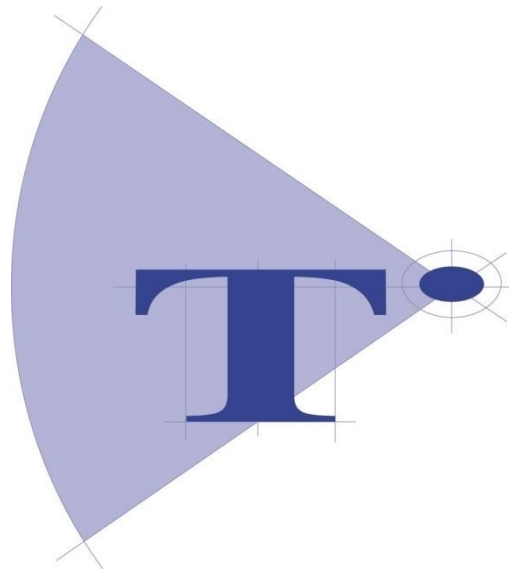




# **A FLOOD RISK ASSESSMENT FOR 79 MOSLEY STREET, MANCHESTER**

**ISSUE 1.0**

**TW/16/1129/FRA**

**30 NOVEMBER 2017**

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### EXECUTIVE SUMMARY

This FRA demonstrates that the site can be operated with minimal risk from flooding and will not increase flood risk elsewhere. The site should not therefore be precluded on the grounds of flood risk.

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal), the site has a 'low probability' of fluvial/tidal flooding as the site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

The proposed development is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

The Sequential and Exception Tests will not need to be undertaken as part of this planning application.

Existing foul water from the site discharges to the United Utilities public sewers. Development of the site will take place with separate systems for foul and surface water drainage. The existing connection to the public sewers will be re-used.

The amount of impermeable surfaces will not increase post-application compared to pre-application. The Modified Rational Method has been used to calculate the runoff from the impermeable surfaces, the existing and proposed impermeable areas total 0.061ha. The existing and proposed surface water discharge rate from the site is 8.48l/s. The proposed development of the site will not increase the surface water runoff from the site and there will be no increase in surface water flood risk to the site and off-site locations. It is understood that the existing drainage infrastructure at the site efficiently and effectively manages surface water runoff generated at the development site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed use. No changes to the current surface water network are proposed.

The flooding sources will be managed on the site by using a number of mitigation strategies to manage and reduce the overall flood risk at the site and will ensure the development will be safe. Measures used:

**Minimum Floor Level** - There is no minimum finished floor level proposed as a result of flooding. The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

**Flood Resilience and Resistance** - The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

**Access and Egress** - The site and surrounding area is located within Flood Zone 1 therefore a permanently safe and dry access can be maintained.



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# **1. INTRODUCTION**

## **1.1. Background**

This Flood Risk Assessment (FRA) has been prepared by Tier Consult at the request of Boulton Brooks to support a planning application for the proposed development at 79 Mosley Street, Manchester. This FRA includes an assessment of the existing and proposed surface and foul water drainage of the site.

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)<sup>1</sup> and the associated Planning Practice Guidance<sup>2</sup>. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

## **1.2. National Planning Policy Framework (NPPF)**

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall.

A risk based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary provide the evidence to the LPA that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

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<sup>1</sup> Department for Communities and Local Government (2012) National Planning Policy Framework.

<sup>2</sup> Communities and Local Government (2014) Planning Practice Guidance - Flood Risk and Coastal Change.



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### **1.3. Report Structure**

This FRA has the following report structure:

- Section 2 details the sources of information that have been consulted;
- Section 3 describes the location area and the existing and proposed development;
- Section 4 outlines the flood risk to the existing and proposed development;
- Section 5 details the sequential and exception tests;
- Section 6 outlines the proposed foul water drainage for the site;
- Section 7 details the proposed surface water drainage for the site and assesses the potential impacts of the proposed development on surface water drainage;
- Section 8 describes the risk management methods used to mitigate all sources of flood risk; and
- Section 9 presents a summary and conclusions.



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## **2. SOURCES OF INFORMATION**

### **2.1. Discussion with Regulators**

Consultation and discussions with the relevant regulators have been undertaken during this FRA including the Environment Agency, the Local Planning Authority (LPA), the Lead Local Flood Authority (LLFA) and Sewerage Undertakers.

#### **Environment Agency**

The Flood and Water Management Act 2010 gives the Environment Agency a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. The Environment Agency is the statutory consultee with regards to flood risk and planning. Information regarding the current flood risk at the application site, local flood defences and flood risk has been obtained from the Environment Agency.

#### **Manchester City Council**

Manchester City Council is the LPA, the LLFA and has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by Manchester City Council regarding flood risk was consulted to assess the mitigation policies in place. The Manchester City Council Strategic Flood Risk Assessment (SFRA) and the Manchester City Council Preliminary Flood Risk Assessment (PFRA) which cover the site have been reviewed as part of this FRA.

#### **United Utilities**

United Utilities is responsible for the disposal of waste water and supply of clean water for this area. Information with regards to sewer and water main flooding contained within the Manchester City Council SFRA and the Manchester City Council PFRA have been consulted as part of this FRA. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.



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### **3. LOCATION & DESCRIPTION**

#### **3.1. Site Location**

The site is located at 79 Mosley Street, Manchester on the junction of Princess Street / St Peters Square / Mosley Street (see Drawing TM/16/1129/FRA/1). The National Grid Reference (NGR) of the site is 384017, 397989.

#### **3.2. Existing Development**

The site is currently in use as offices and is constructed entirely from impermeable surfaces covering an area of 0.061 hectares (ha) or 610m<sup>2</sup>.

#### **3.3. Proposed Development**

It is understood that the proposals are for a full façade retention and complete internal rebuild and the proposed use is offices (see Appendix B). The site is an existing building and there will be no extension to the footprint of the building. The site will be constructed entirely from impermeable surfaces, as per the existing site, covering an area of 0.061ha or 610m<sup>2</sup>. Further details with regard to the proposed development can be found in the accompanying information submitted with the planning application.

#### **3.4. Ground Levels**

Site ground levels are relatively flat with a ground level of approximately 42.00 metres Above Ordnance Datum (mAOD).

#### **3.5. Catchment Hydrology**

There are no watercourses evident either on, or within the vicinity of the site (see Drawing TM/16/1129/FRA/1).

#### **3.6. Geology**

The British Geological Survey (BGS) Map for the site indicates that the site is underlain by the Chester Pebble Beds Formation - sandstone. The superficial deposits consist of Till, Devensian - diamicton.

#### **3.7. Groundwater**

The Environment Agency has designated the bedrock as a Principal Aquifer - these are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer. The superficial deposits are designated as Unproductive Strata - these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

#### **3.8. Groundwater Source Protection Zones**

The site is not located within an Environment Agency Groundwater Source Protection Zone.



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### **3.9. Soil**

Information from the National Soil Resource Institute<sup>3</sup> details the site area as being situated on slowly permeable seasonally wet acid loamy and clayey soils. The Flood Studies Report WRAP soil map classification is Type 4 - clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

### **3.10. Permeability/Infiltration Rate**

In determining the future surface runoff from the site, the potential of using infiltration devices has been considered. It has been concluded that the site would not be suitable for infiltration drainage due to the site ground conditions and limited space. Therefore, it will not be possible to discharge surface water runoff from the site via infiltration methods.

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<sup>3</sup> National Soil Resources Institute (NSRI). The Soils Guide. Available: [www.landis.org.uk](http://www.landis.org.uk). Cranfield University, UK. Last accessed 29/11/2017.



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## **4. FLOOD RISK**

### **4.1. Sources of Flooding**

All sources of flooding have been considered, these are; Fluvial (river) Flooding, Tidal (coastal) Flooding, Groundwater Flooding, Surface Water (pluvial) Flooding, Sewer Flooding and Flooding from Artificial Drainage Systems/Infrastructure Failure. The key consequences of flooding are death/personal injury, extensive damage to property, properties uninhabitable for long periods, properties cannot be sold, insurance unavailable or too expensive, expense of installing flood resilience measures and business interruptions.

### **4.2. Historic Flooding**

Data from the BGS indicates that the types of deposits in the locality of the site are of the type not normally associated with floodplains. This normally relates to flooding which happened many thousands of years ago. There are no records of anecdotal information of flooding at the site. The British Hydrological Society "Chronology of British Hydrological Events" has no information on flooding within the vicinity of the site. No other historical records of flooding for the site have been recorded. Therefore, it has been assumed that the site has not flooded within the recent past (i.e. the last thousand years).

### **4.3. Existing and Planned Flood Defence Measures**

A review of the Environment Agency flood map confirm that the site is not protected by any formal or informal flood defence measures (see Drawing TM/16/1129/FRA/2).

### **4.4. Environment Agency Flood Zones**

A review of the Environment Agency's flood map indicates that the site is located within Flood Zone 1 and therefore has a 'low probability' of fluvial/tidal flooding as shown in see Drawing TM/16/1129/FRA/2, with less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The Environment Agency Flood Zones and acceptable development types are explained in Table 4.1. Table 4.1 shows that all development types are generally acceptable in Flood Zone 1.

In the Planning Practice Guidance to the NPPF (Table 1) appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in Table 2 and 3 of the Planning Practice Guidance to the NPPF, the development is classified as 'less vulnerable'. Table 4.2 of this report and Table 3 of the Planning Practice Guidance to the NPPF states that 'less vulnerable' uses are appropriate within Flood Zones 1.

**Table 4.1 - Environment Agency Flood Zones and Appropriate Land Use**

| Flood Zone | Probability             | Explanation                                                                                                                                                                                                                                                                                                                                                        | Appropriate Land Use                            |
|------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Zone 1     | Low                     | Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)                                                                                                                                                                                                                                                                                | All development types generally acceptable      |
| Zone 2     | Medium                  | Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year                                                                                                                                                                                 | Most development types are generally acceptable |
| Zone 3a    | High                    | A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year                                                                                                                                                                                                          | Some development types not acceptable           |
| Zone 3b    | 'Functional Floodplain' | Land where water has to be flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes) | Some development types not acceptable           |

**Table 4.2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' as identified in the Planning Practice Guidance to the NPPF**

| Flood Risk Vulnerability Classification | Essential Infrastructure | Water Compatible | Highly Vulnerable       | More Vulnerable         | Less Vulnerable |
|-----------------------------------------|--------------------------|------------------|-------------------------|-------------------------|-----------------|
| Zone 1                                  | ✓                        | ✓                | ✓                       | ✓                       | ✓               |
| Zone 2                                  | ✓                        | ✓                | Exception test required | ✓                       | ✓               |
| Zone 3a                                 | Exception test required  | ✓                | ✗                       | Exception test required | ✓               |
| Zone 3b 'Functional Floodplain'         | Exception test required  | ✓                | ✗                       | ✗                       | ✗               |

Key: ✓: Development is appropriate, ✗: Development should not be permitted.

## 4.5. Fluvial (river) Flooding

There are no watercourses evident either on, or within the vicinity of the site (see Drawing TM/08/1040/FRA/1). A review of the Environment Agency flood map indicates that the site is located within Flood Zone 1 and therefore has a 'low probability' of fluvial flooding as shown in Drawing TM/16/1129/FRA/2, with less than a 1 in 1000 annual probability of river flooding in any year (<0.1%). The site is not located within the vicinity of fluvial flooding sources and the risk of fluvial flooding is considered to be not significant.

## 4.6. Tidal (coastal) Flooding

The site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be not significant.

## 4.7. Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded. Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).



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Site conditions (see Section 4.6 to 4.9) suggest a low probability of groundwater flooding. The Manchester City Council SFRA shows that the site is not at risk of groundwater flooding. The site has a low risk of groundwater flooding this will be mitigated by the adoption of the SWMS for the site and provided the finished floor levels are set above the adjacent ground levels, the risk of flooding from groundwater flooding is considered to be not significant.

#### **4.8. Surface Water (pluvial) Flooding**

The soil condition at the site and within the vicinity of the site (see Section 4.9) and the topography of the site suggest that the site is relatively well drained and surface water flooding would not be expected to accumulate to any significant depths. Surface water flooding tends to occur sporadically in both location and time such surface water would tend to be confined to the streets around the development. Drawing TM/16/1129/FRA/3 confirms that the site has a very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 years (0.1%).

The Manchester City Council SFRA has no recorded incidents of surface water flooding on or within the vicinity of the site. The site is not risk of surface water flooding this will be further mitigated by the adoption of the SWMS for the site and provided the finished floor levels are set above the adjacent ground levels, the risk of flooding from surface water flooding is considered to be not significant.

#### **4.9. Sewer Flooding**

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

There are existing public sewers within roads adjacent to the site; these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment. Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 30 years. The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less.

The Manchester City Council SFRA has no recorded incidents of sewer flooding on or within the vicinity of the site. The site has a low risk of sewer flooding, this will be mitigated by the adoption of the SWMS for the site and provided the finished floor levels are set above the adjacent ground levels, the risk of flooding from sewer flooding is considered to be not significant

#### **4.10. Flooding from Artificial Drainage Systems/Infrastructure Failure**

There are no other nearby reservoirs, artificial water bodies, water channels and artificial drainage systems that could be considered a flood risk to the site. This has been confirmed within the Manchester City Council SFRA. The Environment Agency Reservoir flood map shows that the site is not at risk of reservoir flooding (see Drawing TM/16/1129/FRA/4). The risk of flooding from artificial drainage systems/infrastructure failure is considered to be not significant.



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## 4.11. Site Specific Flood Risk Assessment

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4.3.

Table 4.3 - Risk Posed by Flooding Sources

| Sources of Flooding                                              | Potential Flood Risk | Potential Source | Probability/Significance |
|------------------------------------------------------------------|----------------------|------------------|--------------------------|
| Fluvial (river) Flooding                                         | No                   | None Reported    | Not significant          |
| Tidal (coastal) Flooding                                         | No                   | None Reported    | Not significant          |
| Groundwater Flooding                                             | No                   | None Reported    | Not significant          |
| Surface Water (pluvial) Flooding                                 | No                   | None Reported    | Not significant          |
| Sewer Flooding                                                   | Yes                  | Local Sewers     | Not significant          |
| Flooding from Artificial Drainage Systems/Infrastructure Failure | No                   | None Reported    | Not significant          |

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal), the site has a 'low probability' of fluvial/tidal flooding as the site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

The proposed development is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.



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## **5. SEQUENTIAL APPROACH**

### **5.1. Sequential Test**

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding (i.e. Flood Zone 1). The proposed development site complies with the sequential approach which should be applied at all stages of planning. Therefore, the Sequential Test will not need to be undertaken as part of this planning application.

### **5.2. Exception Test**

Applications located within Flood Zone 1 are not subject to the Exception Test as confirmed within Table 4.2 of this report and Table 3 of the Planning Practice Guidance to the NPPF.



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## **6. PROPOSED FOUL WATER DRAINAGE**

### **6.1. Existing Foul Water Drainage**

Existing foul water from the site discharges to the United Utilities public sewers.

### **6.2. Foul Water Drainage Strategy**

Development of the site will take place with separate systems for foul and surface water drainage. The existing connection to the public sewers will be re-used.

### **6.3. Conditions**

The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. No land drainage can be connected/discharged to the public sewer.

At a last resort, highway drainage may be accepted under certain circumstances. If SUDS are not a viable option, there are no watercourses or highway drains available and if capacity is available within the public sewer network, highway drainage discharge to the public sewer network may be permitted. In this event, the developer may be required to enter into a formal agreement with United Utilities under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

Foul water from kitchens and/or food preparation areas of any restaurants and/or canteens etc. must pass through a fat and grease trap of adequate design before any discharge to the public sewer network.



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## **7. SURFACE WATER MANAGEMENT**

### **7.1. Surface Water Management Overview**

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the development site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

The requirement for managing surface water runoff from developments depends on the pre-developed nature of the site. In this case the site is in a brownfield condition, drainage proposals will be measured against the existing performance of the site. The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration. This is reflected in recently implemented guidance and released National Sustainable Drainage Systems (SUDS) Standards.

### **7.2. Opportunities for Discharge of Surface Water**

There are three possible options to discharge the surface water runoff in accordance with requirement H3 of the Building Regulations 2002, this hierarchy is also promoted within the NPPF. Rainwater shall discharge to one of the following, listed in order of priority:

1. an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
2. a watercourse; or where that is not reasonably practicable,
3. a sewer.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local runoff profile by using systems that can either attenuate runoff and reduce peak flow rates or positively impact on the existing surface water runoff.



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### Soakaway/Infiltration System

It has been concluded that the site would not be suitable for infiltration drainage due to the site ground conditions and limited space. Therefore, it will not be possible to discharge surface water runoff from the site via infiltration methods.

### Watercourse

Should infiltration be found to be unsuitable, the next option is discharge to a watercourse. There are no watercourses evident either on, or within the vicinity of the site (see Drawing TM/16/1129/FRA/1). Therefore, it will not be possible to discharge surface water runoff from the site into a watercourse.

### Sewer

The site has an existing connection to the public sewer and it is considered sustainable to retain and reuse this connection.

### 7.3. Surface Water Runoff Rates

The amount of impermeable surfaces will not increase post-application compared to pre-application. The Modified Rational Method<sup>4</sup> has been used to calculate the runoff from the impermeable surfaces, the existing and proposed impermeable areas total 0.061ha. This derivation includes for a fixed rainfall rate of 50mm/hr and a dimensionless coefficient of 1.00 with the conversion factor of 2.78 to give the equation:

$$Q \text{ (l/s)} = 2.78 \times 50 \times C \times A \text{ (ha)}$$

This gives an existing and proposed discharge rate of 8.48 litres a second (l/s). The proposed development of the site will not increase the surface water runoff from the site and there will be no increase in surface water flood risk to the site and off-site locations. It is understood that the existing drainage infrastructure at the site efficiently and effectively manages surface water runoff generated at the development site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed use. No changes to the current surface water network are proposed.

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<sup>4</sup> Wallingford Procedure, Volume 4, 1981.



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## **8. RISK MANAGEMENT**

### **8.1. Introduction**

The flood risk at this location is considered suitable for 'less vulnerable' developments within the NPPF. In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout, form of the development and the use of flood mitigation measures including SUDS techniques. The flooding sources have been mitigated on the site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the proposed development on flood risk generally; and;
- Minimal disruption to natural heritage.

### **8.2. Minimum Floor Level**

There is no minimum finished floor level proposed as a result of flooding. The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

### **8.3. Flood Resilience and Resistance**

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

### **8.4. Access and Egress**

The site and surrounding area is located within Flood Zone 1 therefore a permanently safe and dry access can be maintained.

### **8.5. Flooding Consequences**

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources.



## **A FLOOD RISK ASSESSMENT FOR 79 MOSLEY STREET, MANCHESTER**

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## **9. SUMMARY AND CONCLUSIONS**

### **9.1. Introduction**

This report presents an FRA in accordance with the NPPF for the proposed development of 79 Mosley Street, Manchester and includes an assessment of the existing and proposed surface and foul water drainage of the site. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

### **9.2. Flood Risk**

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal), the site has a 'low probability' of fluvial/tidal flooding as the site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

The proposed development is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

### **9.3. Sequential Test**

The Sequential and Exception Tests will not need to be undertaken as part of this planning application.

### **9.4. Foul Water Drainage Strategy**

Existing foul water from the site discharges to the United Utilities public sewers. Development of the site will take place with separate systems for foul and surface water drainage. The existing connection to the public sewers will be re-used.

### **9.5. Surface Water Drainage**

The amount of impermeable surfaces will not increase post-application compared to pre-application. The Modified Rational Method has been used to calculate the runoff from the impermeable surfaces, the existing and proposed impermeable areas total 0.061ha. The existing and proposed surface water discharge rate from the site is 8.48l/s. The proposed development of the site will not increase the surface water runoff from the site and there will be no increase in surface water flood risk to the site and off-site locations. It is understood that the existing drainage infrastructure at the site efficiently and effectively manages surface water runoff generated at the development site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed use. No changes to the current surface water network are proposed.



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## 9.6. Risk Management

The flooding sources will be managed on the site by using a number of mitigation strategies to manage and reduce the overall flood risk at the site and will ensure the development will be safe. Measures used:

**Minimum Floor Level** - There is no minimum finished floor level proposed as a result of flooding. The building is set above the back of the footway of the adjacent highways to enable the full capacity of any secondary flood conveyance to be utilised, the risk of flooding from all sources is considered to be not significant.

**Flood Resilience and Resistance** - The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

**Access and Egress** - The site and surrounding area is located within Flood Zone 1 therefore a permanently safe and dry access can be maintained.

## 9.7. Conclusion

Table 9.1 summarises the probability and consequence of flooding for the site with and without mitigation measures. This FRA demonstrates that the site can be operated with minimal risk from flooding and will not increase flood risk elsewhere. The site should not therefore be precluded on the grounds of flood risk.

**Table 9.1 - Probability and Consequences of all Sources of Flooding**

| Sources of Flooding                                              | Potential Source | Probability     | Consequence & Impact Without Mitigation | Consequence & Impact with Mitigation |
|------------------------------------------------------------------|------------------|-----------------|-----------------------------------------|--------------------------------------|
| Fluvial Flooding                                                 | No               | Not Significant | Negligible                              | Negligible                           |
| Tidal Flooding                                                   | No               | Not Significant | Negligible                              | Negligible                           |
| Groundwater Flooding                                             | No               | None Reported   | Negligible                              | Negligible                           |
| Surface Water Flooding                                           | No               | None Reported   | Negligible                              | Negligible                           |
| Sewer Flooding                                                   | No               | None Reported   | Negligible                              | Negligible                           |
| Flooding from Artificial Drainage Systems/Infrastructure Failure | No               | Not Significant | Negligible                              | Negligible                           |

## **APPENDIX A - FIGURES AND DRAWINGS**



**KEY**  
 Site Boundary



|                              |  |
|------------------------------|--|
| PROJECT                      |  |
| 79 Mosley Street, Manchester |  |
| CLIENT                       |  |
| Boulton Brooks               |  |
| TITLE                        |  |
| Site Location                |  |
| PROJECT REF                  |  |
| TM/16/1129/FRA               |  |
| DRAWING NO                   |  |
| TM/16/1129/FRA/1             |  |
| SCALE                        |  |
| NTS@A3                       |  |
| DATE                         |  |
| November 2017                |  |



KEY

-  Flood Zone 3
-  Flood Zone 2
-  Flood Zone 1



|                                |  |
|--------------------------------|--|
| PROJECT                        |  |
| 79 Mosley Street, Manchester   |  |
| CLIENT                         |  |
| Boulbee Brooks                 |  |
| TITLE                          |  |
| Environment Agency Flood Zones |  |
| PROJECT REF                    |  |
| TM/16/1129/FRA                 |  |
| DRAWING NO                     |  |
| TM/16/1129/FRA/2               |  |
| SCALE                          |  |
| NTS@A3                         |  |
| DATE                           |  |
| November 2017                  |  |



KEY

- Very Low
- Low
- Medium
- High



|                                            |  |
|--------------------------------------------|--|
| PROJECT                                    |  |
| 79 Mosley Street, Manchester               |  |
| CLIENT                                     |  |
| Boulton Brooks                             |  |
| TITLE                                      |  |
| Environment Agency Surface Water Flood Map |  |
| PROJECT REF                                |  |
| TM/16/1129/FRA                             |  |
| DRAWING NO                                 |  |
| TM/16/1129/FRA/3                           |  |
| SCALE                                      |  |
| NTS@A3                                     |  |
| DATE                                       |  |
| November 2017                              |  |



KEY

Reservoir Flood Outline



|             |                                        |
|-------------|----------------------------------------|
| PROJECT     | 79 Mosley Street, Manchester           |
| CLIENT      | Boulbee Brooks                         |
| TITLE       | Environment Agency Reservoir Flood Map |
| PROJECT REF | TM/16/1129/FRA                         |
| DRAWING NO  | TM/16/1129/FRA/4                       |
| SCALE       | NTS@A3                                 |
| DATE        | November 2017                          |

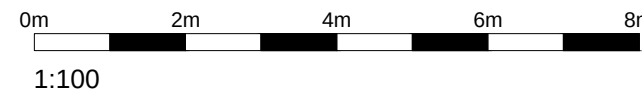
## **APPENDIX B - PROPOSED SITE LAYOUT**

The contractor is responsible for checking dimensions, tolerances and references. Any discrepancy to be verified with the Architect before proceeding with the works. Where an item is covered by drawings to different scales the larger scale drawing is to be worked to.

Do not scale drawing. Figured dimensions to be worked to in all cases.

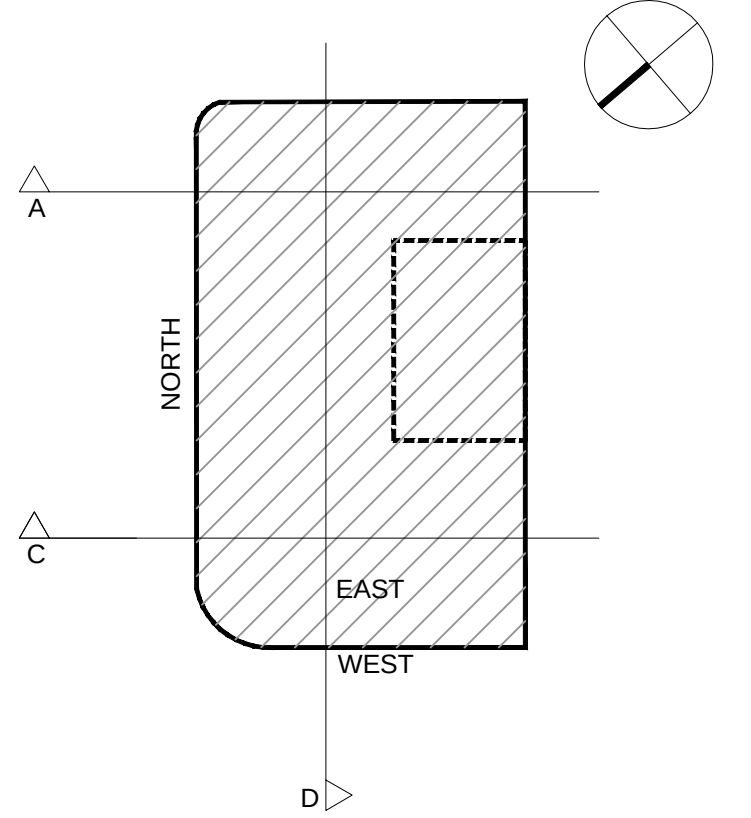
CDM REGULATIONS 2015. All current drawings and specifications for the project must be read in conjunction with the Designer's Hazard and Environment Assessment Record

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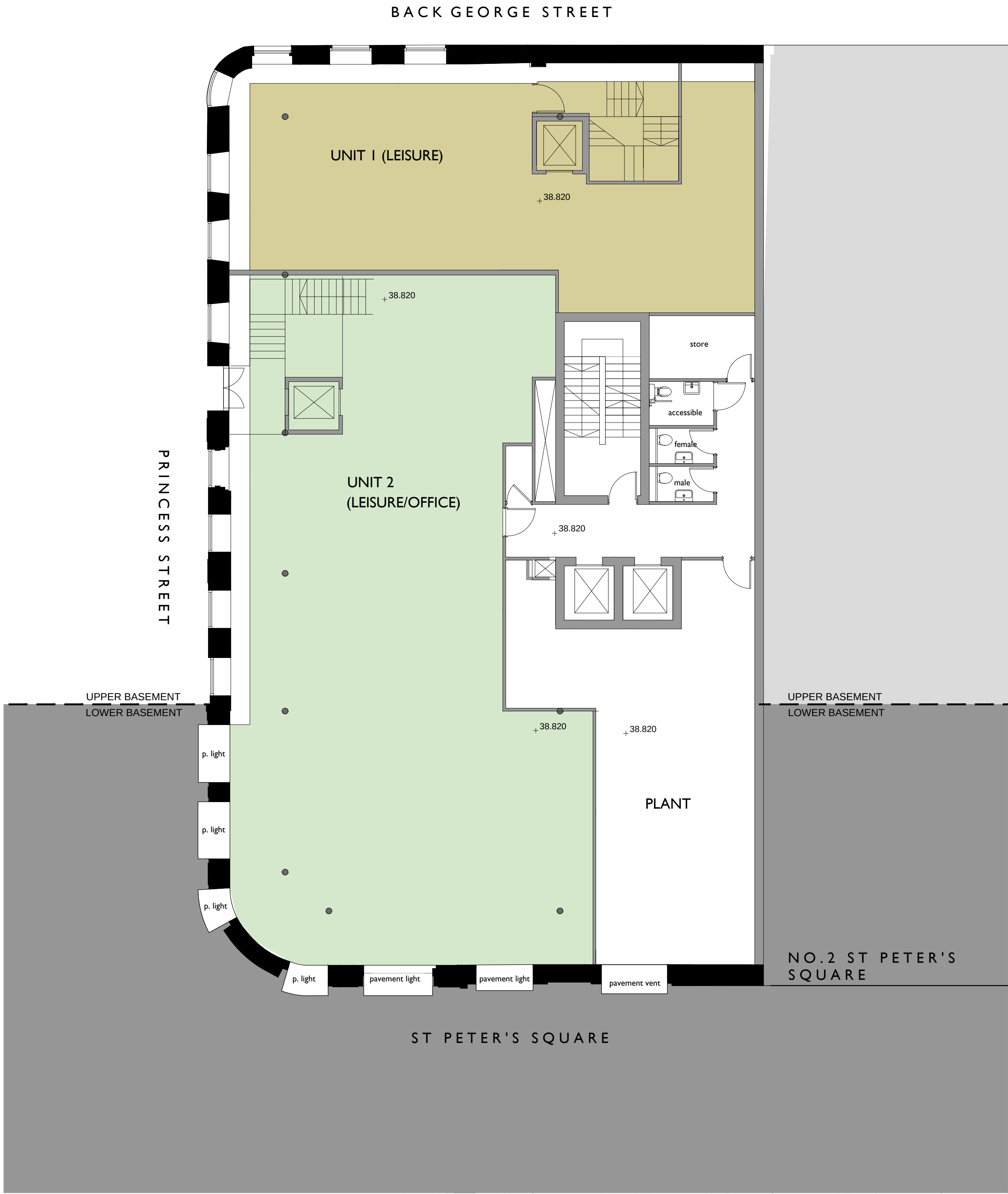


NOTES:

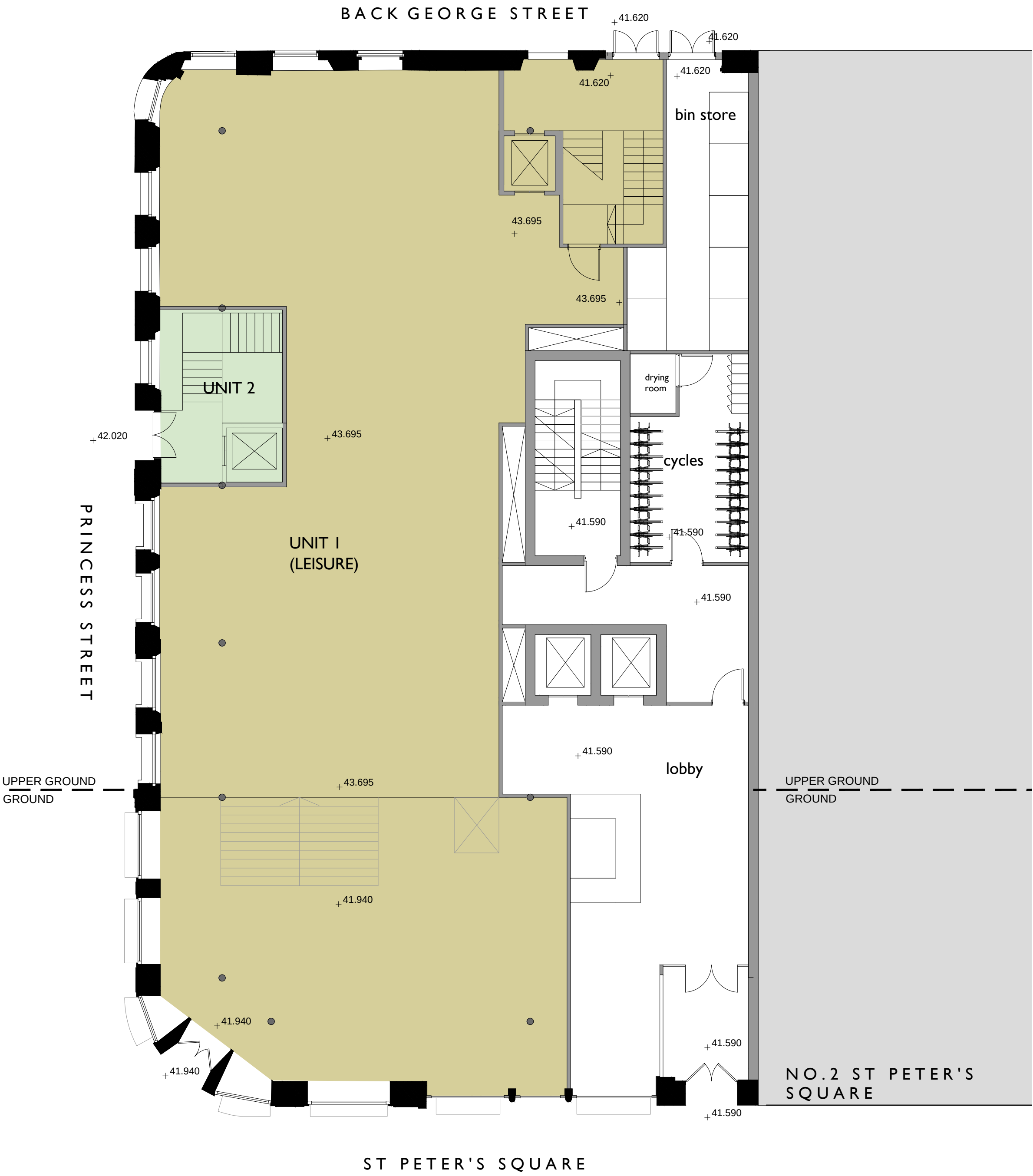
- Existing information in this drawing is based on survey provided by Paragon on DWG no. ps-0455-01 to ps-0455-09 dated June 2008.
- Elevations of surrounding buildings based on street elevations provided by OBI property 23.11.17
- To be read in conjunction with external interventions report and drawings by Grade 2 Structural Repairs Limited, dated November 2017
- Drawing to be read with all other relevant PRP drawings.
- All levels in meters.



Existing  
Proposed



BASEMENT PLAN



GROUND FLOOR PLAN

|   |          |                                                       |    |    |
|---|----------|-------------------------------------------------------|----|----|
| C | 01/12/17 | Issued for planning                                   | DS | FS |
| B | 09/11/17 | Further core layout modifications at client request   | DS | FS |
| A | 08/11/17 | Layout modified to meet design brief                  | DS | FS |
| I | 24/10/17 | Basement Modified to SE request to reduce excavations | FS | DS |

| Rev | Date | Description | Dwn | Ckd |
|-----|------|-------------|-----|-----|
|-----|------|-------------|-----|-----|

79 MOSLEY STREET

Proposed Floor Plans  
Basement and Ground

AA5751\_2110

REV C

PLANNING

|       |    |         |    |      |        |       |            |
|-------|----|---------|----|------|--------|-------|------------|
| Drawn | YM | Checked | DS | Date | Aug 16 | Scale | @ A1 1:100 |
|-------|----|---------|----|------|--------|-------|------------|

PRP

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