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FLOOD RISK ASSESSMENT and SUDS STRATEGY

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1 EXECUTIVE SUMMARY

This Drainage Assessment reviews the existing drainage arrangement at the application site and proposes a surface water drainage strategy in line with Local Authority and Lead Local Flood Authority (LLFA) guidance.

The site is currently occupied by an existing dwelling and is located at 47 Fairfield Road, Uxbridge UB8 1AZ

The proposed development comprises the construction of a new block of residential dwellings and associated external works.

The proposed strategy presented in detail in this report aims to infiltrate all surface water via permeable paving. Storage is provided for all storm events up to and including the 1 in 100-year storm plus 40% allowance for climate change.

Should infiltration not be possible (after completion of infiltration testing), the paving will be tanked and discharge will be via a hydrobrake to the sewers in the street.

In the case of infiltration not being viable, discharge will be limited to 2 litres/second in accordance with best practice. Attenuation and reduced discharge will be provided for all storm events up to and including the 1 in 100-year storm plus 40% allowance for climate change.

A 10% allowance for urban creep has been included within the calculations.

Maintenance/management of all onsite drainage infrastructure has been considered within a separate maintenance plan appended to this report. This will be updated through the development process.

The proposed drainage strategy is entirely based on-site with the exception of the new sewer connections if required.

Overall, the proposals provide a high level of water treatment, runoff reduction and flooding protection for the proposed development and are in accordance with all requirements of the Lead Local Flood Authority (LLFA).

Foul Drainage
It is proposed to discharge the foul drainage from the site into the existing Thames Water sewer.

2 INTRODUCTION

2.1.1 Jomas was commissioned to undertake a Drainage Assessment for the proposed development of the site located at 47 Fairfield Road, Uxbridge UB8 1AZ

2.1.2 The proposed development comprises the construction of a new block of residential dwellings and associated external works.

2.1.3 This Flooding and Drainage Assessment has been produced in support of a planning application and should be read in conjunction with the other planning documents.

2.2 Site Description

2.2.1 The site is approximately 690 square metres in size and is occupied by an existing dwelling.

2.2.2 Pre-development, the site is approximately 61% impermeable. Post development, the impermeable area will decrease to approximately 57%.

2.2.3 The site location information is as follows:

- Nearest Postcode: UB8 1AZ

2.3 Topography

Site Topography

2.3.1 The topographic survey plan is provided in appendix B. The site is generally rectangular in shape with a gentle fall from south to north.

3 DESIGN PRINCIPLES AND POLICY REQUIREMENTS

3.1.1 Since April 2015, Lead Local Flood Authorities (LLFA's) have become a statutory consultee on surface water drainage for many planning applications. For this site, the following is considered to be the required level of detail required for planning approval:

3.1.2 Report to be prepared in accordance with the National Planning Policy Framework (NPPF), the accompanying Planning Practice Guidance (PPG), and the Sefton Council SUDS Information Note and SUDS policies as the Lead Local Flood Authority (LLFA).

3.2 General Principles for Flooding

3.2.1 The National Planning Policy Framework (NPPF) states that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific FRA. This assessment is required for:

"Proposals of 1 hectare (ha) or greater in Flood Zone 1, all new development (including minor development and change of use) in Flood Zones 2 and 3 and an area within Flood Zone 1, which has critical drainage problems as notified to the local planning authority by the Environment Agency (EA)."

3.2.2 In accordance with the March 2014 Planning Practice Guidance (PPG), which supports the NPPF, the objectives of this FRA are to establish:

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

3.3 General Principles for Surface Water Drainage

3.3.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015), the London Borough of Hillingdon Surface Water Management Plan, Local Flood Risk Management Strategy and the London Plan require sustainable drainage systems in all development to reduce surface water runoff and provide water treatment on site. This includes but is not limited to addressing the following issues in order of preference:

- store rainwater for later use
- use infiltration techniques, such as porous surfaces in non-clay areas
- attenuate rainwater in ponds or open water features for gradual release
- attenuate rainwater by storing in tanks or sealed water features for gradual release
- discharge rainwater direct to a watercourse
- discharge rainwater to a surface water sewer/drain
- discharge rainwater to the combined sewer.

Consideration must be given to the direction of water flow across the site and where this may be dispersed and incorporating any features that will help reduce surface water run-off. All developments should aim to achieve greenfield run off with at least a 50% reduction in surface water discharge and this needs to be demonstrated as part of the planning submission.

4 FLOODING INFORMATION

4.1 Flood Risk from Rivers (Fluvial)

4.1.1 As the site is within Flood Zone 1, there is a low risk of fluvial flooding to the site.

4.1.2 Based on the above, the risk of flooding from rivers is considered very low.

4.2 Coastal and Tidal Flood Risk

4.2.1 The site is located inland and is not near any tidally influenced watercourses; therefore, there is negligible risk of flooding from this source.

4.3 Geology and Hydrogeology (Groundwater)

4.3.1 The British Geological Survey (BGS) mapping available on line suggests that the area is underlain by

Bedrock of London Clay Formation - Clay, Silt And Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas.

Superficial Geology of Lynch Hill Gravel Member - Sand And Gravel. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by rivers (U).

4.3.2 The MAGIC Map indicates the area is of medium-high groundwater vulnerability.

4.3.3 Due to the presence of the permeable superficial geology, the risk of flooding from ground water is considered Medium.

4.4 Surface Water Flood Risk (Overland Flows)

4.4.1 Surface water flooding occurs when the rainwater does not drain away through the normal drainage system or infiltrate the ground, but instead lies on or flows over the ground.

4.4.2 The EA produced a Risk of Flooding from Surface Water Map in December 2013. The maps were produced using 'direct rainfall' modelling. Although they consider local drainage capacity, non-surface water influences such as rivers, seas or groundwater are not considered. The map is based on LIDAR topographic data which is not suitable for site specific assessment and therefore, where available, topographic survey data should be used to provide a more accurate understanding of potential flow paths.

4.4.3 The map shows the entire country within four different risk categories, defined below in Table 1.

Table 1: EA Surface Water Flood Risk Categories

Risk Category	Definition

High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

4.4.4 An extract of the map, provided below, shows no surface water flooding within the site.

Figure 1: EA Flood Risk from Surface Water Map

4.4.5 The local Flood Risk Management Strategy does not show any risk of surface water flooding within this area.

4.4.6 Based on the EA's mapping, the local SFRA, historical data and local topography, the risk of surface water flooding to the site is considered to be Low.

4.5 Sewer/Drainage Flood Risk

4.5.1 Sewer flooding is often caused by excess surface water entering the drainage system when there is insufficient sewer capacity to cope with this excess water, but also due to 'one off' events such as blockages.

4.5.2 Thames Water is the statutory undertaker for the local public sewer network. The nearest Thames Water sewers to the site are located within the street.

4.5.3 As the natural topography of the site falls away towards the street, this indicates that the site is at very low risk of sewer flooding.

4.5.4 There are no records within any local flooding and drainage documents of sewer flooding in the area.

4.5.5 On the basis there is considered to be a very low risk of sewer flooding to the site.

4.6 Reservoir Flood Risk

4.6.1 The EA has produced a Reservoir Flood Map that shows that the site is at risk from reservoir flooding. This map indicates very low risk of reservoir flooding at this site.

4.6.2 It should be emphasised that the risk of flooding from reservoir breach is very small since the EA is the enforcement authority for the Reservoirs Act (1975) and all large raised reservoirs are inspected and supervised by reservoir panel engineers.

4.6.3 On the basis there is considered to be a negligible risk of reservoir flooding to the site.

4.7 Summary of risk levels

4.7.1 Pre-development, the risk of flooding is summarised below.

Table 2: Flood Risk Categories

Source	Risk Category
Fluvial (Rivers and Sea)	Very low
Coastal and tidal	Negligible
Groundwater	Medium
Surface water	Low
Sewers	Very low
Reservoirs	Negligible

5 SITE DRAINAGE INFORMATION

5.1.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015) states that the following options must be considered for disposal of surface water runoff in order of preference:

- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

Discharge to Ground

5.1.2 The potential for surface water to discharge to ground has been assessed through a review of the likely ground conditions and possible infiltration structures.

5.1.3 The surface geology of this site is within an area generally underlain by permeable gravels. Based upon this information, it is likely that infiltration is possible on this site.

5.1.4 It is noted that the site and surrounds are urban in nature and may have existing surface water sewer connections. Hence consideration is given within this report to both the possibility of infiltration and connection to the combined sewer.

5.1.5 Infiltration tests will be completed prior to construction and should infiltration prove to be possible the drainage design is such that it can be revised to accommodate infiltration rates calculated.

Discharge to Surface Water Body

5.1.6 There are no suitable surface water bodies near to the site that can be used for surface water discharge.

Discharge to Surface Water Sewer/Combined Sewer

5.1.7 Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted.

5.2 Sustainable Drainage Systems (SuDS)

5.2.1 To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 3 in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Table 3: SuDS Selection Based on the SuDS Hierarchy

Component	Recommendation
Green/Blue roofs	Whilst the use of green and blue roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and orientation

Component	Recommendation
	must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority. If feasible, depending on the roof design, a green/blue roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green/blue roof/s will offer some attenuation for run-off, reducing volumes of run-off and in higher frequency events (i.e. 1in2 year storms) will result in no run-off for the building. There are no green roofs proposed for the site.
Basins and Ponds	Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value. There are no open areas on the site which are suitable for basins or ponds.
Filter Strips and Swales	Swales are linear vegetated drainage features, which provide overland conveyance and storage of surface water whilst trapping sediments and hydrocarbons within run-off. They also create biodiverse areas for planting and habitat. Swales are not considered suitable for this site due to the urban setting restricting the availability of space.
Infiltration Devices	Infiltration devices are likely to be suitable for the main drainage system due to the permeable nature of the existing ground. Infiltration is proposed through use of permeable paving.
Permeable Paving	Whilst incorporating attenuation storage, permeable paving also provides treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel. External areas will be permeable paving.
Tanked Systems	This is the least sustainable option in terms of the SuDS Hierarchy. However, the use of tanked systems would still be of benefit compared to traditional drainage systems as it does allow run-off to be slowed down to an acceptable discharge rate. There are no tanks proposed for the site.

6 SURFACE WATER DRAINAGE DESIGN

6.1 Site Areas

6.1.1 The development area currently comprises a carpark. The existing and proposed areas are summarised below.

Table 4: Site Areas

Parameter	Existing (m2)	Existing (%)	Proposed (m2)	Proposed (%)
Impermeable area	419	61	390	57
Permeable area	271	39	300	43
Total area	690	100	690	100

6.1.2 It is assumed that the surface water runoff from the site either drains into an existing drainage system or is currently infiltrated into the ground.

6.2 Design Considerations

6.2.1 Consideration has been given to the following when calculating the proposed impermeable areas.

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. A 10% allowance for urban creep has been included within the calculations.

6.2.2 The climate change allowance used in the Drainage Strategy is in line with updated EA guidance values published in February 2016 for increased rainfall intensities by 2115.

6.3 Greenfield Run-Off Rates

6.3.1 The greenfield run off rates have been calculated using the Wallingford method. Calculations are provided in Appendix C and summarised in the table below.

6.4 Existing Run-Off Rates

6.4.1 The existing run-off rates for a variety of return periods have been calculated using the Wallingford method.

6.4.2 The total site area is 690 square metres and is 61% impermeable, resulting in an impermeable area of 419 square metres. Taking conservative peak 1 year, 30 year and 100 year rainfall rates of 50mm/hr, 125mm/hr and 185mm/hr respectively, the maximum existing peak discharge rates have been calculated as follows.

Contributing Area (ha) x 1 yr Rainfall (mm/hr) x 2.78

419/1000 x 50 x 2.78 = **5.8 l/s**

Contributing Area (ha) x 30 yr Rainfall (mm/hr) x 2.78

419/1000 x 125 x 2.78 = **14.6 l/s**

Contributing Area (ha) x 100yr Rainfall (mm/hr) x 2.78

419/1000 x 185 x 2.78 = **21.5 l/s**

6.4.3 The discharge rates for the existing and proposed site are summarised below.

Table 5: Existing Run-off Rates

Parameter	Greenfield Discharge (l/s)	Existing Discharge (l/s)	Proposed Discharge (l/s)
QBAR	0.11	NA	NA
1 year	0.1	5.8	0
30 year	0.26	14.6	0
100 year	0.36	21.5	0
100 year +40%	NA	NA	0

6.4.4 Site discharge should be as close to the greenfield rates as possible. However, due to the low rate, it is proposed to limit discharge to 2l/s which is less than the existing 100 year greenfield discharge rate.

6.5 Design Option 1 – Infiltration

6.5.1 Option 1 is to discharge surface water to ground via infiltration.

6.5.2 An infiltration rate of $5x10^{-5}$ m/s is assumed for the gravel ground conditions.

6.5.3 To infiltrate surface water, a total of $17m^3$ of soakaway storage is proposed within the permeable paved subbase. The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. See Appendix C for design details and calculations and EA approval for the discharge to ground.

6.5.4 Should the infiltration rate prove to be lower, the soakaway will be resized accordingly. There is sufficient space in the paving area to accommodate a soakaway with more capacity by extending the depth of the pavement.

6.5.5 Should the infiltration rate be lower than the minimum required for building regulations approval, the design will be revised to use attenuation and discharge to the Thames Water sewer as per option 2 below.

6.6 Design Option 2 – Attenuation

6.6.1 Should infiltration not be possible, option 2 is to discharge to the existing sewers as close to greenfield rates as possible. However, as the greenfield rates from this site are low (See Appendix C), in accordance with best practice, outflow controls will be set to discharge at a rate of 2 litres/second.

6.6.2 A calculation of the required attenuation is provided in Appendix C. The total attenuation volume is unchanged at approximately 17 cubic metres is proposed to cater for the 100 year +40% storm event.

6.6.3 The drainage layout and paving location will be relatively unchanged from the infiltration option. The only difference from the infiltration option is that the paving will be tanked and will discharge via a hydrobrake to the Thames Water sewer.

6.6.4 Thames Water will be contacted for approval of the discharge to their sewer if required. See Appendix C for calculations and Thames Water sewer locations.

6.7 Basement Drainage

6.7.1 The basement design will incorporate a dewatering system as required to minimise the risk of flooding. Details of a system to be considered are provided in Appendix C.

6.8 Exceedance Flooding and Overland Flow

6.8.1 The area is not subject to overland flow routes or surface water flooding as discussed in section 5 above.

6.8.2 The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the overland flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site.

6.8.3 Due to the site levels falling to the street, all overland flow will move towards the sewers and existing overland flow path in the street. See overland flow plan in Appendix C.

6.9 Consents, Offsite Works and Diversions

6.9.1 The proposed surface water drainage strategy is accommodated mostly on-site, with the only requirement for off-site works being the connection to the Thames Water Sewer should infiltration not be feasible.

6.9.2 Consent is not required from the EA for the soakaway as the discharge is domestic and clean.

6.10 Maintenance

6.10.1 A SuDS maintenance plan has been prepared to outline the management of the potential SuDS features. The maintenance plan is provided in Appendix D.

7 WATER QUALITY

7.1 Post-Development Water Quality Treatment

7.1.1 In line with the 2015 SuDS Manual (CIRIA C753), certain criteria should be applied to manage the quality of run-off to support and protect the natural environment effectively. Treatment design, wherever practicable, should be based on good practice, comprising the following principles:

- Manage surface water run-off close to source
- Treat surface water run-off on the surface
- Treat surface water run-off to remove a range of contaminants
- Minimise risk of sediment remobilisation
- Minimise impacts from accidental spills

7.1.2 Managing pollution close to the source can help keep pollutant levels and accumulation rates low, essentially allowing natural treatment processes to be effective. This in turn can help maximise the amenity and biodiversity value of downstream surface SuDS components and keep maintenance activities straightforward and cost-effective.

7.1.3 The proposed development comprises a single type of land use; residential roofs. This land use is classified as having a very low hazard pollution level. The table detailing this is provided below in Table 6.

Table 6: Pollution Hazard Indices from 2015 SuDS Manual (C753)

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

7.1.4 The proposed drainage strategy utilises the following SuDS features:

- Permeable Paving

7.1.5 The indicative SuDS mitigation indices, provided in Table 26.3 of the 2015 SuDS Manual (C753) have been reviewed for the roof and paving. This table is provided below in Table 7.

Table 7: Indicative SuDS Mitigation Indices from 2015 SuDS Manual (C753)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

7.1.6 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type), as follows:

Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

7.1.7 For each type of land-use, the pollution hazard indices, mitigation indices and concluding hazard have been outlined in Table 8 below.

Table 8: Roof Space Water Quality Mitigation Summary

Commercial Roofs				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.2	0.2	0.05	Table 26.2
Mitigation Index (Permeable Paving)	0.7	0.6	0.7	Table 26.3
Total Mitigation index	0.7	0.6	0.7	Worst case only
Result	Total SuDS mitigation index ≥ pollution hazard index and therefore hazard is exceeded			

Table 9: External Areas Water Quality Mitigation Summary

Driveway/External Areas				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.5	0.4	0.4	Table 26.2
Mitigation Index (Permeable Paving)	0.7	0.6	0.7	Table 26.3
Total Mitigation index	0.7	0.6	0.7	Worst case only
Result	Total SuDS mitigation index ≥ pollution hazard index and therefore hazard is exceeded			

7.1.8 Therefore, it can be concluded that the provision of the permeable paving exceeds the required pollution mitigation indices and provides sufficient treatment as part of the surface water management train, in accordance with the 2015 SuDS Manual (CIRIA C753).

7.1.9 While the site is located in a Source Protection Zone, the proposals provide a high level of treatment and so nothing further is considered necessary.

8 FOUL DRAINAGE

8.1 Discharge to Public Sewer Network

8.1.1 Thames Water are the foul sewerage suppliers for the area.

8.1.2 The identified point of connection from the site is into the public foul sewer network in the street. A Sewer connection application will be submitted for approval.

9 DRAINAGE DURING CONSTRUCTION

9.1 Construction Run-off Management

9.1.1 Installing the surface water and foul drainage system, whilst managing temporary run-off, are key aspects of the construction works involved in any development. The information provided below is in accordance with the 'C698 Site handbook for the construction of SUDS' (CIRIA, 2007).

9.1.2 Please note that the measures recommended below are recommendations only and need to be confirmed at the construction stage by the client and the contractor.

9.2 Management of Construction (Including Drainage)

9.2.1 Drainage is typically an early activity in the construction stage of a development, taking form during the earthworks phase. However, final construction i.e. piped drainage system connections to the SuDS devices, should not take place until the end of site development work, unless a robust strategy for silt-removal is implemented prior to occupation of the site.

9.2.2 A plan for the management of construction (including phasing of works, details of any offsite works etc.) cannot be provided at this early stage, as construction work plans are not yet known. However, the following key points are general construction issues associated with SuDS which will be addressed when these plans are complete:

- Silt-laden waters from construction sites represent a common form of waterborne pollution;
- These silt-laden waters cannot enter SUDS drainage systems unless specifically designed to accept this as it can clog the systems and pollute receiving waters. Therefore, piped drainage systems should not be connected to the attenuation SuDS devices until the late stages of construction.
- Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to the attenuation SuDS devices.

9.3 Temporary Drainage During Construction

9.3.1 The three principal aspects of drainage control during construction are trapping sediment, conveying run-off, and controlling run-off.

9.3.2 Sediment traps and barriers can include basin traps and sediment fences (with any necessary boundary controls). The principal basins are to be installed after the construction site is accessed. Sediment fences and barriers will then be installed as needed during grading.

9.3.3 Conveyance of run-off can be achieved through small ditches/stream, storm drains, channels and sloped drains with sufficient inlet/outlet protection.

9.3.4 Slope stability needs to be considered when using any channels to convey run-off across the site into any basins etc.

9.3.5 Run-off control measures will need to be implemented in order not overwhelm the temporary system and cause flooding issues. Run-off rates from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockage. Any additional conveyance measures are to be installed as needed during grading.

9.3.6 Run-off control to include provision of perimeter ditches or appropriate levels grading to direct any water from the construction site to remain on site.

9.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.

9.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

9.4 Protection of Drainage Infrastructure during Construction

9.4.1 All drainage infrastructure should be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers, and storing construction materials away from the drainage infrastructure.

Appendix A: Proposed Development Details

NOTES

1. LEVELS ARE RELATED TO ORDNANCE SURVEY BY GPS OBSERVATION.
2. SURVEY ORIENTATED NORTH BY GPS OBSERVATION.
3. GIRTH, SPREADS, HEIGHTS AND SPECIES OF TRESS ARE INDICATIVE ONLY.
4. SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:100 SCALE DRAWING.
5. DETAILS IN ADJACENT PROPERTIES ARE APPROXIMATE WHERE WE HAVE NO ACCESS.
6. LEVELS SHOWN ON KERB LINES ARE ROAD (CHANNEL) LEVELS.

ABBREVIATION LIST

AV	AIR VALVE
B	BOLLARD
CL	COVER LEVEL
DK	DROP KERB
DPC	DAMP PROOF COURSE
ECB	ELECTRIC CABLE CABINET
ECP	ELECTRIC CABLE PIT
EP	ELECTICITY POLE
ER	EARTH ROD
FAI	FRESH AIR INLET
FH	FIRE HYDRANT
GC	GAS COCK
GU	GULLY
GUS	GULLY SURROUND
IC	INSPECTION COVER
IL	INVERT LEVEL
LC	LAMP COLUMN
M	SERVICE MARKER
MH	MANHOLE COVER
NPV	NO PIPES VISIBLE
OHC	OVERHEAD CABLES
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SC	STOP COCK
SV	STOP VALVE
SVP	SOIL AND VENT PIPE
TBM	TEMPORARY BENCH MARK
TCB	TELEPHONE CABLE CABINET
TC	TELEPHONE CABLE PIT
TP	TELEPHONE POLE
TOS	TOP OF SILT
TOP	TOP OF PILLAR
TOW	TOP OF WALL
TV	CABLE TV PIT
UTL	UNABLE TO LIFT
VP	VENT PIPE
WL	WATER LEVEL
WM	WATER METER
WO	WASH OUT

STATION CO-ORDINATES

NO.	EASTING	NORTHING	LEVEL
1	505558.428	184738.134	45.263
2	505553.751	184747.025	45.122
3	505566.244	184758.338	45.132
4	505548.134	184768.094	43.705
5	505573.370	184753.301	45.248
6	505587.766	184771.358	44.842
7	505577.058	184778.091	43.956
8	505535.275	184745.675	43.141

2
122.11 SURVEY STATION

STATIONS IN HARD SURFACES ARE CROSS HEAD GALVANISED BOLTS.

STATIONS IN SOFT GROUND ARE PEGS AT GROUND LEVEL WITH CROSS HEAD GALVANIZED SCREWS.

NO.	DATE	DETAILS

REVISIONS

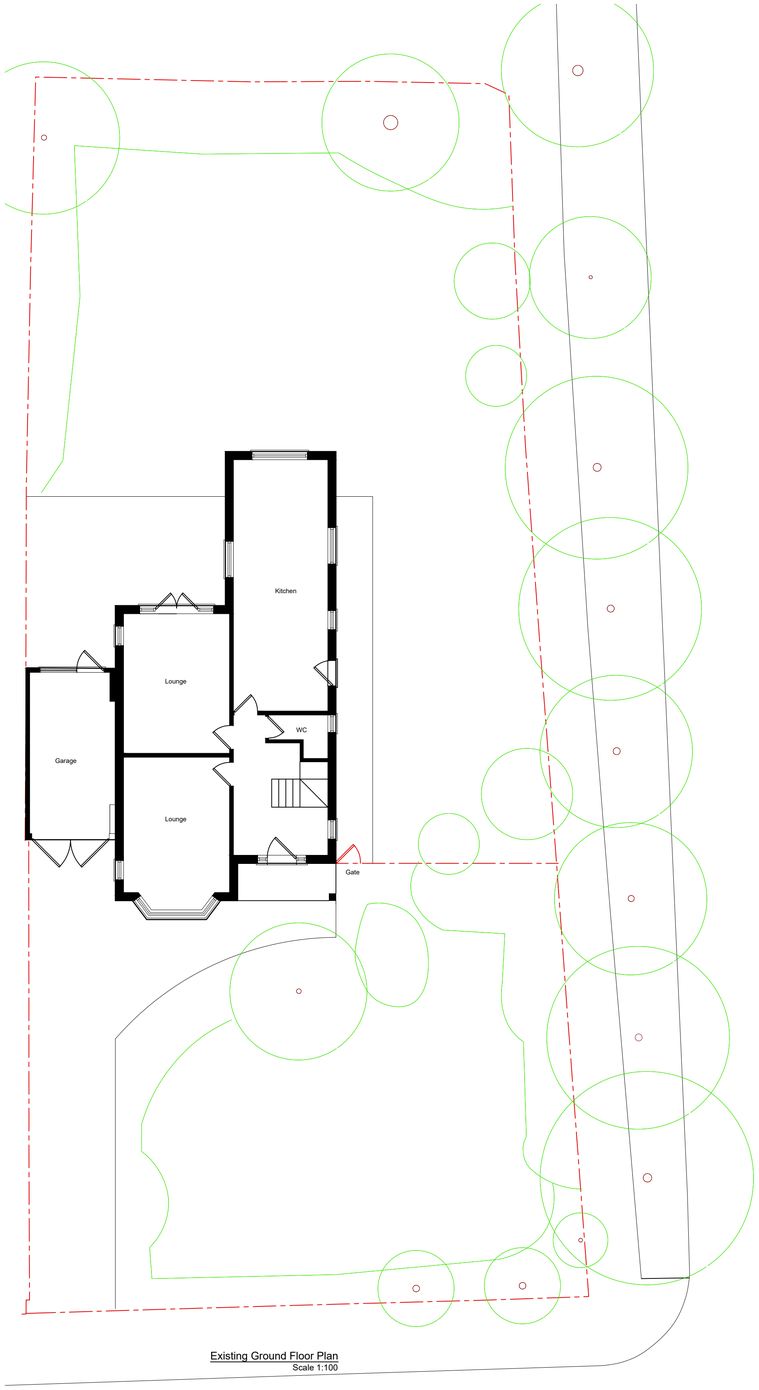
KND SURVEYS LTD
74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
HP15 6UG
Tel: 01494 718453
Fax: 01494 717576
e-mail: admin.office@kndsurveys.com

CLIENT

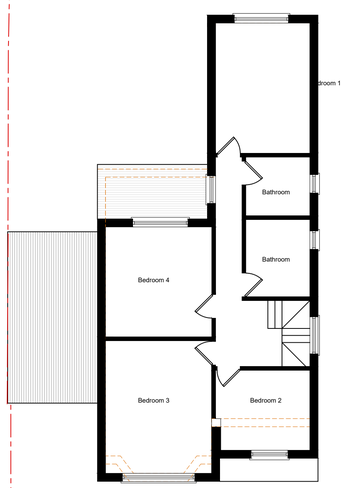
JOB TITLE
47 FAIRFIELD ROAD
UXBRIDGE
UB8 1AZ

DRAWING TITLE
SITE SURVEY

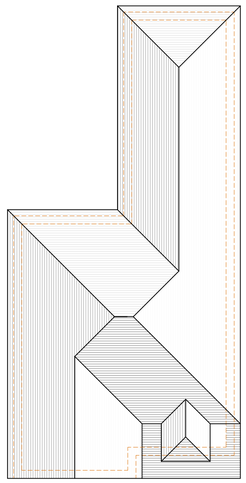
DRAWING No.	DRAWN BY	DATE
E0819 - T	MF	03 MAY 2019
SURVEYED BY		SCALE
DJH / JFF		1:200 A1 Sheet



Existing Ground Floor Plan
Scale 1:100



Existing First Floor Plan
Scale 1:100



Existing Roof Plan
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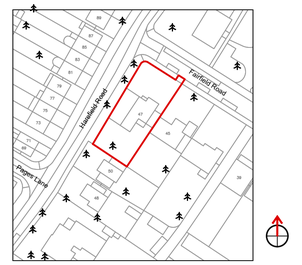

Location Plan Scale 1:1250

Existing Front Elevation
Scale 1:100

Existing Side Elevation
Scale 1:100

Existing Rear Elevation
Scale 1:100

Existing Side Elevation
Scale 1:100

Revision	Date	Description

Important general note:
the latest edition is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
all work is to be carried out to the local authority planning and building regulations approval, and the codes of practice and british standards as necessary.
all dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be verified by the appointed contractor on site prior to engaging in works. any discrepancies must be reported to the architect/surveyor/engineer or responsible person/s immediately.
the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
the client/building owner must obtain any necessary party wall agreements, prior to engaging in the works on site.

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0 1 2 3 4 5 10m

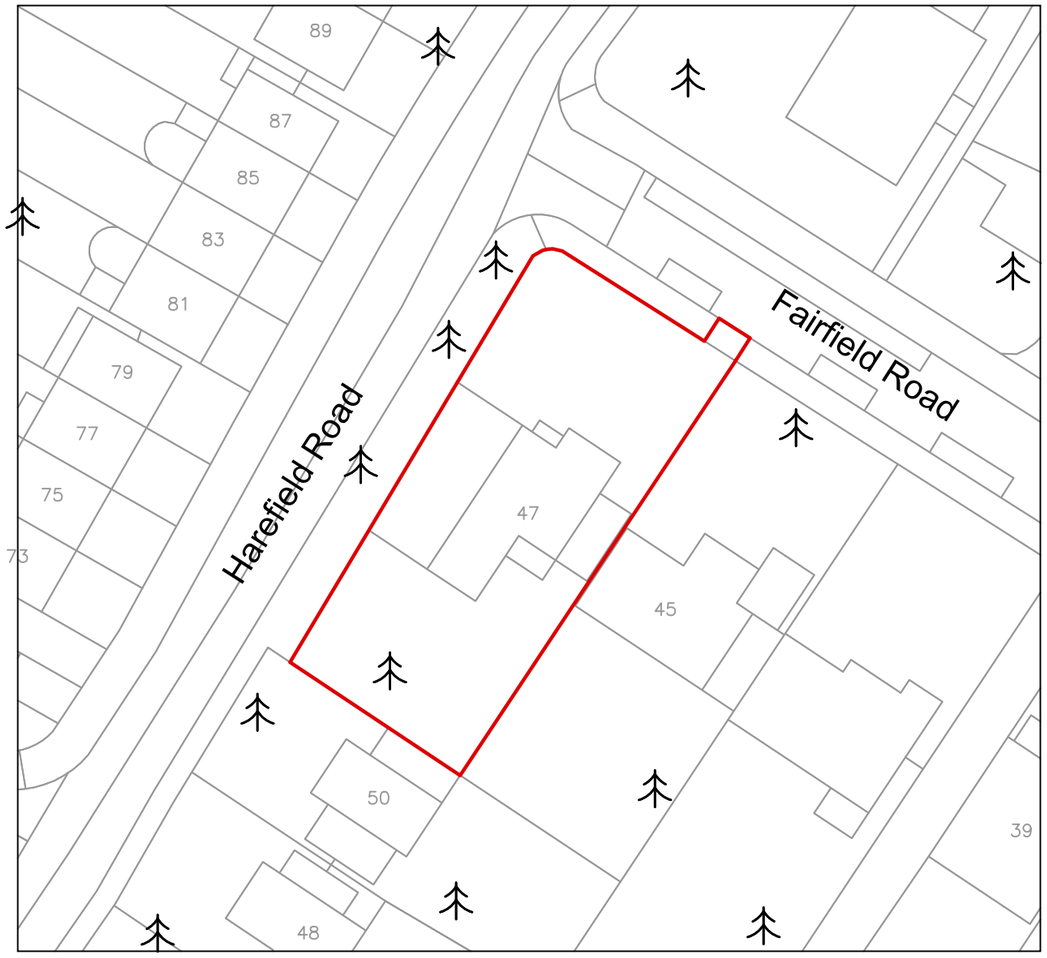
Scale: 1:100
Revision:
Jun-21
Drawn By/Checked By: ----

B-12 Development
Architectural consultancy

Site Address:
47 Fairfield Road
Uxbridge
UB8

Existing
Plans & Elevations

Drawing Number: FR47-AP4-1001



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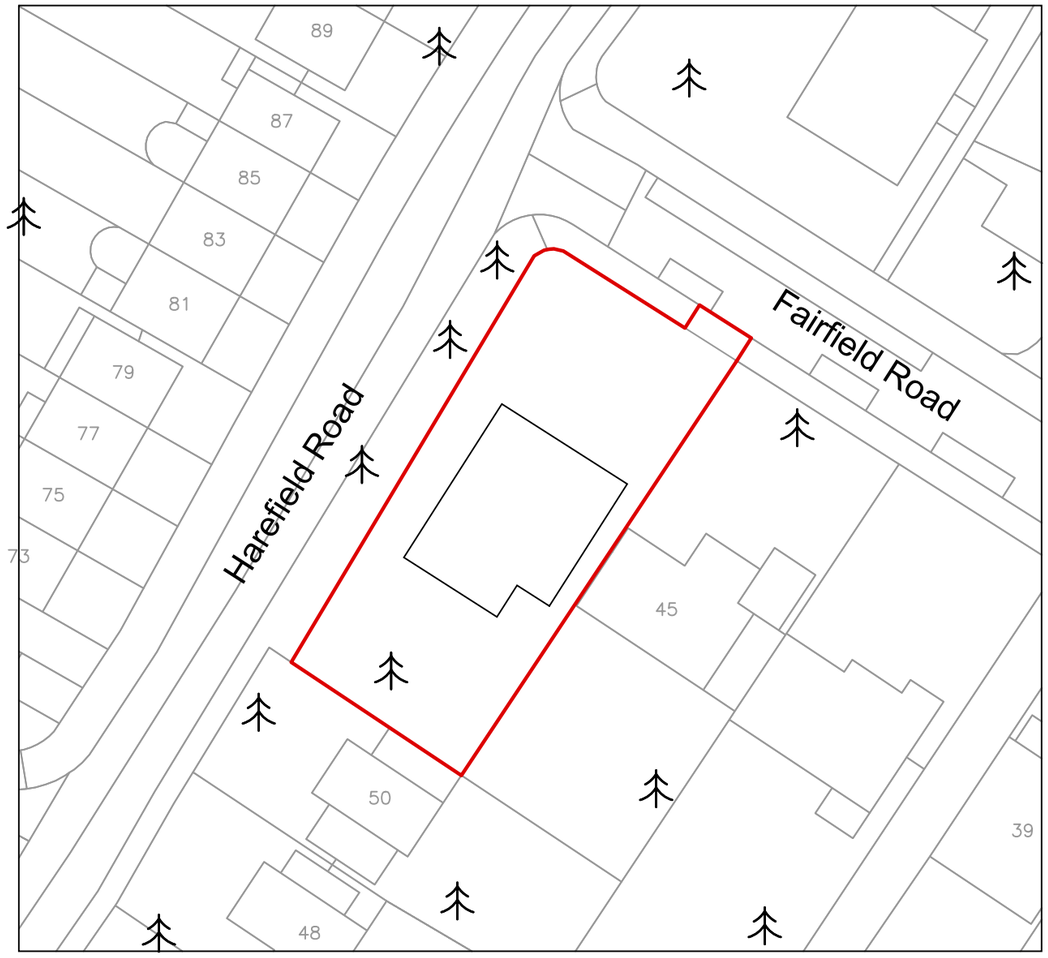
Existing Site Plan Scale 1:500



0 5 10 25m 50m

Proposed Site Plan Scale 1:500

Revision	Date	Description

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the specification is to be read in conjunction with the plans/section details, and other associated structural details as may be provided.
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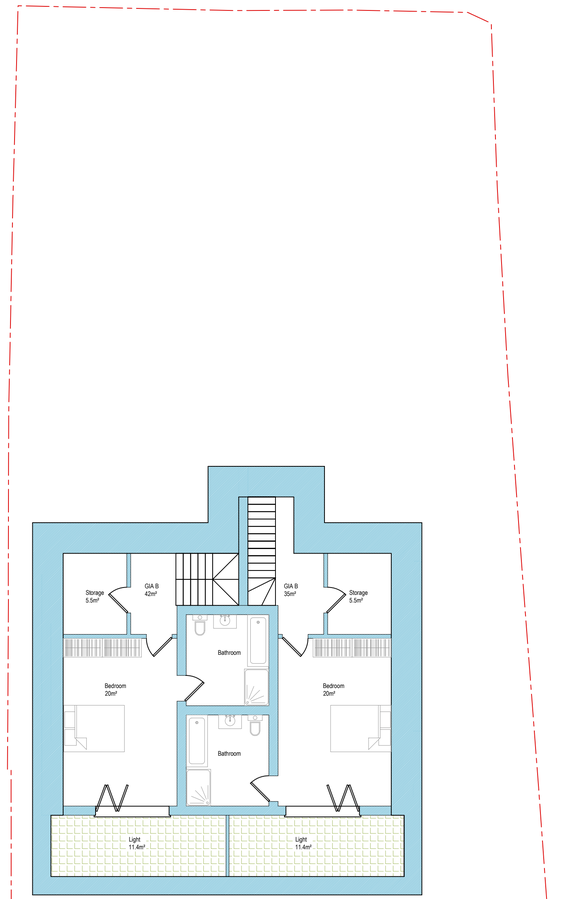
UB8

Existing & Proposed Site Plan

Drawing Number
FR47-AP4-1002



Proposed Basement Floor Plan
Scale 1:100

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the contractor is responsible for ensuring compliance with the cdm regulations, and appropriate health & safety on site precautions.
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0 1 2 3 4 5 10m

Scale
1:100

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Proposed Basement

Drawing Number
FR47-AP4-1003