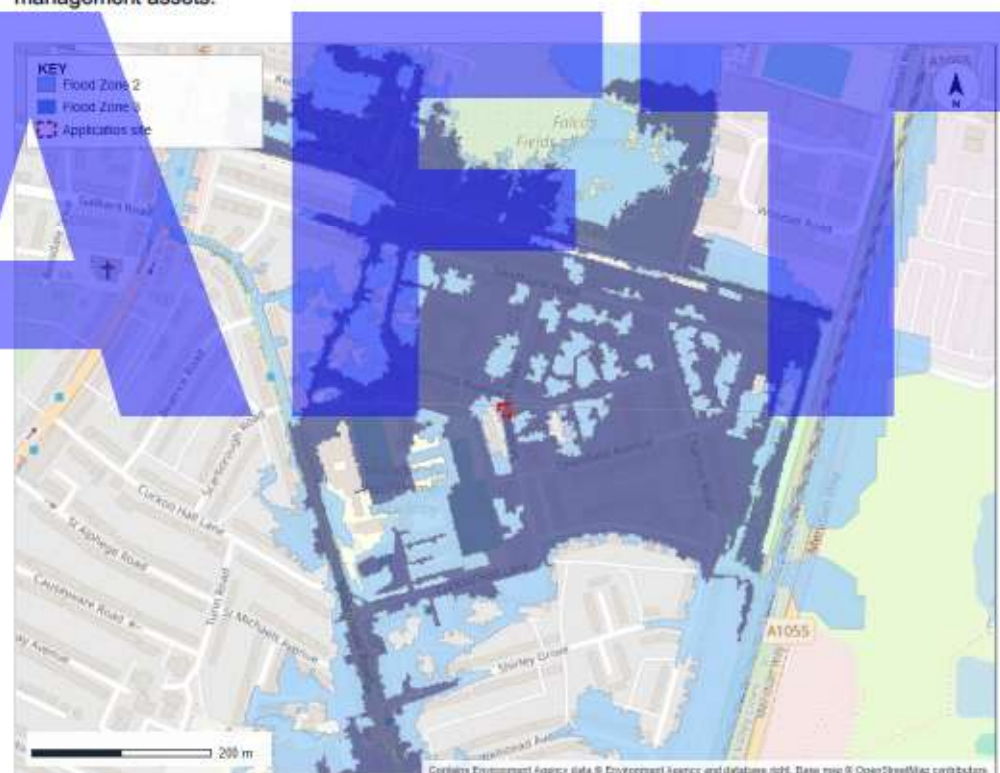


Figure 2 - Flood Map for Planning - Flood Zones 2 and 3 (application site outlined red)



## Surface water

### Risk of flooding from surface water (RoFSW)

The Environment Agency Risk of Flooding from Surface Water mapping places the site within the mapped extent, in the low-risk band, which is between a 0.1% and a 1% chance of surface water flooding in any year. The site does not fall within the deeper-water extent of that mapping, so surface water flooding here takes the form of shallow, short-duration ponding and overland flow during intense rainfall rather than deep or fast-moving water.

Because the scheme places sleeping accommodation at ground floor, surface water is carried forward as a medium risk to the development on a precautionary basis rather than at the mapped band. It is managed by four measures acting together: the finished floor level, which is 600 mm above existing ground and therefore four times the 150 mm freeboard above the 1 in 100 year plus climate change surface water flood depth required by the London Borough of Enfield; external levels graded away from every opening; the exceedance route described below; and the sustainable drainage strategy, which replaces the site's existing unrestricted discharge with 6 m<sup>3</sup> of on-site storage and a controlled 2 l/s outfall, so the development reduces rather than adds to the volume of surface water reaching the local network in an intense storm.

### Overland flow routes & low spots

Overland flow across this frontage follows the natural fall of the land, which drops approximately 0.5 m eastwards across the site towards the Lee valley. That route is preserved.

The extension is built at existing ground level within the plot and does not dam or divert the flow path. External levels are graded so that overland flow passes around the building envelope and continues eastwards to the shared driveway and parking court beyond the site boundary, as it does at present. The new footprint sits within the continuous frontage of the parade and does not project into any flow corridor that the existing built form does not already occupy.

There are no low spots or depressions within the site that would pond water against the building. Door thresholds sit at finished floor level, 600 mm above existing site ground level, and the entrance approaches are graded up to meet them in permeable paving so that no water stands against an opening. The landscaped frontage is set marginally below threshold level so that the rain gardens receive and detain frontage runoff instead of allowing it to build against the walls. No boundary treatment is proposed that would obstruct overland flow across the site.



Figure 3 - Risk of Flooding from Surface Water (application site outlined red)



Figure 4 - Surface water exceedance flow route



## Other sources

### Groundwater

No basement or other below-ground accommodation is proposed. The ground floor is formed as a suspended slab over a vented void, so the habitable envelope sits clear of the ground and is not exposed to groundwater emergence at floor level.

The site lies within the Lee valley, where groundwater is comparatively shallow. That is one of the reasons infiltration is not adopted as the discharge route for the scheme, as set out in the Discharge hierarchy assessment. No records identify the site or the surrounding parade as having been affected by groundwater flooding, and no below-ground structure is proposed that could intercept a groundwater body.

Groundwater flood risk to the development is low. The resilient construction specified in the Mitigate section, including low-permeability external wall construction from ground level to 600 mm above the finished floor, protects the ground-floor structure against moisture at the base of the wall.

### Sewers

No public sewer flooding records are identified for the site. The building's existing surface water connection discharges without restriction, so at present the full 90 m<sup>2</sup> of existing impermeable area drains to the public system at pipe-full rate during a storm.

The proposals replace that arrangement with 6 m<sup>3</sup> of attenuation storage and a flow control limiting discharge to 2 l/s. This reduces the peak burden the site places on the local network in every storm event, and therefore reduces the risk of surcharge downstream as well as at the site itself.

Non-return valves are fitted on the foul and surface water connections so that surcharge in the public system cannot back up into the building, and the internal drainage is arranged so that no appliance discharges below the level at which surcharge could occur. Sewer flood risk to the development is low, and the development reduces the risk of sewer flooding to third parties.

### Reservoirs

The Environment Agency reservoir flood extent for the wet-day scenario covers the site, reflecting its position in the Lee valley downstream of the reservoir chain. This is a residual risk rather than a probability-based one. Reservoirs regulated under the Reservoirs Act 1975 are subject to statutory supervision and periodic inspection by qualified panel engineers, and the annual likelihood of an uncontrolled release is extremely low. Development is not restricted by the reservoir extent, and the extent is not a flood zone.

The risk is addressed by the same measures that address the residual fluvial risk. Occupants receive warnings through the Environment Agency service and, in a reservoir emergency, directly from the emergency services. The flood plan issued with each unit records that instructions from the emergency services take precedence over the routine flood plan, and identifies the first and second floors as the place of safety within the building.

### Canals & other artificial sources

No canal, raised channel, ornamental lake or other artificial water body with the potential to flood the site is identified in the vicinity on available mapping. The site does not lie below any raised or perched channel, and no water-retaining structure adjoins it.

Risk to the development from artificial sources is low, and the development creates no artificial water body of its own: all attenuation storage is enclosed below-ground cellular construction, and the rain gardens are shallow bioretention features that drain within hours.

### Historic flooding record

The Environment Agency Historic Flood Map and the Recorded Flood Outlines dataset hold no record of flooding at the site or at the adjoining properties in the parade.

No weight is placed on that absence. A recorded outline reflects events that were surveyed and reported, so the absence of a record is not evidence that the site has not flooded. The design of this scheme responds to the modelled Flood Zone 3 designation, to the mapped surface water extent and to the climate change allowances applied over the development lifetime, rather than to the flood history of the plot.



Figure 5 - Historic flood map (application site outlined red)





Figure 6 - Reservoir flood extent - wet day scenario (application site outlined red)

## Climate change

### Climate change allowances over the development lifetime

The assessment covers the 100-year lifetime of the development, to the 2120s. Environment Agency climate change allowances are applied as follows.

For surface water drainage design, the peak rainfall intensity allowance is applied at the upper end, 40%, to the 1 in 100 year design event. This is the allowance used in the runoff and storage calculations in the drainage strategy. It exceeds the central allowance, so the drainage system carries capacity in reserve against the range of plausible outcomes over the development lifetime.

For fluvial flooding, peak river flow allowances for the relevant river basin district are reflected in the freeboard applied to finished floor levels. The 600 mm adopted is twice the 300 mm freeboard above the 1 in 100 year plus climate change fluvial depth required by the London Borough of Enfield, and it accommodates the additional rise in flood level associated with the higher-end river flow allowances late in the development lifetime.

The measures in this report therefore remain effective as the climate changes, and the development is safe for its full lifetime without further intervention.

## Summary of flood risk by source

| Source             | Risk to development   | Basis                                                       |
|--------------------|-----------------------|-------------------------------------------------------------|
| Rivers and the sea | High (pre-mitigation) | Flood Zone 3 - river                                        |
| Surface water      | Medium                | RoFSW extent at/adjoining the site                          |
| Groundwater        | Low (managed)         | No below-ground accommodation                               |
| Sewers             | Low                   | Restricted discharge reduces network burden                 |
| Reservoirs         | Low (residual)        | Within mapped maximum extent                                |
| Artificial sources | Low                   | None identified in the vicinity                             |
| Climate change     | Allowed for           | +40% rainfall uplift; river flow allowances per EA guidance |

## Avoiding, controlling, mitigating and managing flood risk

The hierarchy required by the NPPF: avoid flood risk through location and layout; control it through levels and flow routes; mitigate what remains through resistant and resilient construction; manage residual risk through warnings and planning.

## Avoid - sequential approach

### Sequential Test position

The development is in Flood Zone 3, so the sequential test applies. The area of search is the administrative area of the London Borough of Enfield, which is the area within which the local planning authority determines applications of this scale and the area covered by its Strategic Flood Risk Assessment.

Within that area of search there is no reasonably available site at a lower probability of flooding that could accommodate this development. The proposal consists of an extension to, and the internal reorganisation of, an existing building on its own curtilage: the development is defined by works to this building and cannot be delivered on another site. The plot is previously developed land within an established shopping parade in a sustainable and accessible location, and the eastern part of the borough, including this frontage, lies extensively within the Lee valley floodplain, so directing development of this kind elsewhere in the borough would not reliably avoid Flood Zone 3.

The sequential test is passed. The Exception Test, which Table 2 of the Planning Practice Guidance also requires for 'More vulnerable' development in Flood Zone 3, is addressed below.

### Sequential approach within the site

The sequential approach is applied within the site as well as between sites. The plot is 179 m<sup>2</sup> and the completed building occupies 152 m<sup>2</sup> of it, so the scope to move uses horizontally is limited. The approach is therefore applied vertically, which is the more effective control at this scale.



Two of the three flats, Flats 15B and 15C, are located at first and second floor, entirely above the design flood level and above any credible extreme event. The Class E commercial unit is 'Less vulnerable' development, which Table 2 of the Planning Practice Guidance treats as appropriate in Flood Zone 3 without the Exception Test, and it occupies the ground-floor frontage where flood risk is highest. The refuse and cycle stores, the circulation and the ground-floor store are also placed at ground level.

Flat 15A retains sleeping accommodation at ground floor, and level makes that appropriate. Its floor is 600 mm above existing external ground level, which exceeds both freeboard standards set by the London Borough of Enfield for this site. Its occupants are given access to the communal stair core, so the first and second floor landings serve as an internal place of safety in an event exceeding the design standard. Electrical services, the consumer unit and the incoming utilities are located above the resilient design level, and the whole ground floor is built to the resilience specification in the Mitigate section.

### Exception Test (where required)

The Exception Test applies to this development and both parts are satisfied.

Part (a) - wider sustainability benefits to the community that outweigh the flood risk. The scheme makes effective use of previously developed land in an established shopping parade in a sustainable, accessible location, delivering two additional dwellings towards the borough's housing requirement on a small site of the kind London Plan Policy H2 seeks to bring forward. It returns active commercial floorspace to the ground floor of a local centre, supporting the vitality of the parade and the local economy. It delivers measurable environmental benefit on a plot that is currently 50% hard surfaced with no vegetated drainage at all: a 30 m<sup>2</sup> sedum green roof, rain gardens and planting to the set-back frontage, and a reduction in surface water discharge from an unrestricted connection to a controlled 2 l/s. These benefits outweigh the flood risk, which the measures in this report manage to an acceptable level.

Part (b) - the development will be safe for its lifetime without increasing flood risk elsewhere, and where possible will reduce flood risk overall. This assessment demonstrates that. The finished floor level carries 600 mm of freeboard, exceeding both standards the London Borough of Enfield sets. The suspended ground floor over a vented void preserves floodplain storage level for level. The building is constructed to the property flood resilience standard of CIRIA C790. Egress is available at Very Low Hazard on the FD2320 classification. Occupants receive Environment Agency flood warnings and hold a flood management and evacuation plan. Surface water discharge is reduced against the existing position at every return period. Flood risk overall is reduced by the development.

## Control - levels & flow routes

### Finished floor levels

Site ground level is 12.90 m AOD. The ground floor of the completed building is formed as a suspended slab with its finished floor level set 600 mm above that, at 13.50 m AOD, across the whole ground floor including the Class E unit, Flat 15A, the stores and the circulation.

That freeboard satisfies both standards set by the London Borough of Enfield for this site: finished floor levels at least 150 mm above the 1 in 100 year plus climate change surface water flood depth,

and at least 300 mm above the 1 in 100 year plus climate change fluvial flood depth. The 600 mm adopted is four times the surface water standard and twice the fluvial standard, and it also meets the freeboard in Environment Agency standing advice, which sets floor levels above the higher of the average site ground level, the adjacent highway level and the estimated flood level. Because that freeboard is achieved, the bedrooms in Flat 15A are appropriate at ground floor level.

Level access is maintained to every entrance. The external approach to each doorway is graded up to threshold level within the site and surfaced in permeable paving, so the accessibility standards for the flats and the commercial unit are met and no water stands at a threshold. External levels elsewhere fall away from the building on all sides, and low-permeability materials are used in the external wall construction from ground level to 600 mm above the finished floor.

### Flood flow routes across the site

The development does not obstruct flood flow routes. The land falls approximately 0.5 m eastwards across the site and that direction of flow is preserved: the extension is built at existing ground level, no land raising is proposed, and external levels are regraded only locally at the entrance approaches.

The new footprint occupies the northern part of the plot in line with the existing building and within the continuous frontage of the parade, so it does not project into a flow corridor that the existing built form does not already occupy. Boundary treatments crossing the potential flow path are permeable to flow at ground level, and the landscaped frontage is open to the highway so that overland flow can continue to pass across and around the site as it does today.

Flows leaving the site to the east reach the shared driveway and parking court along the same route and at no greater rate than at present, because the drainage strategy holds 6 m<sup>3</sup> of storage upstream of that point and releases it at 2 l/s. The development therefore has no adverse effect on flow routes across neighbouring land.

### Floodplain storage / compensation

The London Borough of Enfield requires that the development does not reduce flood storage on the site, and that any loss is compensated level for level. The scheme achieves this and delivers no net loss.

No land raising is proposed. Existing external ground levels are retained across the open parts of the site, so the storage volume available across the landscaped frontage and the entrance approaches is unchanged.

Within the footprint of the two-storey side extension the ground floor is formed as a suspended slab over a void, and the void is vented to external ground level so that flood water enters and leaves it freely. In the 600 mm band between existing ground level and the finished floor at 13.50 m AOD, the open yard that the extension occupies presently offers approximately 44 m<sup>3</sup> of storage, being 73.5 m<sup>2</sup> at 600 mm. The vented void beneath the suspended slab returns approximately 40 m<sup>3</sup> of that volume within the same level band. The balance, displaced by the new external and party wall construction, is offset by the removal of the existing boundary wall and hardstanding within the site and within the same band.

Compensation is therefore delivered level for level and volume for volume within the site boundary. The 6 m<sup>3</sup> of below-ground attenuation storage is provided for surface water management and is additional to this; no part of it is counted towards the flood compensation. There is no net loss of flood



storage on the site and no increase in flood risk elsewhere.

## Mitigate - resistance & resilience

### Flood resistance & resilience measures

Flood resistance and resilience measures are incorporated in accordance with the CIRIA Code of Practice for Property Flood Resilience (C790) and applied to the ground floor of the whole building.

**Resistance.** Water-entry-resistant doorsets with proprietary threshold seals to every ground-floor entrance; non-return valves on the foul and surface water connections; low-permeability external wall construction from ground level to 600 mm above the finished floor; and a water-resistant suspended slab with sealed service penetrations. The vents serving the sub-floor void are left permanently open so that the void continues to perform its flood storage function; the slab above it is the water-resistant barrier, and the resistance line is therefore at floor level rather than at ground level.

**Resilience.** Closed-cell insulation and water-compatible wall and floor finishes to the ground floor up to 600 mm above the finished floor; solid water-resistant floor finishes in place of timber; kitchen units and appliances in Flat 15A and the Class E unit mounted on plinths; electrical circuits dropped from above, with socket outlets, switches and the consumer units at least 600 mm above finished floor level; and services routed so that any water entering can be drained and the ground floor dried and reoccupied quickly.

Together these measures exclude water from the building in the design event and limit damage and disruption in an event exceeding it.

### Essential services & utilities

The incoming water, gas and electricity supplies, the meters, the consumer units serving all three flats and the Class E unit, and the communal services are located above the resilient design level, 600 mm above the finished floor of the ground floor. Distribution to the ground floor is dropped from above rather than run at or below floor level, so no live circuit sits within the zone that could be wattled.

No external plant is located below the resilient design level, and any external units are mounted on raised plinths. Foul and surface water connections carry non-return valves as set out above, and no drainage or service plant is located below the resilient design level.

The development does not provide essential services or infrastructure for the wider community, so the 'Essential infrastructure' provisions of the Planning Practice Guidance do not apply to it.

## Manage - warnings & evacuation

### Safe access & escape

Safe access and egress is provided, and it is the primary means by which the safety of occupants is secured in an event approaching or exceeding the design standard.

The egress route runs from the entrances on the Mottingham Road frontage directly onto the public highway and then west, away from the fall of the land and away from the Lee valley, towards progressively higher ground. The route is dry in the design event: the finished floor level and the

entrance approaches sit 600 mm above existing ground level, and surface water flooding mapped along this frontage is shallow.

The route is assessed against the flood hazard classification of Defra/Environment Agency report FD2320, in which the hazard rating is  $HR = d \times (v + 0.5) + DF$ , where  $d$  is depth in metres,  $v$  is velocity in metres per second and  $DF$  is the debris factor. At the depth and velocity applicable along this frontage in the 1 in 100 year plus climate change event, a depth of 0.15 m and a velocity of 0.25 m/s, with a debris factor of zero for this urban setting with no significant debris source upstream, the hazard rating is 0.11. That is well within the 0.75 threshold for the Very Low Hazard category, so the evacuation route meets the standard set by the London Borough of Enfield.

In an extreme event exceeding the design standard, occupants of Flats 15B and 15C remain within their own homes above the flood level, and occupants of Flat 15A and the Class E unit use the communal stair core, to which Flat 15A holds access, as a place of safety at first and second floor level, rather than travelling through flood water.

### Flood warning availability

The site is covered by the Environment Agency flood warning service. The relevant warning and alert areas are Salmons Brook at Grange Park and Lower Edmonton, Lower River Lee at Enfield, Lower River Lee from Hoddesdon to Canning Town, and Lower Lee tributaries.

All occupants, being the three flats and the Class E unit, register for the free service on occupation and receive Flood Alerts and Flood Warnings by telephone, text and email. The service gives advance warning of fluvial flooding, which is the source that governs the flood zone designation at this site, and that lead time is what makes the evacuation strategy in the flood plan practicable.

Registration is included in the information pack issued with each unit and repeated in the flood plan, and the management company issues the registration instructions again on each change of occupier so that coverage is maintained for the lifetime of the development.

### Emergency / evacuation plan

A Flood Management and Evacuation Plan is provided for the building and issued to every occupier with the home user guide, meeting the requirement of the London Borough of Enfield for this development. It covers the following.

How warnings are received: Environment Agency Flood Alerts and Flood Warnings by telephone, text and email, and Floodline on 0345 988 1188.

Action on a Flood Alert: confirm that warning registration details are current, move valuables, documents and medication above the resilient design level, and move vehicles from the shared parking court to higher ground west of the site.

Action on a Flood Warning: move people and pets to the upper floors; isolate the electricity and gas supplies at the meters; close the water-entry-resistant doorsets; and evacuate along the egress route west to higher ground, which is classified Very Low Hazard on the FD2320 scale.

Place of safety: the first and second floor landings of the stair core and the upper flats. Occupants of Flat 15A hold access to the stair core for this purpose.

Reservoir emergencies: instructions issued by the emergency services take precedence over this plan and are followed without waiting for a flood warning.



Contacts: Floodline, the emergency services on 999, the managing agent, and the utility emergency numbers.

The plan is kept with the property, forms part of the building's management arrangements, and passes to future occupiers on any transfer.

### Residual risk

Residual risk is the risk that remains once the measures in this report are in place: events exceeding the 1 in 100 year plus climate change design standard, blockage or surcharge of the local drainage network, failure of an upstream reservoir, and climate change beyond the allowances applied.

Each is addressed. The 600 mm freeboard on the finished floor level is substantially more than either standard the London Borough of Enfield requires and absorbs a flood level materially above the design event. The resistance and resilience specification limits damage and enables rapid drying and reoccupation if water does enter. The exceedance route across the site conveys flows beyond the capacity of the drainage system safely eastwards without entering the building. Non-return valves protect against surcharge from the public system. The Environment Agency warning service and the flood plan give occupants time to act, and the upper floors provide a place of safety within the building for every occupier.

With these measures in place the development remains safe for its 100-year lifetime, and it does not increase flood risk on neighbouring land or elsewhere in the catchment.

## Surface water drainage strategy (SuDS)

Sustainable drainage designed to the discharge hierarchy, restricting runoff and providing treatment, in accordance with the PPG, the Non-Statutory Technical Standards for SuDS and the CIRIA SuDS Manual (C753). Calculations follow the stated methods (design rainfall with climate change allowance; greenfield rates with IH124 growth factors).

### Discharge strategy

#### Discharge hierarchy assessment

Surface water disposal follows the drainage hierarchy of London Plan Policy SI 13 and the Planning Practice Guidance, taking each option in turn.

**Rainwater use.** Water butts are fitted to every roof downpipe, storing roof water for irrigating the sedum roof and the frontage planting. The scale of the site limits the volume that can be re-used, so this is a partial rather than a complete solution, but it is adopted in full and it delivers the interception requirement.

**Infiltration to ground.** Infiltration is not adopted. The completed building occupies 152 m<sup>2</sup> of the 179 m<sup>2</sup> plot, leaving 27 m<sup>2</sup> of external area, which is insufficient to site infiltration components at the separation distances required from the building and the site boundaries. The site also lies in Flood Zone 3 within the Lee valley, where groundwater is shallow and where infiltration would not provide reliable discharge during the very events the system exists to serve.

**Attenuated discharge to a watercourse.** There is no watercourse within or adjoining the site and no prospect of a gravity connection to one.

**Attenuated discharge to the public surface water sewer.** This is the adopted route. Discharge is attenuated in 6 m<sup>3</sup> of storage and controlled to 2 l/s, replacing the building's existing unrestricted connection.

Discharge to a combined sewer is neither required nor proposed.

The strategy therefore takes the highest option in the hierarchy that is deliverable on this site, and applies source control above it throughout the management train.

### Runoff rates & betterment

The site is 179 m<sup>2</sup>. The existing impermeable area is 90 m<sup>2</sup>. The proposed impermeable area, counting the sedum roof at 40% of its area as the runoff model requires, is 134 m<sup>2</sup>, an increase of 49% over the existing position. The permeable and soft area, including the permeable paving and the balance of the green roof, is 45 m<sup>2</sup>.

Greenfield runoff rates for a site of this size, at 2.3 l/s/ha with IH124 growth factors, are QBAR 0.04 l/s, with 0.03 l/s for the 1 in 1 year event, 0.09 l/s for the 1 in 30 year event and 0.13 l/s for the 1 in 100 year event. Rates of that order cannot be delivered by a constructable flow control: an orifice sized to pass a tenth of a litre per second would block in service. The adopted discharge rate is therefore 2 l/s, which is the minimum practicable controlled rate, delivered by a vortex-type flow control on the attenuated outfall.

The London Borough of Enfield requires minor development to achieve as close to greenfield runoff rates as possible for the 1 in 1 year and the 1 in 100 year plus climate change events. The strategy meets that requirement in the way that is effective at this scale. The rate is held to the minimum a flow control can reliably pass, and the shortfall against the numerical greenfield rate is answered by volume: interception removes the first 5 mm of every rainfall event at source, so small and frequent storms produce no discharge from the site at all, and 6 m<sup>3</sup> of attenuation holds back the design event so that the peak leaves the site over many hours rather than minutes.

Against the existing position, an unrestricted connection draining 90 m<sup>2</sup> of impermeable area at pipe-full rate, the scheme delivers substantial betterment at every return period up to and including the 1 in 100 year plus climate change event.

### Attenuation storage

The design event is the 1 in 100 year, 6 hour storm with a 40% climate change allowance, giving 77 mm of design rainfall. Applied to the 134 m<sup>2</sup> of proposed impermeable area this generates 10.3 m<sup>3</sup> of runoff. Allowing for the volume released through the 2 l/s flow control as the event progresses, the attenuation requirement is 6 m<sup>3</sup>, and 6 m<sup>3</sup> is provided.

The storage is distributed through the management train rather than concentrated in a single component. The sedum roof build-up retains and detains rainfall at roof level across 30 m<sup>2</sup>. The water butts on the downpipes hold the first flush from the roofs. The sub-base of the 8 m<sup>2</sup> of permeable paving stores water within the aggregate voids. Below-ground cellular storage beneath the landscaped frontage and the entrance approaches makes up the balance, sized on a 95% void ratio and positioned clear of the building foundations and above the finished formation of the approaches.

The system meets the Non-Statutory Technical Standards for Sustainable Drainage Systems: no part of the site floods in the 1 in 30 year event, no building floods in the 1 in 100 year plus climate change



event, and any flooding in that event is retained within the site boundary and routed as described under Exceedance routing.

### Drain-down time

The attenuation storage half-empties within 1 hour of the peak of the design event at the restricted discharge rate of 2 l/s, and empties completely well within the same day.

That is comfortably inside the 24-hour half-drain standard, so the full 6 m<sup>3</sup> of storage is available again for a following storm within the same rainfall sequence. This matters on a site of this size, where the design event is short and intense and where successive storms are the realistic loading case rather than a single isolated event.

The sedum roof and the permeable paving sub-base recover on the same timescale as the cellular storage. The water butts are emptied by use, and the flood plan directs occupants to empty them ahead of forecast heavy rainfall so that their interception capacity is available when it is needed.

## SuDS measures

### Proposed SuDS measures

The following components form the management train, working from source control at roof level down to the controlled outfall.

**Sedum green roof** - 30 m<sup>2</sup> over the single-storey element. Retains rainfall in the substrate, delays and reduces what does run off, and is counted at 40% of its area as impermeable in the runoff model.

**Water butts and rainwater re-use** - on every roof downpipe. Provide interception of the first 5 mm and store roof water for irrigating the sedum roof and the frontage planting.

**Rain gardens and bioretention** - within the 19 m<sup>2</sup> of soft landscaping to the set-back frontage. Receive runoff from the frontage and the entrance approaches, provide filtration and interception, and give the drainage system visible amenity and biodiversity value at street level.

**Permeable paving** - 8 m<sup>2</sup> to the entrance approaches. Self-draining, with sub-base storage that doubles as attenuation and provides water-quality treatment.

**Below-ground cellular attenuation** - 6 m<sup>3</sup> beneath the landscaped frontage and the entrance approaches, holding the balance of the design event.

**Flow control** - a vortex-type control on the attenuated outfall, restricting discharge to the public surface water sewer to 2 l/s.

Each component is sized and positioned as set out in this strategy and shown on the surface water drainage / SuDS strategy plan, drawing FA-FRA-0175 / SuDS-01, which records the roof areas and falls, the rainwater pipe positions, the SuDS components and the discharge route. The maintenance schedule covers every component for the lifetime of the development.

### Interception of the first 5 mm

The first 5 mm of rainfall falling on the impermeable areas of the development, 0.7 m<sup>3</sup>, is intercepted at source and does not leave the site.

Interception is delivered by three components acting together. The sedum roof substrate absorbs the first several millimetres of every event before any runoff occurs. The water butts on the roof downpipes capture the first flush from the pitched and flat roof areas. The sub-base of the permeable paving holds the equivalent depth from the entrance approaches before any water reaches the attenuation system.

This satisfies the interception standard of the CIRIA SuDS Manual (C753). Its practical effect is that the small, frequent rainfall events that make up the great majority of the annual rainfall total produce no discharge from the site at all, which is the most direct answer available on a plot of this size to the requirement to approach greenfield behaviour.

### Water quality treatment

Water quality is assessed using the Simple Index Approach of the CIRIA SuDS Manual (C753).

The land use gives a low pollution hazard. There is no parking, servicing or vehicle movement within the site: the shared driveway and parking court lie outside the site boundary and drain separately from the site's own system. The contributing surfaces are roofs and pedestrian entrance approaches, for which the pollution hazard indices are low for total suspended solids, metals and hydrocarbons.

The mitigation indices of the proposed components exceed those hazard indices for every contaminant group before discharge. Roof runoff passes through the sedum roof substrate and the water butts. Frontage and approach runoff passes through the permeable paving sub-base and the vegetated rain gardens, which provide filtration, adsorption and biological treatment. Two treatment stages therefore act in series on all surface runoff, which exceeds the single stage the Simple Index Approach requires for this land use, and no discharge is made to the public sewer without treatment.

### Exceedance routing

Rainfall exceeding the 1 in 100 year plus 40% climate change event, or a blockage of the piped system or the flow control, is routed at surface rather than allowed to build up against the building.

External levels fall away from the building on all sides and follow the natural fall of the land eastwards across the site. Exceedance flows leave the rain gardens and the permeable paving at their designed overflow points, pass across the landscaped frontage and the entrance approaches as shallow sheet flow, and continue east to the shared driveway and parking court beyond the boundary. That is the route surface water takes across the site today, and it carries no greater rate than at present because 6 m<sup>3</sup> of storage is held upstream of it.

The route is clear of every ground-floor opening. The finished floor level and the thresholds are 600 mm above existing ground level, so exceedance flow passes the building without entering it. No exceedance flow is directed onto neighbouring property at a rate greater than at present, and none is directed towards the adjoining units in the parade.

## Wider design & construction

### Biodiversity & vegetated SuDS

Vegetated sustainable drainage is maximised within the constraints of a 179 m<sup>2</sup> site. The 30 m<sup>2</sup> sedum roof, together with the rain gardens and planting within the 19 m<sup>2</sup> of landscaped frontage,



gives 49 m<sup>2</sup> of vegetated drainage on a plot that at present has 90 m<sup>2</sup> of impermeable surface and no vegetated drainage at all.

The benefits run beyond drainage. The sedum roof and the frontage planting provide forage for pollinators and habitat in a part of the borough with little green infrastructure, contributing to the urban greening objectives of London Plan Policy G5 and to the local plan's landscaping and ecological enhancement policies. The green roof moderates summer surface temperatures on the building and reduces the heat island effect of a hard-surfaced parade frontage, supporting the Council's climate change adaptation policy. The frontage planting softens the streetscape at the point where the extension is set back from the building line, so the drainage function and the townscape improvement are delivered by the same intervention.

Planting favours drought-tolerant, pollinator-friendly species suited to the wetting and drying regime of a rain garden and to a shallow sedum roof substrate, so the vegetated components perform their drainage function and their habitat function together over the lifetime of the development.

### Amenity, health & safety

The SuDS components are designed for safety in accordance with the CIRIA SuDS Manual. There is no open water anywhere in the scheme. The rain gardens are shallow bioretention features with side slopes no steeper than 1 in 3 and a maximum design ponding depth of 150 mm, draining within hours of an event. All attenuation storage is enclosed below-ground cellular construction beneath the landscaped frontage and the entrance approaches. The sedum roof is reached only for maintenance, with edge protection to its perimeter.

The landscape-integrated components add amenity. The rain gardens and the frontage planting are the visible face of the drainage system at street level, in the set-back that the design creates along the frontage, and the sedum roof is overlooked by the communal terrace at first floor.

The design has been reviewed against the duties of the Construction (Design and Management) Regulations. Maintenance access is available to every component without working at height beyond the sedum roof perimeter, and inspection chambers serving the cellular storage and the flow control are positioned within the landscaped frontage where they can be reached and operated from ground level.

### Construction-phase surface water management

Surface water and sediment are controlled throughout construction so that runoff from the works does not affect the adjoining units in the parade, the shared driveway and parking court to the east, or the public sewer.

Excavated material and stockpiles are kept clear of the eastward flow path and covered. Silt fencing and cut-off measures protect the site boundary and the gullies on Mottingham Road, and a filtered settlement point is provided before any discharge to the public system. Wheel-washing and road-sweeping keep the highway clean, and concrete washout is contained within the site and taken off site for disposal.

The below-ground cellular storage and the flow control are installed and brought into service early, so the permanent drainage system manages runoff through the main construction phase rather than relying on temporary measures. The sedum roof, the permeable paving and the rain gardens are the last elements completed and are protected from construction traffic and sediment until the external

works are finished, so their infiltration and treatment performance is intact at handover.

## Maintenance

### Ownership & maintenance regime

The sustainable drainage system serving the development remains in private ownership. It is maintained by the building's management company on behalf of the owners of the three flats and the Class E unit, under the terms of the leases, so responsibility and funding are fixed for the lifetime of the development. No adoption by the sewerage undertaker or the highway authority is sought or required, and no component lies outside the site boundary.

Maintenance follows the schedule set out in this report, which is based on the CIRIA SuDS Manual and covers every component: the sedum roof, the water butts, the rain gardens, the permeable paving, the cellular attenuation and the flow control. The schedule is appended to the home user guide issued with each unit and is held by the management company, and it passes with the property on any transfer.

The management company keeps a record of inspections and works carried out, and makes it available to the Lead Local Flood Authority on request.

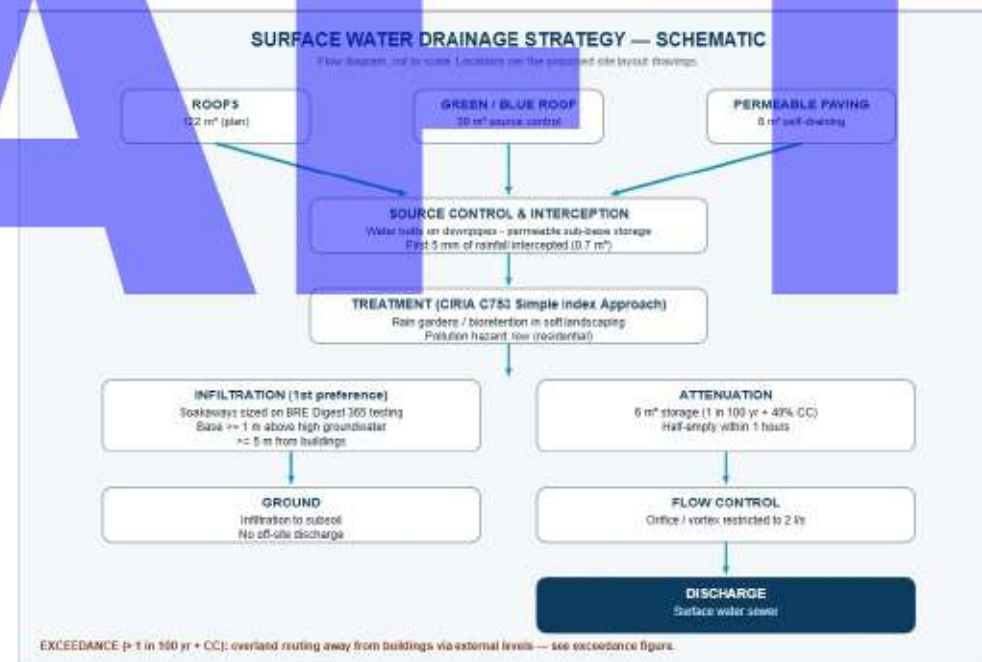


Figure 7 - Surface water drainage strategy - schematic flow diagram (not to scale)



## Drainage calculation summary

| Parameter                                                               | Value                                   |
|-------------------------------------------------------------------------|-----------------------------------------|
| Total site area                                                         | 179 m <sup>2</sup>                      |
| Existing impermeable area                                               | 90 m <sup>2</sup>                       |
| Proposed impermeable area (roofs + hardstanding + 40% green roof)       | 134 m <sup>2</sup>                      |
| Proposed permeable / soft area (incl. permeable paving)                 | 45 m <sup>2</sup>                       |
| Impermeable area increase vs existing                                   | +49 %                                   |
| Greenfield runoff rate - QBAR (2.3 l/s/ha)                              | 0.04 l/s                                |
| Greenfield runoff rate - 1 in 1 yr / 1 in 30 yr / 1 in 100 yr           | 0.03 / 0.09 / 0.13 l/s                  |
| Restricted discharge rate adopted                                       | 2 l/s (2 l/s minimum practical orifice) |
| Design rainfall (1 in 100 yr, 6 hr) + 40% climate change                | 77 mm                                   |
| Runoff volume generated in the design event                             | 10.3 m <sup>3</sup>                     |
| Attenuation storage provided                                            | 6 m <sup>3</sup>                        |
| Drain-down time (half-empty at the restricted rate)                     | 1 hour                                  |
| Interception depth captured at source (first 5 mm on impermeable areas) | 0.7 m <sup>3</sup>                      |

## Schedule of SuDS measures

| Measure                            | Application on this site                                                                                                                                                        | Design notes                                                                                                                                                |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soakaways / infiltration           | First preference in the discharge hierarchy - designed to the infiltration characteristics of the ground, positioned clear of high groundwater in line with the buffer standard | Designed to the infiltration characteristics of the ground; base set at least 1 m above the seasonal high groundwater level and at least 5 m from buildings |
| Green / blue roof                  | 30 m <sup>2</sup> of green/blue roof proposed - source control credited in the runoff model                                                                                     | Reduces runoff volume and rate at source; biodiversity benefit                                                                                              |
| Permeable paving                   | 8 m <sup>2</sup> of permeable paving proposed - self-draining with sub-base storage                                                                                             | Provides source control and water-quality treatment; sub-base storage can double as attenuation                                                             |
| Water butts / rainwater harvesting | Roof downpipes discharge via water butts before onward disposal, providing interception of the first 5 mm                                                                       | Small-scale source control; encourages re-use                                                                                                               |
| Rain gardens / bioretention        | Rain gardens within the 19 m <sup>2</sup> of soft landscaping provide treatment, interception and amenity value                                                                 | Provides treatment, interception and amenity value                                                                                                          |

| Measure                                     | Application on this site                                                                                        | Design notes                                                                 |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Attenuation tank / oversized pipes / crates | 6 m <sup>3</sup> of attenuation storage discharging at 2.0 l/s, engaged where infiltration capacity is exceeded | Sized for the 1 in 100 year + climate change event with restricted discharge |
| Flow control (orifice / vortex)             | Flow control on the attenuated outfall, restricted to 2.0 l/s                                                   | Restricts discharge to the agreed rate                                       |

## SuDS maintenance schedule

| Component                                   | Activity & frequency                                                                          | Responsibility |
|---------------------------------------------|-----------------------------------------------------------------------------------------------|----------------|
| Soakaways / infiltration                    | Inspect silt traps annually; remove sediment; verify half-empty time after major storms       | Property owner |
| Green / blue roof                           | Inspect twice yearly; weed, check outlets and membranes                                       | Property owner |
| Permeable paving                            | Brush/vacuum surface annually; avoid sand/soil contamination; replace jointing grit as needed | Property owner |
| Water butts / rainwater harvesting          | Empty/check before forecast storms; clean gutters and leaf guards seasonally                  | Property owner |
| Rain gardens / bioretention                 | Seasonal planting maintenance; check inlets/overflows for blockage                            | Property owner |
| Attenuation tank / oversized pipes / crates | Jet/inspect via access chambers annually; maintain flow control                               | Property owner |
| Flow control (orifice / vortex)             | Inspect annually; clear debris screens                                                        | Property owner |

## Summary of measures

The measures below are incorporated in the design, classified against the NPPF hierarchy so the local planning authority can secure them by condition where appropriate.

| Class           | Measure                                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Avoid</b>    | Vulnerable elements located in the lowest-risk parts of the site; sequential approach applied to layout            |
| <b>Avoid</b>    | Sleeping accommodation at ground floor, set above the design flood level with the freeboard in the Control section |
| <b>Control</b>  | Finished floor levels set at 13.50 m AOD with raised door thresholds above adjacent ground (see Control section)   |
| <b>Control</b>  | External levels graded away from openings; overland exceedance routes preserved towards the east                   |
| <b>Mitigate</b> | Flood resistance and resilience measures per CIRIA C790 (raised electrics, resilient finishes, non-return valves)  |
| <b>Manage</b>   | Occupants register for EA flood warnings; flood plan provided with the home user guide                             |



| Class | Measure                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------|
| SuDS  | Discharge restricted to 2 l/s following the discharge hierarchy; first 5 mm of rainfall intercepted at source               |
| SuDS  | 6 m <sup>2</sup> attenuation for the 1 in 100 yr + 40% CC event, half-emptying within 1 hour, with treatment per CIRIA C753 |
| SuDS  | Maintenance schedule in private ownership for the lifetime of the development                                               |

## Data sources and basis of assessment

| Dataset / service                                           | Publisher                                         | Access                                                                                  |
|-------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------|
| Flood Map for Planning - Flood Zones 2 & 3 (Rivers and Sea) | Environment Agency                                | environment.data.gov.uk (WMS: flood-map-for-planning-flood-zones)                       |
| Risk of Flooding from Surface Water (NaFRA2)                | Environment Agency                                | environment.data.gov.uk (WMS: nafra2-risk-of-flooding-from-surface-water)               |
| Historic Flood Map                                          | Environment Agency                                | environment.data.gov.uk (WMS: historic-flood-map)                                       |
| Recorded Flood Outlines                                     | Environment Agency                                | environment.data.gov.uk (WMS: recorded-flood-outlines)                                  |
| Reservoir Flood Extents - Wet Day                           | Environment Agency                                | environment.data.gov.uk (WMS: reservoir-flood-extents-wet-day)                          |
| Spatial Flood Defences                                      | Environment Agency                                | environment.data.gov.uk (WMS: spatial-flood-defences-including-standardised-attributes) |
| Statutory Main River Map                                    | Environment Agency                                | environment.data.gov.uk (WMS: statutory-main-river-map)                                 |
| Flood warning / alert area coverage                         | Environment Agency real-time flood monitoring API | environment.data.gov.uk/flood-monitoring                                                |
| Postcode geocoding & local authority lookup                 | postcodes.io (ONS/OS open data)                   | api.postcodes.io                                                                        |
| Address geocoding                                           | OpenStreetMap Nominatim                           | nominatim.openstreetmap.org                                                             |
| Ground elevation (EU-DEM 25 m)                              | OpenTopoData / Copernicus                         | api.opentopodata.org                                                                    |
| Base mapping                                                | OpenStreetMap contributors                        | openstreetmap.org                                                                       |

All datasets were accessed on 04 August 2026 under the Open Government Licence v3.0 / ODbL. Contains Environment Agency data © Environment Agency and database right; base mapping © OpenStreetMap contributors.

## Basis of assessment

- This is a professional flood risk assessment prepared in accordance with the Planning Practice Guidance and Environment Agency standing advice, applying the industry-standard methodologies used by flood risk practitioners across the UK to the authoritative national datasets listed above, current at the date of access and specific to this site.
- Ground levels derive from the Copernicus EU-DEM national elevation model; floor levels are specified at 13.50 m AOD so they carry directly through to the construction drawings.
- Drainage calculations follow the stated methods: greenfield rates at 2.3 l/s/ha with IH124 growth factors, and the 1 in 100 year, 6 hour design rainfall with a 40% climate change allowance, in accordance with the Non-Statutory Technical Standards for SuDS.
- The drainage components are designed to the standards stated, with soakaway bases set clear of seasonal high groundwater, and are built to the design values.
- The assessment addresses flood risk and surface water drainage; foul drainage and other environmental matters are covered by the other application documents.

## Closure

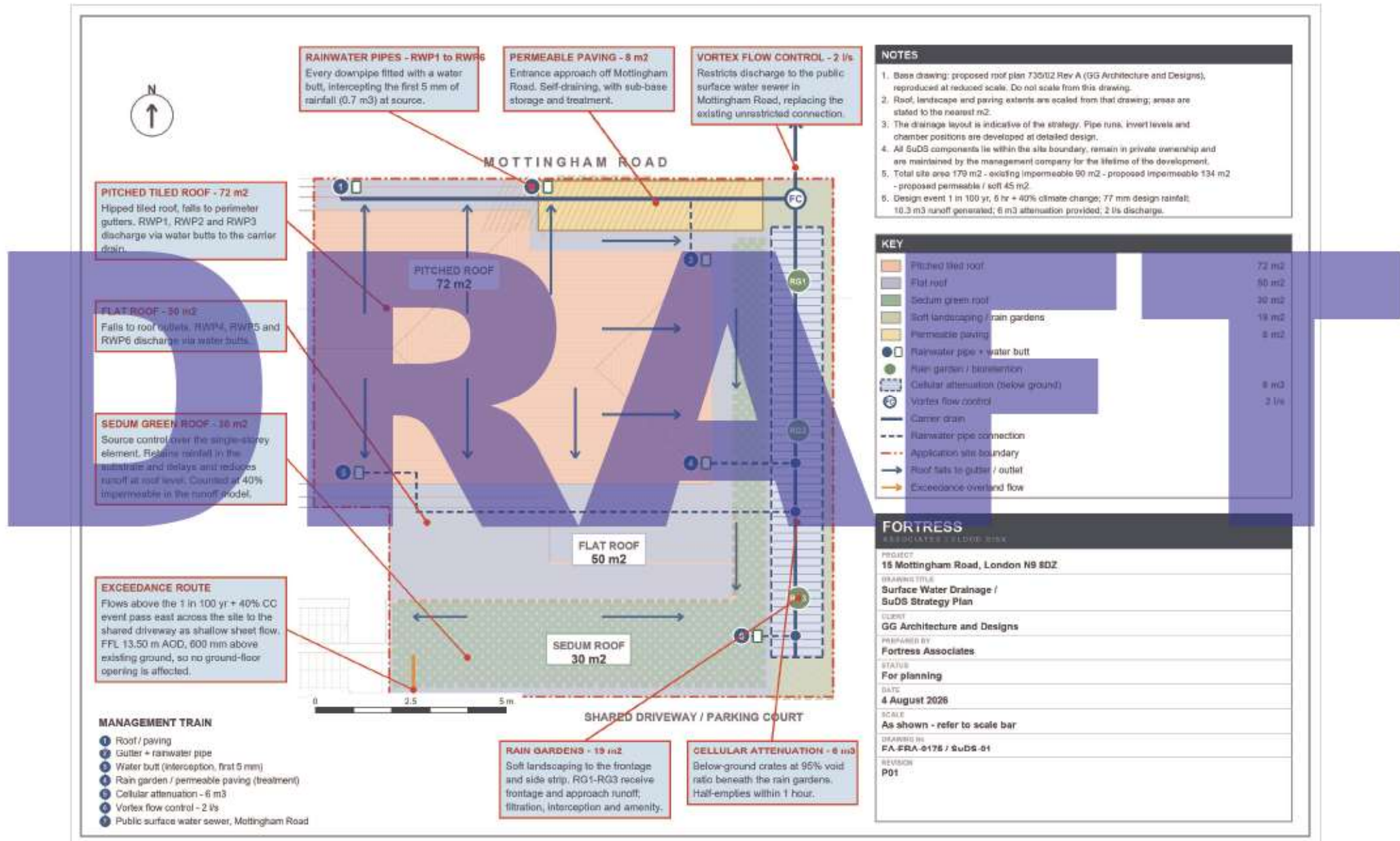
This Flood Risk Assessment and Drainage Strategy demonstrates that the proposed development satisfies the requirements of the NPPF and PPG: flood risk from all sources has been assessed for the lifetime of the development including climate change; the development is compliant with both parts of the Exception Test; it is safe for its lifetime; it does not increase flood risk elsewhere; and surface water is managed sustainably with betterment over the existing position.

Prepared by  
**Fortress Associates**

FA-FRA-0175 | 4 August 2026

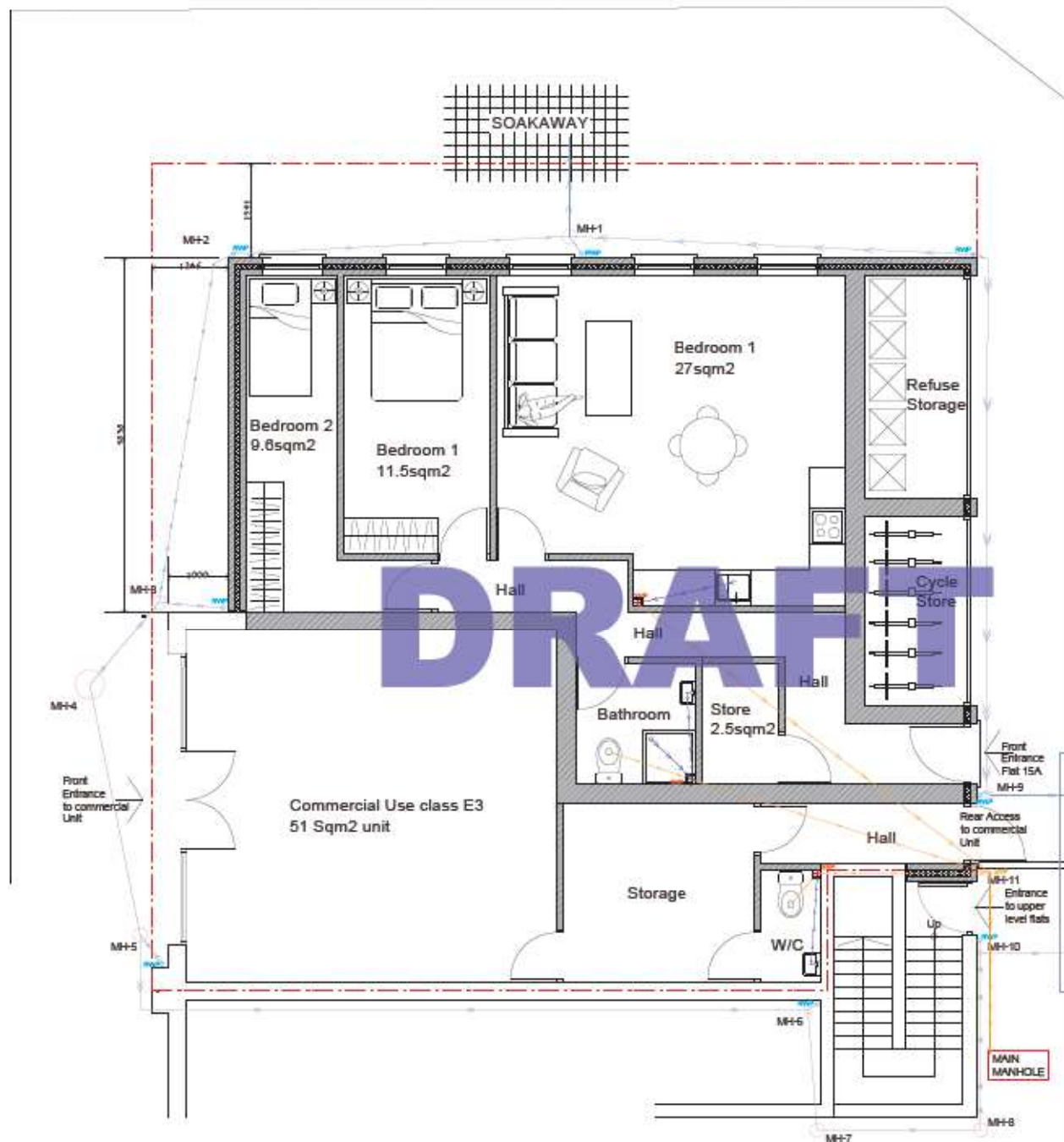


## Appendix A - Surface Water Drainage / SuDS Strategy Plan



Drawing FA-FRA-0175 / SuDS-01 - base: proposed roof plan 735/02 Rev A (GG Architecture and Designs)





# NOTES:

- ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
- ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO COMMENCING ON SITE.
- DO NOT SCALE FROM THIS DRAWING. ANY DISCREPANCY IS TO BE REPORTED.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL STRUCTURAL DRAWINGS AND DAMAGE REPORT.

- DO NOTES NEW MASONRY WALLS AS PER ARCHITECT'S SPEC
- DO NOTES EXISTING WALLS
- DO NOTES NEW TRIMMER PARTITIONS, 2000 FIRE PROTECTION
- DO NOTES NEW TRIMMER PARTITIONS, 2000 FIRE PROTECTION
- DO NOTES NEW TRIMMER PARTITIONS, NO FIRE PROTECTION
- DO NOTES SMOKE DETECTOR TO BE CONNECTED TO A REPEATER FIRE ALARM PANEL, INSTALLED POINT LOCATED AT THE ENTRANCE OF THE GROUND FLOOR
- DO NOTES HEAT DETECTOR
- DO NOTES SAFETY LIGHTING
- DO NOTES FIRE DOOR - 30 MIN RATED
- DO NOTES FIRE DOOR - 60 MIN RATED
- DO NOTES ESCAPE ROUT THROUGH DOOR
- DO NOTES ESCAPE ROUT THROUGH STAIRS
- DO NOTES REPEATER FIRE ALARM PANEL
- DO NOTES CALL POINT

## KEY:

|                    |
|--------------------|
| WHITE WATER PIPING |
| SOIL VENT PIPING   |
| SWP                |
| DWP                |
| SUS-MANHOLE        |
| ADD DRAIN          |
| MAIN MANHOLE       |

| REV | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
|     |      |             |
|     |      |             |

|                         |                                                                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Fortress Associates | <b>FORTRESS ASSOCIATES</b><br>Principal Engineer (Structural)<br>Building Regulations Compliance<br>1 Supply House, London E15 1DD<br>020 7700 0000   020 7700 0000 |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|          |                    |
|----------|--------------------|
| PROJECT: | 15 Mottingham Road |
|----------|--------------------|

|        |                                 |
|--------|---------------------------------|
| TITLE: | PROPOSED GROUND - DRAINAGE PLAN |
|--------|---------------------------------|

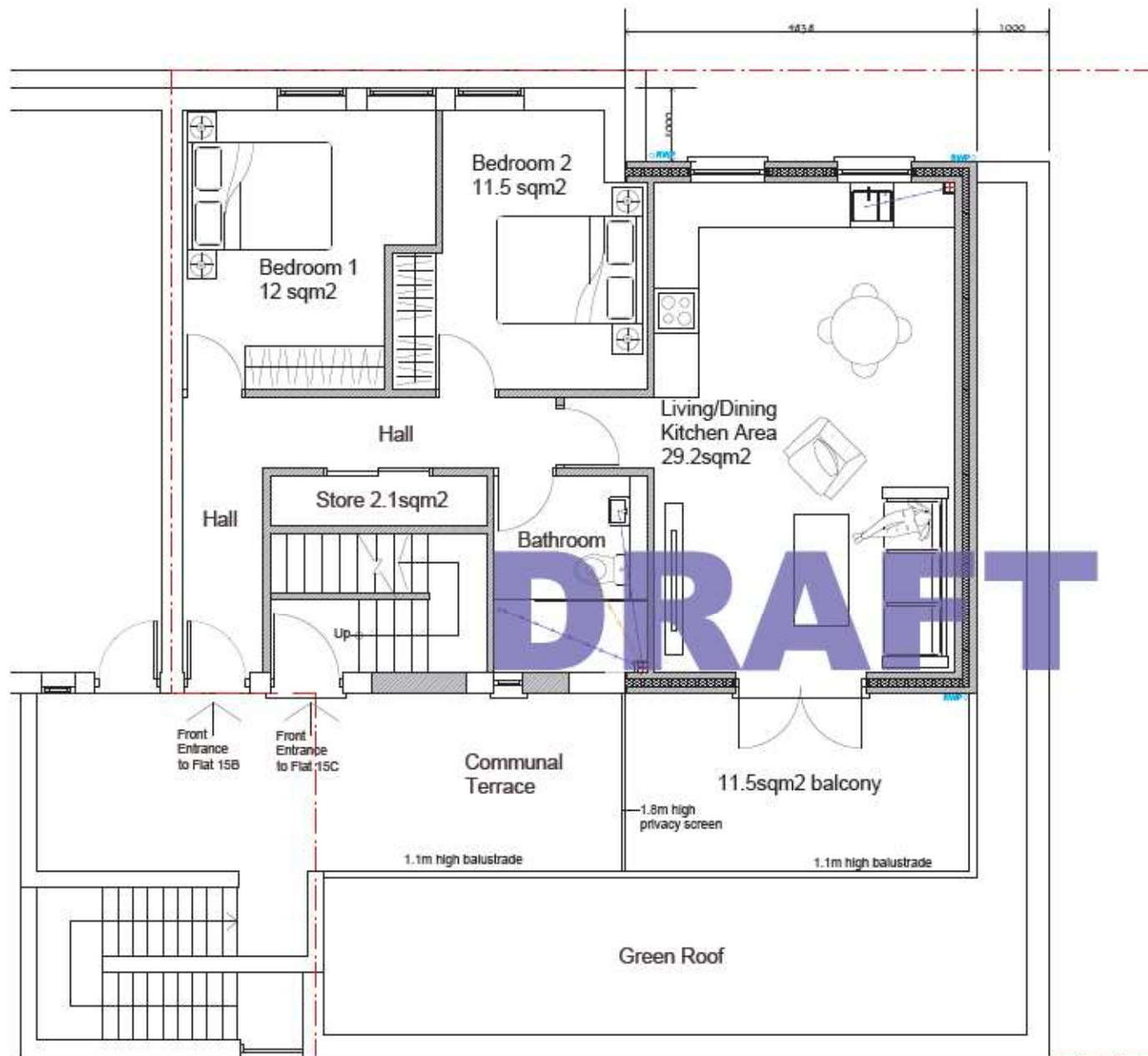
|            |     |
|------------|-----|
| ARCHITECT: | N/A |
|------------|-----|

|         |   |
|---------|---|
| CLIENT: | - |
|---------|---|

|         |                 |
|---------|-----------------|
| STATUS: | FOR INFORMATION |
|---------|-----------------|

|                     |                 |
|---------------------|-----------------|
| DATE: AUG 2025      | DRAWN BY:       |
| SCALE: 1:100        | CHECKED BY: MJA |
| JOB No: SR.33.EX.01 | REV: P1         |





PROPOSED FIRST LEVEL - DRAINAGE PLAN

NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
2. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO COMMENCING ON SITE.
3. DO NOT SCALE FROM THIS DRAWING, ANY DISCREPANCY IS TO BE REPORTED.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL STRUCTURAL DRAWINGS AND DAMAGE REPORT.

- DEVOTES NEW MASONRY WALLS AS PER ARCHITECT'S SPEC
- DEVOTES EXISTING WALLS
- DEVOTES NEW TIMBER PARTITIONS, 25mm FIRE PROTECTION
- DEVOTES NEW TIMBER PARTITIONS, 60mm FIRE PROTECTION
- DEVOTES NEW TIMBER PARTITIONS, NO FIRE PROTECTION
- DEVOTES SMOKE DETECTOR, TO BE CONNECTED TO A REPEATER FIRE ALARM PANEL AND CALL POINT LOCATED AT THE ENTRANCE OF THE GROUND FLOOR
- DEVOTES HEAT DETECTOR
- DEVOTES SAFETY LIGHTING
- DEVOTES FIRE DOOR, 30 MINUTED
- DEVOTES FIRE DOOR, 60 MINUTED
- DEVOTES ESCAPE ROUT THROUGH DOOR
- DEVOTES ESCAPE ROUT THROUGH STAIRS
- DEVOTES REPEATER FIRE ALARM PANEL
- DEVOTES CALL POINT

KEY:

|                    |
|--------------------|
| WASTE WATER PIPING |
| SOIL VENT PIPING   |
| RWP                |
| SWP                |
| GLS-MANHOLE        |
| ACC DRAIN          |
| MAIN MANHOLE       |

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
|     |      |             |
|     |      |             |

**Fortress Associates**

**Fortress Associates**  
 Chartered Engineer - Civil Engineer  
 Building Regulations Designer  
 15 Mottingham Road, London E15 2JZ  
 Tel: 0203 611 1111 | Email: info@fortress.co.uk

|            |                                 |             |     |
|------------|---------------------------------|-------------|-----|
| PROJECT:   | 15 Mottingham Road              |             |     |
| TITLE:     | PROPOSED SECOND - DRAINAGE PLAN |             |     |
| ARCHITECT: | N/A                             |             |     |
| CLIENT:    | -                               |             |     |
| STATUS:    | FOR INFORMATION                 |             |     |
| DATE:      | AUG 2023                        | DRAWN BY:   |     |
| SCALE:     | 1:100                           | CHECKED BY: | Moh |
| JOB No:    | SR.33.EX.01                     | DWG No:     |     |
|            |                                 | REV:        | P1  |





PROPOSED SECOND LEVEL - DRAINAGE PLAN

# NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
2. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO COMMENCING ON SITE.
3. DO NOT SCALE FROM THIS DRAWING, ANY DISCREPANCY IS TO BE REPORTED
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL STRUCTURAL DRAWINGS AND DAMAGE REPORT

- NEW MASONRY WALLS AS PER ARCHITECT'S SPEC
- EXISTING WALLS
- NEW TIMBER PARTITIONS, 90MM FIRE PROTECTION
- NEW TIMBER PARTITIONS, 90MM FIRE PROTECTION
- NEW TIMBER PARTITIONS, NO FIRE PROTECTION
- SMOKE DETECTOR, TO BE CONNECTED TO A REPEATER FIRE ALARM PANEL, AND CALL POINT LOCATED AT THE ENTRANCE OF THE WOODEN FLOOR
- HEAT DETECTOR
- SAFETY LIGHTING
- FIRE DOOR - 90MM RATED
- FIRE DOOR - 90MM RATED
- ESCAPE ROUTE THROUGH DOOR
- ESCAPE ROUTE THROUGH STAIRS
- REPEATER FIRE ALARM PANEL
- CALL POINT

## KEY:

|                    |
|--------------------|
| WASTE WATER PIPING |
| SOIL VENT PIPING   |
| TRAP               |
| GULLY              |
| SUB-DRAIN          |
| ADD DRAIN          |
| MAIN MANHOLE       |

NO. DATE DESCRIPTION

16  
FORTRESS ASSOCIATES  
16/04/2025 - 16/04/2025  
16/04/2025 - 16/04/2025

PROJECT: 15 Mottingham Road

TITLE: PROPOSED SECOND - DRAINAGE PLAN

ARCHITECT: N/A

CLIENT:

STATUS: FOR INFORMATION

DATE: AUG 2025 DRAWN BY:

SCALE: 1:100 CHECKED BY: MJB

JOB No: SR.33.EX.01 DWG No: REV: P1