JOMAS ENGINEERING ENVIRONMENTAL

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

48 Warren Rd, Ickenham, UB10 8AD

JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ

www.jomasassociates.com info@jomasassociates.com

Report Title: **FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY**

Report Status: **Final v1.0**

Job No: **P1173JJ1219**

Date: **18.07.23**

Control: Previous Release

Version	Date	Issued By
V1.0	18/07/23	A Wallace

Prepared by: **JOMAS ASSOCIATES LTD** for Parmar Ventures Ltd

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

info@jomasassociates.com

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	*V01*
Date	18/07/2023
Prepared by	A Wallace
Checked by	A Alsop
Authorised by	A Wallace

Limitations

JOMAS ASSOCIATES Ltd ("JA") has prepared this report for the sole use of the client in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by JA.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by JA, unless otherwise stated in the report.

The methodology adopted and the sources of information used by JA in providing its services are outlined in this report. The work described in this report was undertaken in **July 2023** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

JA disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to JA's attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JA specifically does not guarantee or warrant any estimate or projections contained in this report.

Costs may vary outside the ranges quoted. Whilst cost estimates are provided for individual issues in this report these are based upon information at the time which can be incomplete. Cost estimates for such issues may therefore vary from those provided. Where costs are supplied, these estimates should be considered in aggregate only. No reliance should be made in relation to any division of aggregate costs, including in relation to any issue, site or other subdivision.

No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in JA's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non-technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

Copyright

1 EXECUTIVE SUMMARY

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

The site is located at 48 Warren Rd, Ickenham, UB10 8AD and is currently occupied by a single dwelling and associated external works. The proposed development comprises the demolition of the existing building and construction of a new dwelling and associated external works.

Flooding

As the site is located in Flood Zone 1, a FRA is not required.

The sources of flooding assessed and proposed mitigation measures are summarised in the table below, highlighting that all flood risk is able to be managed on site to ensure the site proposals are acceptable in flood risk terms.

Source	**Risk Category (after mitigation)**	**Comments**
Fluvial (Rivers and Sea)	Low	Building in flood zone 1.
Coastal and tidal	Negligible	Not near coast or tidal waterbody
Groundwater	Low	Proposed finished floor levels are above external ground levels and falls designed away from buildings.
Surface water	Low	Site is at low risk of surface water flooding.
Sewers	Low	Low due to natural topography and raised floor level.
Reservoirs	Negligible	Minimal risk of reservoir flooding.

Surface Water Drainage

The proposed strategy presented in detail in this report aims to restrict surface water discharge to less than 50% of the existing rate in accordance with the Local Authority and Sewer Company Requirements and 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.

Sustainable drainage measures included in the design include the use of permeable paving and water butts. An additional 10% allowance for urban creep has been included in the sizing of surface water storage.

Discharge will be to the TW sewers in the street to TW approval.

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.

Overall, the proposals provide a high level of water treatment, runoff reduction and flooding protection for the proposed development.

Foul Drainage

It is proposed to discharge the foul drainage from the site into the existing Thames Water sewer in the street via the existing connection or a new connection if required.

2 INTRODUCTION

2.1.1 Jomas was commissioned to undertake a Drainage Assessment for the proposed development of land located at 48 Warren Rd, Ickenham, UB10 8AD.

2.1.2 The site is currently occupied by a single dwelling and associated external works. The proposed development comprises the demolition of the existing building and construction of a new dwelling and associated external works.

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

2.1.4 Proposed development details are provided in Appendix A.

3 SITE DESCRIPTION

3.1.1 The site is approximately 842 square metres in size and located at 48 Warren Rd, Ickenham, UB10 8AD

3.1.2 Pre-development, the site is approximately 38% (320 square metres) impermeable. Post development, the impermeable area will increase to 52% (440 square metres).

3.1.3 The site location information is as follows:

- Nearest Postcode: UB10 8AD

3.2 Topography

Site Topography

3.2.1 A topographic survey has been obtained for the site and is provided in Appendix B.

3.2.2 The site is relatively flat with the levels varying between 40.60m AoD and 41.15m AoD.

3.3 Drainage

3.3.1 Sewer record plans are provided in Appendix C. There are both and foul and surface water Thames Water sewers in the street.

3.3.2 A drainage survey of the site has not been carried out, however, it is understood that both the foul and surface water drainage from the existing site connect to the public sewer within the street.

3.3.3 There is an existing Thames Water foul sewer running through the site that will need to be protected during the works and approval from Thames Water obtained for building over or close to the sewer.

4 DESIGN PRINCIPLES AND POLICY REQUIREMENTS

4.1.1 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:

- A Flood Risk Assessment in accordance with the National Planning Policy Framework (NPPF) and National Planning Guidance (NPG)
- SuDS: Designs, Maintenance Plans & Calculations - for SuDS proposed, the LLFA require product specifications or design drawings, all supporting calculations and a maintenance plan. This needs to include details of any attenuation structures and in accordance with the CIRIA C753 SuDS Manual.

4.2 General Principles for Flooding

4.2.1 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)."

4.2.2 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.*

4.3 General Principles for Surface Water Drainage

4.3.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015), 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.

4.4 Drainage Design Considerations – Urban Creep

4.4.1 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. To include an allowance for urban creep, the impermeable area used in the drainage calculations has been increased by 10% in accordance with the recommendation made in SC030219.

5 FLOODING INFORMATION

5.1 Flood Risk from Rivers (Fluvial)

5.1.1 The EA flood map confirms that the site lies within Flood Zone 1 and thus the risk of flooding is considered to be Low

5.2 Coastal and Tidal

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

5.3 Geology and Hydrogeology

5.3.1 Groundwater flooding occurs when the water table rises to the surface and is most likely to occur in low-lying areas underlain by permeable rocks.

5.3.2 The British Geological Survey (BGS) indicates bedrock and superficial drift geology for the site. The strata of the site (bedrock geology) comprises London Clay described as follows:

London Clay Formation - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

The superficial geology is not recorded at this location

No onsite ground water testing is available for the site at the time of producing this report.

5.3.3 As the ground is likely to be impermeable, there is a low risk of groundwater flooding at the site.

5.3.4 Floor levels are raised above surrounding ground levels and falls have been designed to allow water to flow away from buildings.

5.3.5 Based on the above, overall risk of flooding from groundwater is low.

5.4 Surface Water Flood Risk (Overland Flows)

5.4.1 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.

5.4.2 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.

5.4.3 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%)

5.4.4 An extract of the map, provided below, shows that the site is at low risk of surface water flooding.

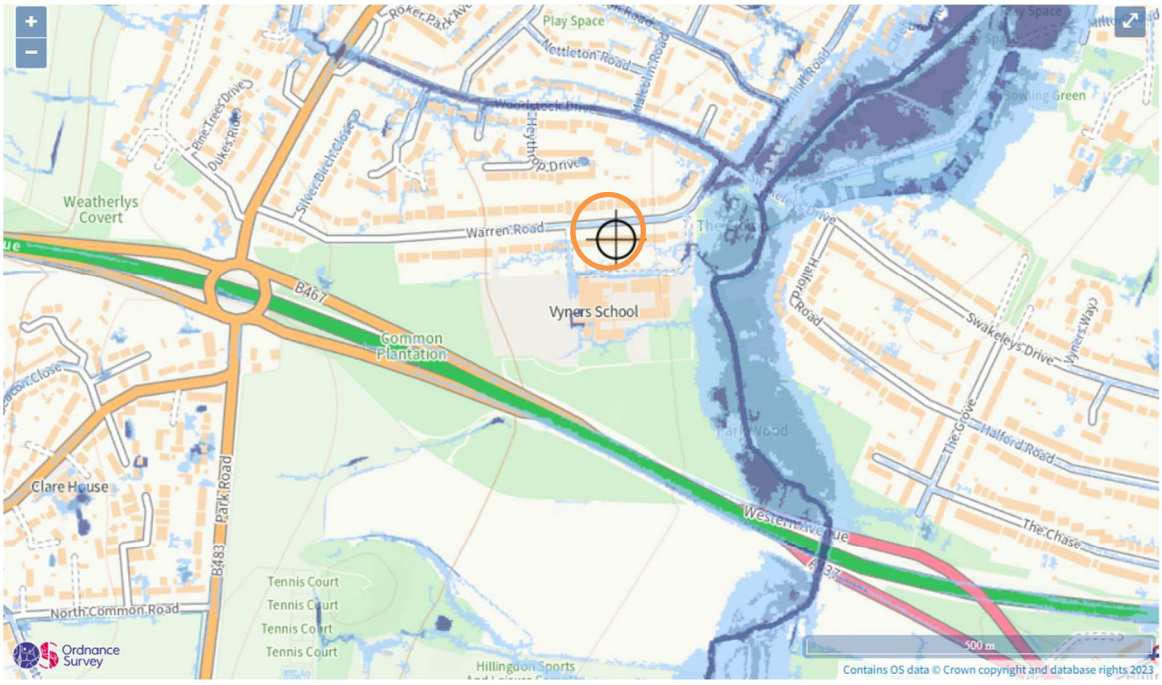


Figure 1: EA Flood Risk from Surface Water Map

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

5.5 Sewer/Drainage Flood Risk

5.5.1 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.

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

5.5.3 As these sewers are at a lower level than the building there is considered to be a low risk of sewer flooding to the site.

5.6 Reservoir Flood Risk

5.6.1 The EA has produced a Reservoir Flood Map that shows that the site is at low risk of reservoir flooding.

5.6.2 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.

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

5.7 Summary of risk levels

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

Table 2: Flood Risk Categories

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

6 SITE DRAINAGE INFORMATION

6.1.1 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

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

6.1.3 The surface geology of this site is within an area generally underlain by impermeable clay making infiltration unlikely.

6.1.4 Contamination and Infiltration tests will be completed prior to construction to confirm if infiltration is possible. Should testing prove infiltration is possible, the design will be revised to remove the outfall to the sewer and the proposed tanked permeable paving will be revised to untanked permeable paving with all surface water discharging to ground.

Discharge to Surface Water Body

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

Discharge to Surface Water Sewer/Combined Sewer

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

6.1.7 It is proposed to discharge surface water to the existing sewer.

6.2 Sustainable Drainage Systems (SuDS)

6.2.1 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 must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority.

Component	Recommendation
	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. Green/Blue roofs are not suitable for the pitched roof.
Basins and Ponds	Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value. There is not sufficient space for inclusion of a basin with external areas being used for amenity.
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 and suitability of swales.
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 unlikely to be suitable for this site.
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. There is extensive permeable paving proposed for the site
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.
Other	Rainwater reuse is proposed.

7 SURFACE WATER DRAINAGE DESIGN

7.1 Drainage Design Considerations

7.1.1 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. To include an allowance for urban creep, the impermeable area used in the drainage calculations is usually increased by 10% in accordance with the recommendation made in SC030219. However, for this site, the entire site is considered impermeable for the purposes of the calculations

7.1.2 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.

7.2 Existing Surface Water Drainage

7.2.1 The development area currently comprises an existing dwelling and outbuildings with external paved areas. The existing and proposed areas are summarised below.

Table 4: Site Areas

Parameter	Existing (m2)	Existing (%)	Proposed (m2)	Proposed (%)
Impermeable area	320	38	440	52
Permeable area	522	62	402	48
Total area	842	100	842	100

7.2.2 It is assumed that the existing drainage currently connects into an existing drainage system.

7.3 Greenfield Rates

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

7.3.2 The greenfield run-off rates are based on the parameters provided below in Table 5.

Table 5: Rural Run-off Calculator Parameters

Parameter	Value
Area (ha)	.0842
SAAR (mm)	639
Soil Type	4

7.3.3 The calculations are presented in Appendix C and summarised below in table 7.

Table 6: Existing Greenfield Run-off Rates

Parameter	Value for site (l/s)
QBAR	0.37
Q1	0.31
Q30	0.84
Q100	1.17

7.4 Existing Site Runoff Rates

7.4.1 The total site area is 842 square metres and is 38% impermeable, resulting in an impermeable area of 4320 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

320/10000 x 50 x 2.78 = **4.5 l/s**

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

320/10000 x 125 x 2.78 = **11.1 l/s**

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

320/10000 x 185 x 2.78 = **16.5 l/s**

7.5 Proposed Drainage Design

7.5.1 Due to the urban nature of the site, the presence of surface water sewers and the likely impermeable ground, infiltration is not considered for this site.

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

Table 7: Existing and proposed Run-off Rates

Parameter	Greenfield (l/s)	Existing (l/s)	Proposed (l/s)
Q1	0.31	4.5	2.2
Q30	0.84	11.1	2.7
Q100	1.17	16.5	2.9
Q100+40%CC	NA	NA	3.3

7.5.3 In accordance with the best practice, it is proposed to limit the site discharge to less than 50% of the existing discharge rate for all storm events up to and including the 100 year +40% climate change event. Attenuation will be provided via tanked permeable paving.

7.6 Attenuation

7.6.1 Discharge will be to the sewers at less than 50% of the existing discharge rate.

7.6.2 To attenuate surface water, a total of 25m3 of storage is proposed within the permeable paving 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 discharged into the sewers. See Appendix C for design details and calculations.

7.7 Infiltration

7.7.1 Should testing prove infiltration is possible, the design will be revised as follows:

- Remove outlet pipe
- Remove tanking to paving so water infiltrates into the ground.

7.8 Consents, Offsite Works and Diversions

7.8.1 The proposed surface water drainage strategy is accommodated entirely on site.

7.8.2 Consent will be required from Thames Water for the foul and surface water sewer connections.

7.8.3 A buildover agreement or an agreement to build close to the existing sewer running through the site may also be required.

7.9 Maintenance

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

7.10 Exceedance Flooding and Overland Flow

7.10.1 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 for the site drainage 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. See Appendix C for overland flow plan.

8 FOUL DISCHARGE

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 within the street. A Sewer connection application will be submitted to Thames Water for approval when necessary.

9 WATER QUALITY

9.1 Post-Development Water Quality Treatment

9.1.1 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

9.1.2 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.

9.1.3 The proposed development comprises two types of land use; residential roofs and a car parks/low traffic driveway. These land uses are classified as having very low and low hazard pollution levels, respectively. This table is provided below in Table 8.

Table 8: 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]

9.1.4 The proposed drainage strategy utilises the following SuDS features:

- Permeable Paving

9.1.5 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 9.

Table 9: 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.		

9.1.6 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)

9.1.7 For each type of land-use, the pollution hazard indices, mitigation indices and concluding hazard have been outlined in Table 10 below.

Table 10: Roof Space Water Quality Mitigation Summary

Residential Roofs				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.2	0.2	0.05	Table 26.2
Mitigation Index (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 11: External Pavement Space Water Quality Mitigation Summary

Residential Roofs				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.5	0.4	0.4	Table 26.2
Mitigation Index (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			

9.1.8 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).

10 DRAINAGE DURING CONSTRUCTION

10.1 Construction Run-off Management

10.1.1 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).

1.1.1 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.

10.2 Management of Construction (Including Drainage)

10.2.1 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.

10.2.2 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.

10.3 Temporary Drainage During Construction

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

10.3.2 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.

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

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

10.3.5 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.

10.3.6 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.

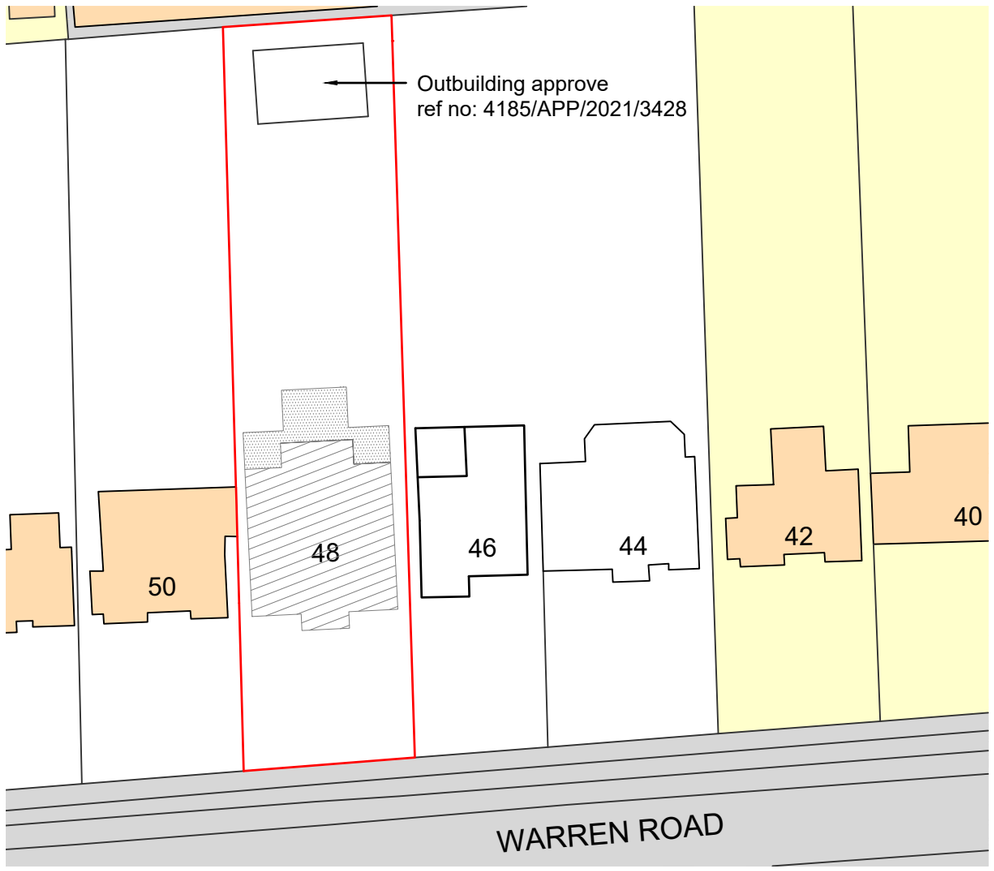
10.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.

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

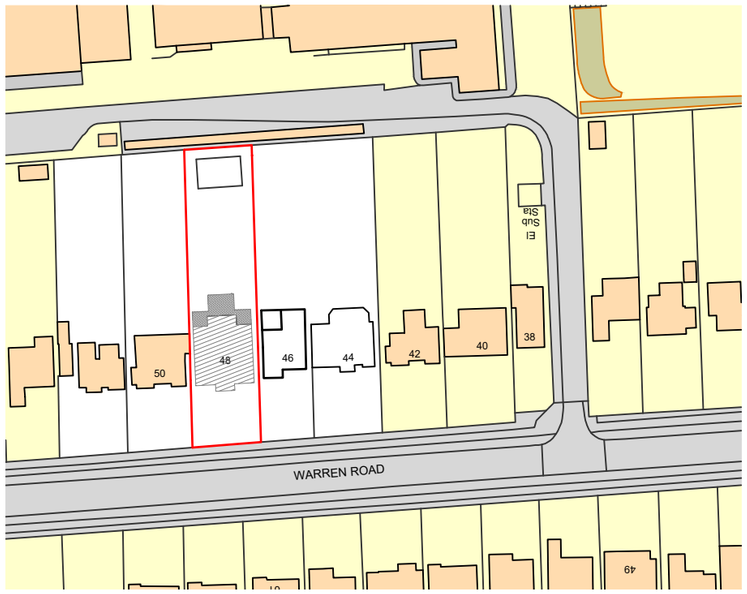
10.4 Protection of Drainage Infrastructure during Construction

10.4.1 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.

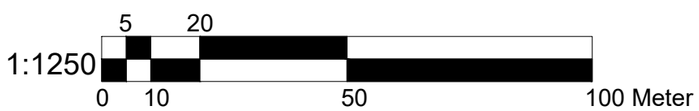
Appendix A: Proposed Development Details



BLOCK PLAN
(scale: 1:500)



LOCATION PLAN
(scale: 1:1250)



BANCIL PARTNERSHIP LTD

Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

Title: Block & Location

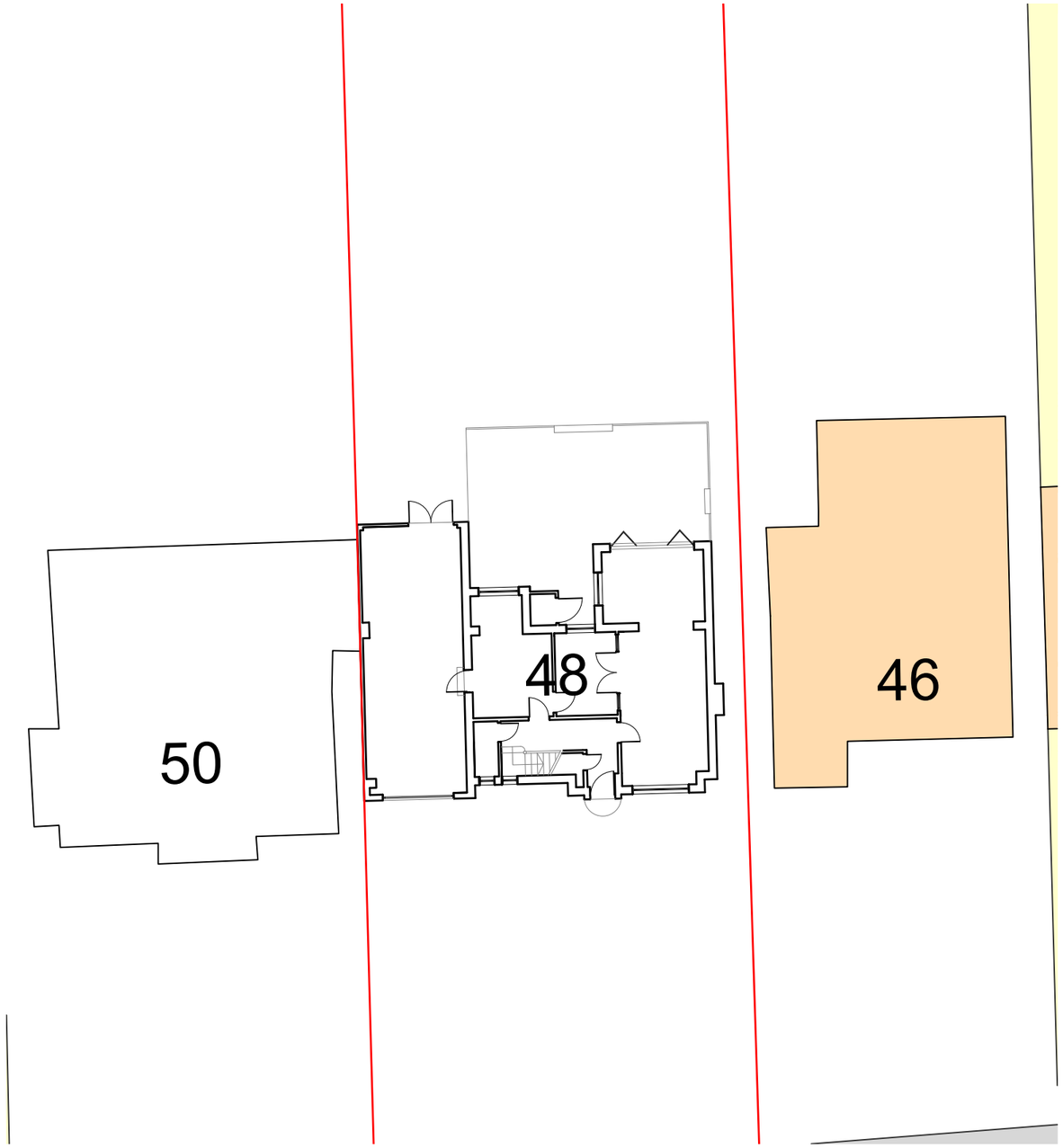
N

Scale:	As Shown	Paper Size:	A3

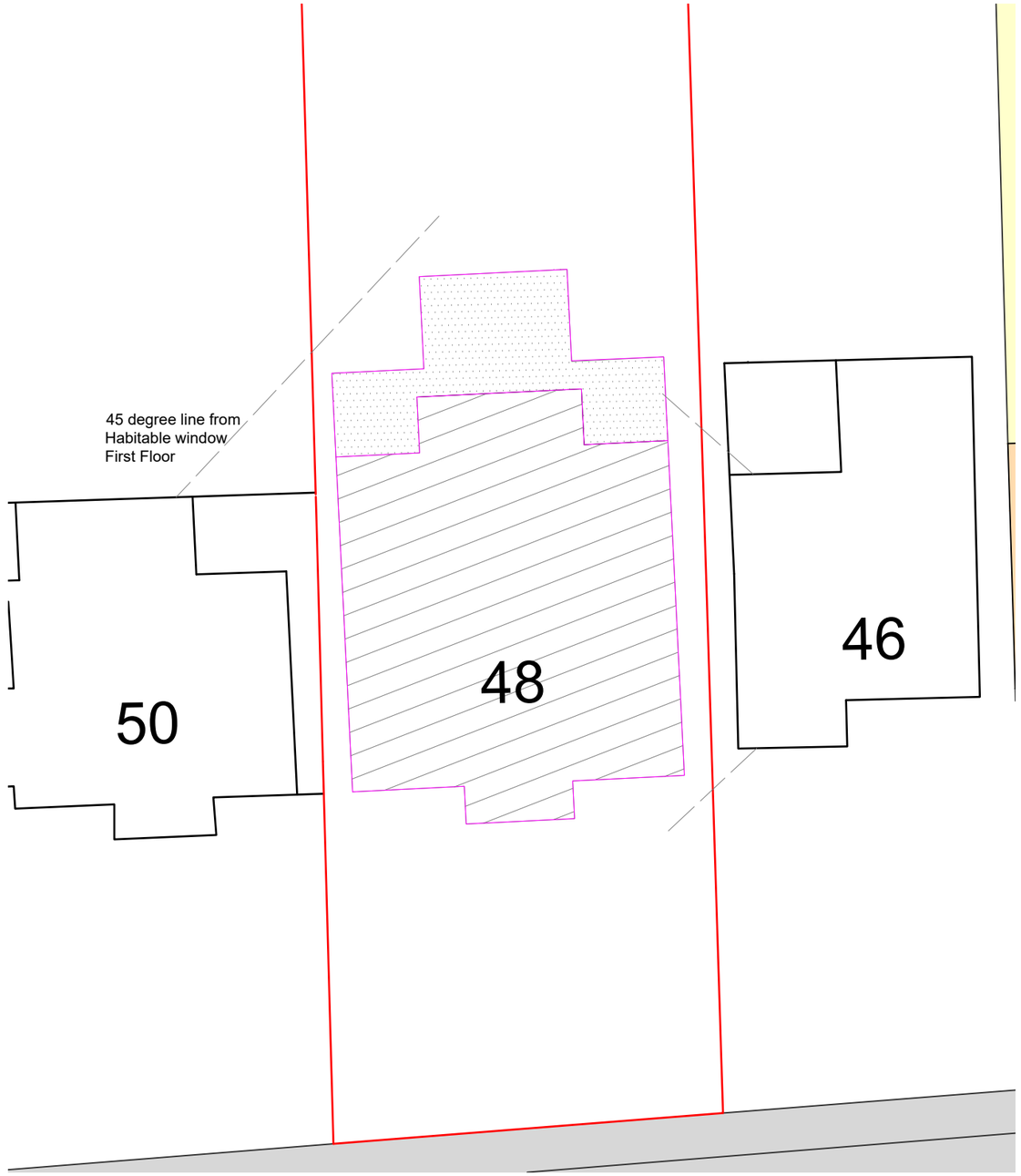
Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 00

Revisions:

Rev	Revision	Date



EXISTING BLOCK PLAN
(scale: 1:200)



PROPOSED BLOCK PLAN
(scale: 1:200)

1:200

0 2 4 10 20 Metre

BANCIL PARTNERSHIP LTD

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

Title: Block Plan

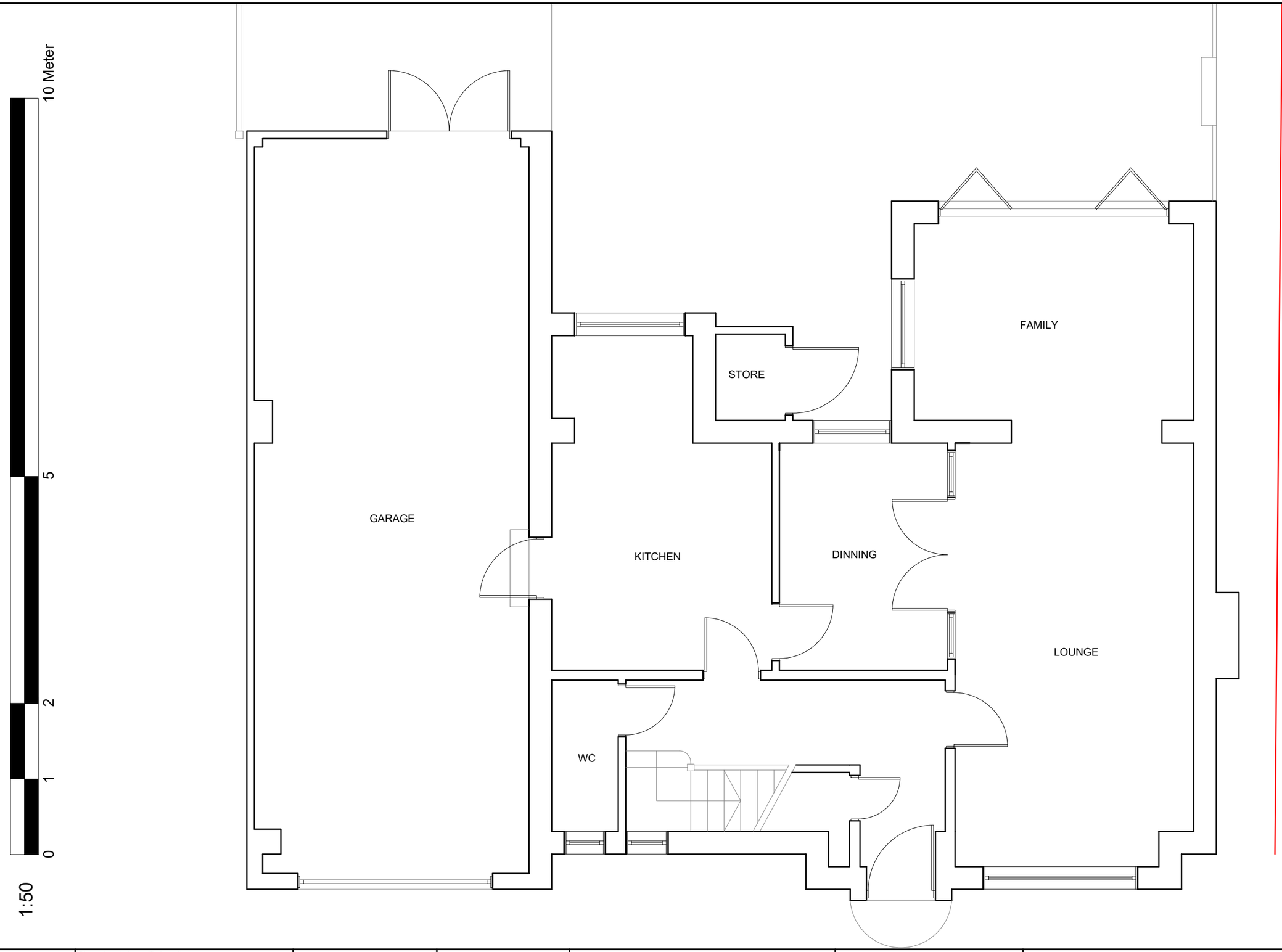
N

Scale:	1:200	Paper Size:	A3

Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 01

Revisions:

Rev	Revision	Date



Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

BANCIL PARTNERSHIP LTD
27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:
48, Warren Road,
Ickenham,
UB10 8AD.

Client Detail:
48, Warren Road,
Ickenham,
UB10 8AD.

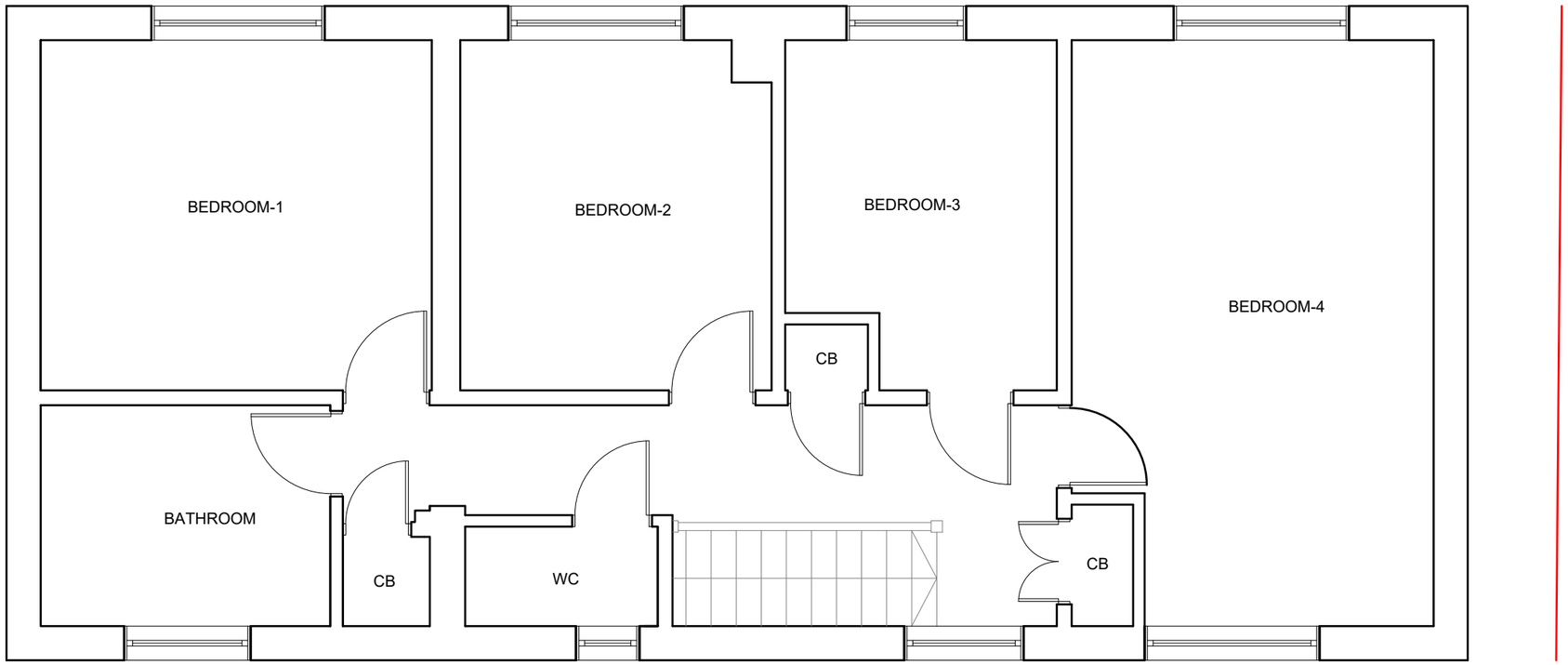
Title:
Existing Ground Floor Plan

Scale: 1:50 Paper Size: A3

Drawn By: NM
Checked By: PP
Date: 02/2022
Drawing No. PL2/PP/2765 - 02

Revisions:

Rev	Revision	Date



1:50

0 1 2 5 10 Meter

Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

BANCIL PARTNERSHIP LTD
27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:
48, Warren Road,
Ickenham,
UB10 8AD.

Client Detail:
48, Warren Road,
Ickenham,
UB10 8AD.

Title:
Existing First Floor Plan

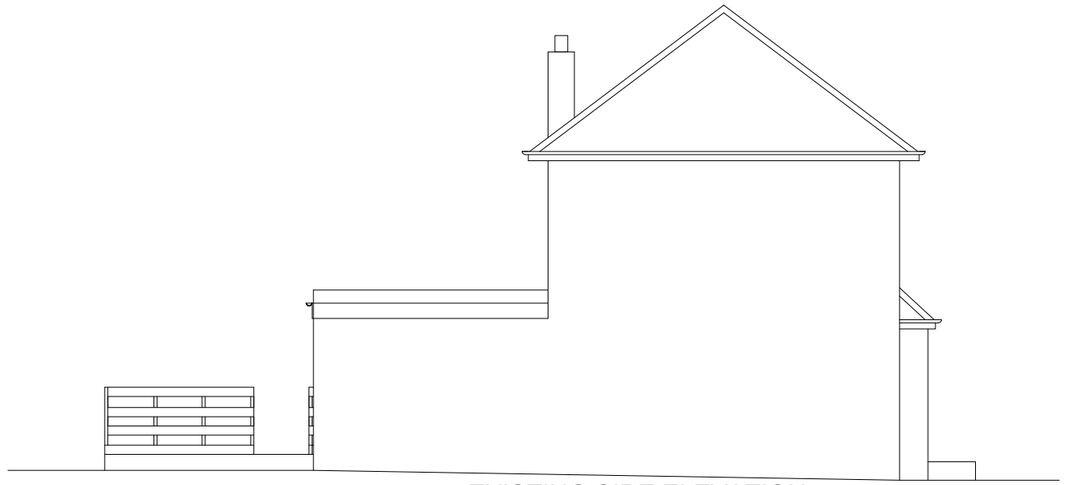
Scale: 1:50 Paper Size: A3

Drawn By: NM
Checked By: PP
Date: 02/2022
Drawing No. PL2/PP/2765 - 03

Revisions:

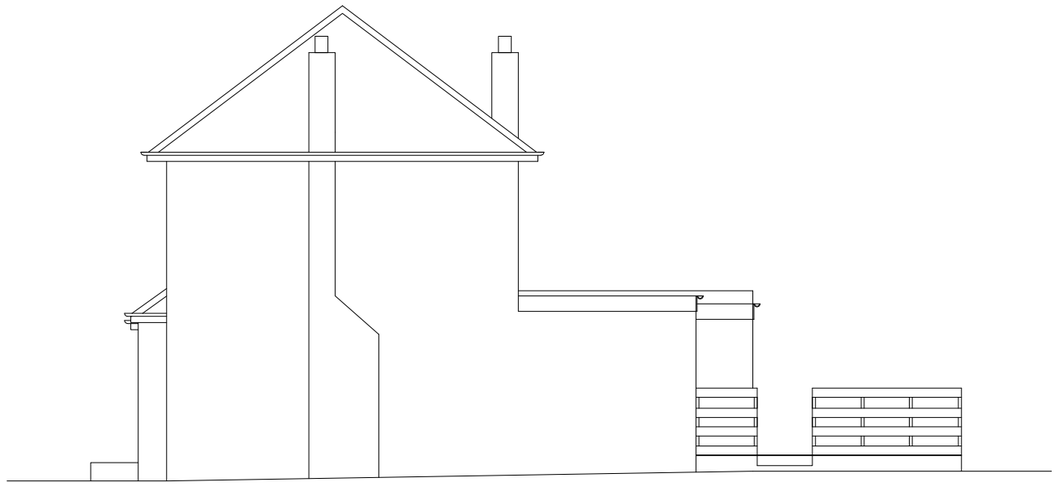
Rev	Revision	Date

EXISTING FRONT ELEVATION



EXISTING SIDE ELEVATION

EXISTING REAR ELEVATION



EXISTING SIDE ELEVATION

1:100

0 1 2 5 10 Meter

BANCIL PARTNERSHIP LTD

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

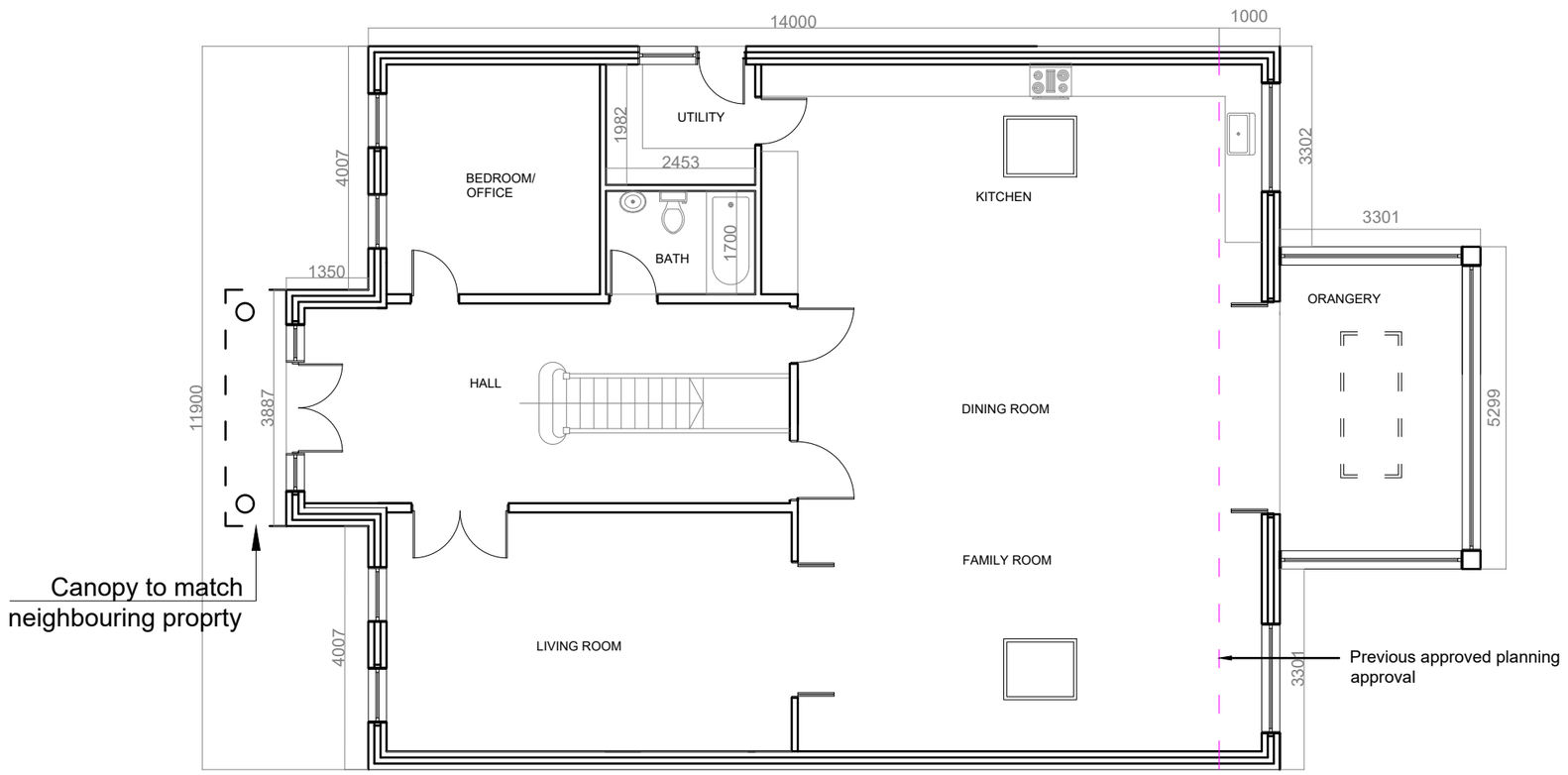
Title: Existing Elevations

Scale:	1:100	Paper Size:	A3

Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 04

Revisions:

Rev	Revision	Date



1:100

0 1 2 5 10 Meter

BANCIL PARTNERSHIP LTD

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

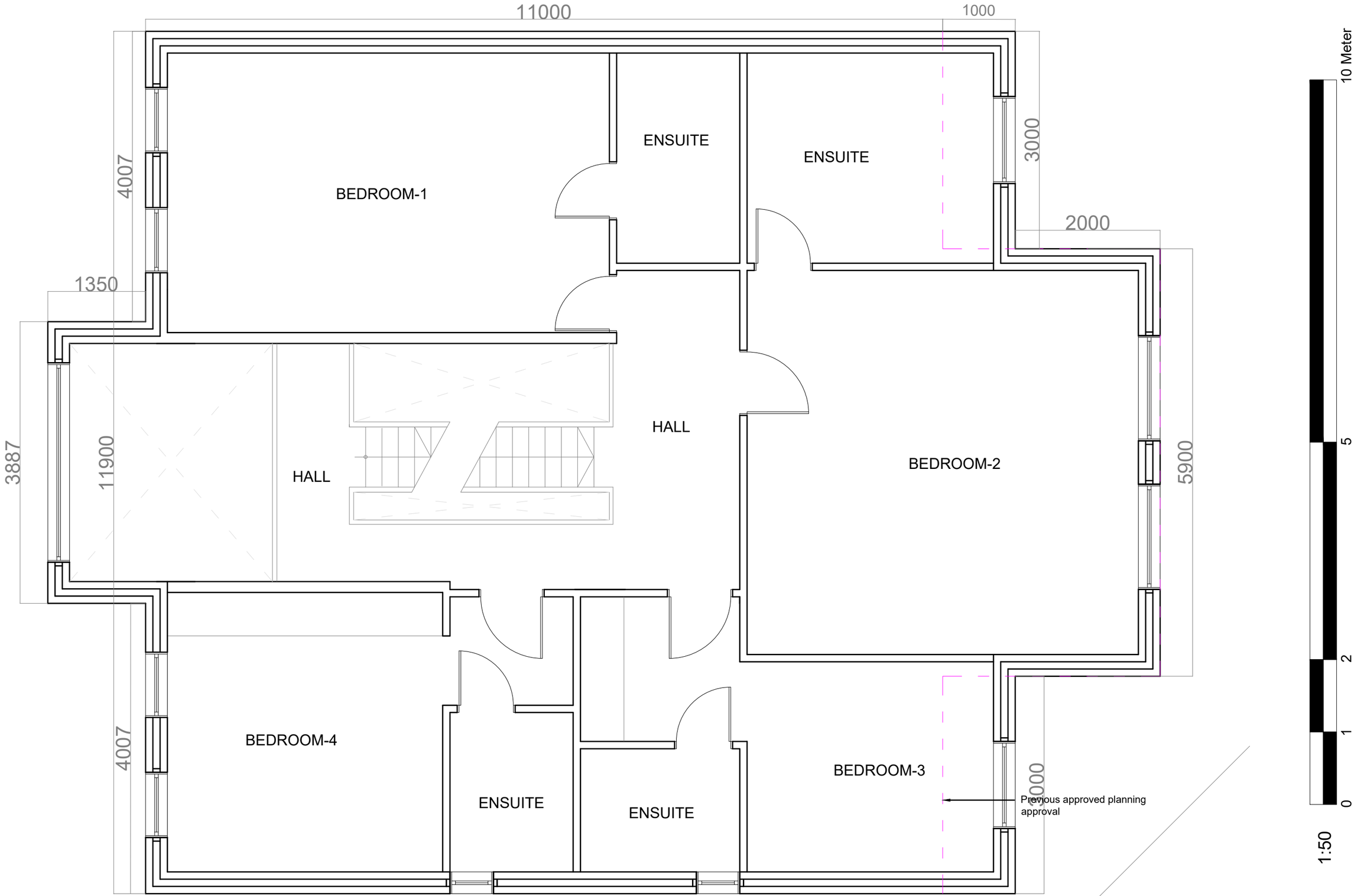
Title: Proposed Ground Floor Plan

Scale: 1:100 Paper Size: A3

Drawn By: NM
Checked By: PP
Date: 02/2022
Drawing No. PL2/PP/2765 - 05

Revisions:

Rev	Revision	Date
A	Dimension added	08.08.2022



BANCIL PARTNERSHIP LTD
27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

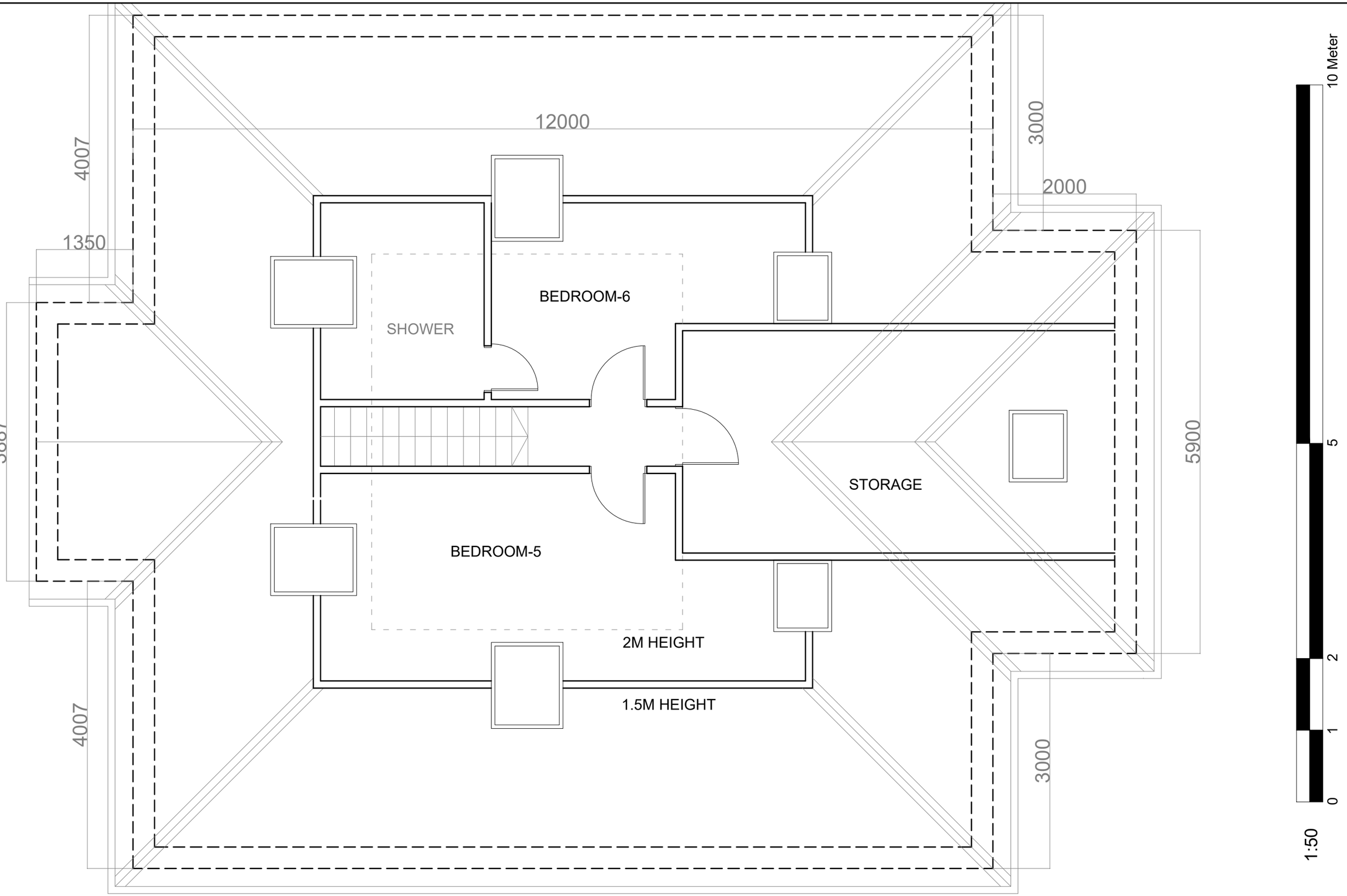
Title: Proposed First Floor Plan

Scale: 1:50 Paper Size: A3

Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 06

Revisions:

Rev	Revision	Date



Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

BANCIL PARTNERSHIP LTD

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

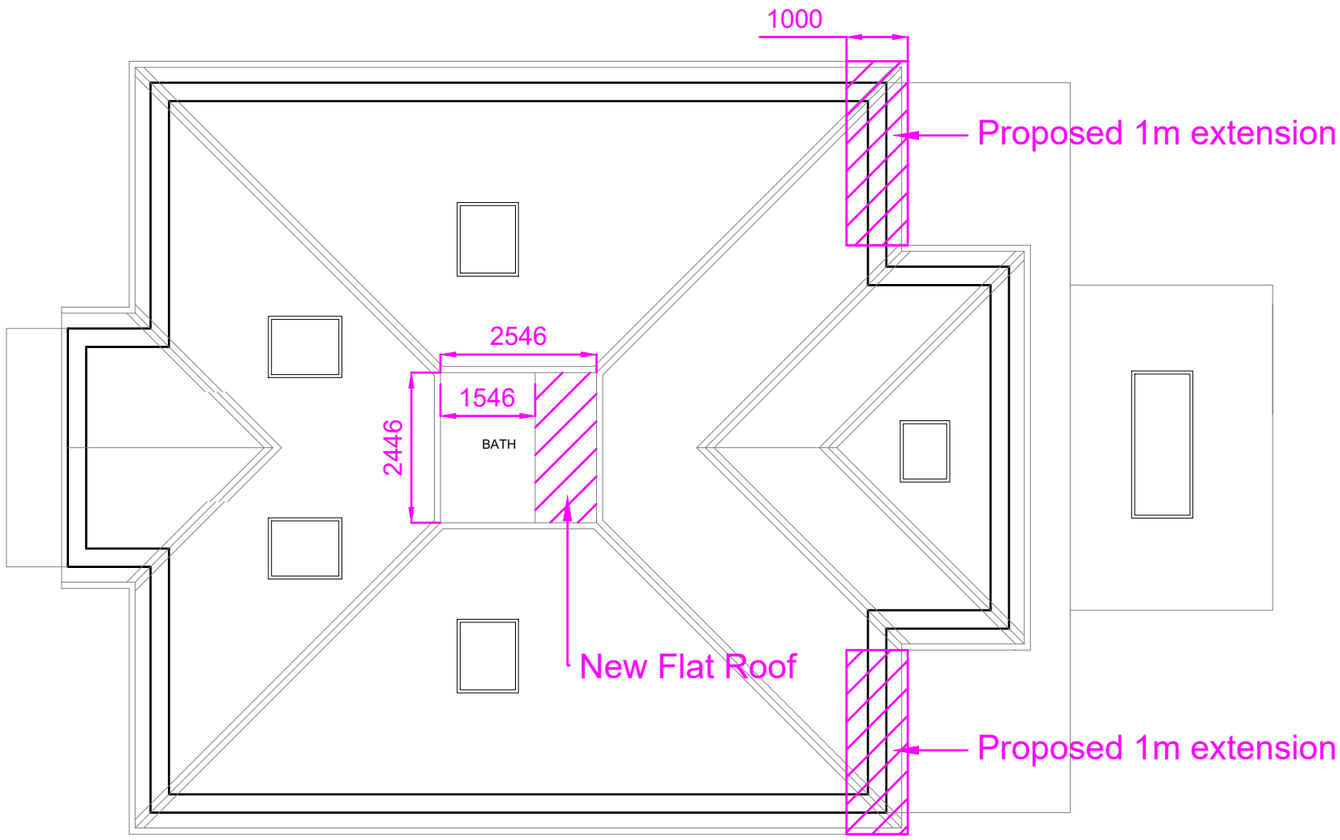
Title: Proposed Second Floor Plan

Scale:	1:50	Paper Size:	A3

Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 07

Revisions:

Rev	Revision	Date



1:100

0 1 2 5 10 Meter

BANCIL PARTNERSHIP LTD

Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:
48, Warren Road,
Ickenham,
UB10 8AD.

Client Detail:
48, Warren Road,
Ickenham,
UB10 8AD.

Title:
Proposed Roof Plan

Scale: 1:100 Paper Size: A3

Drawn By: NM
Checked By: PP
Date: 02/2022
Drawing No. PL2/PP/2765 - 08

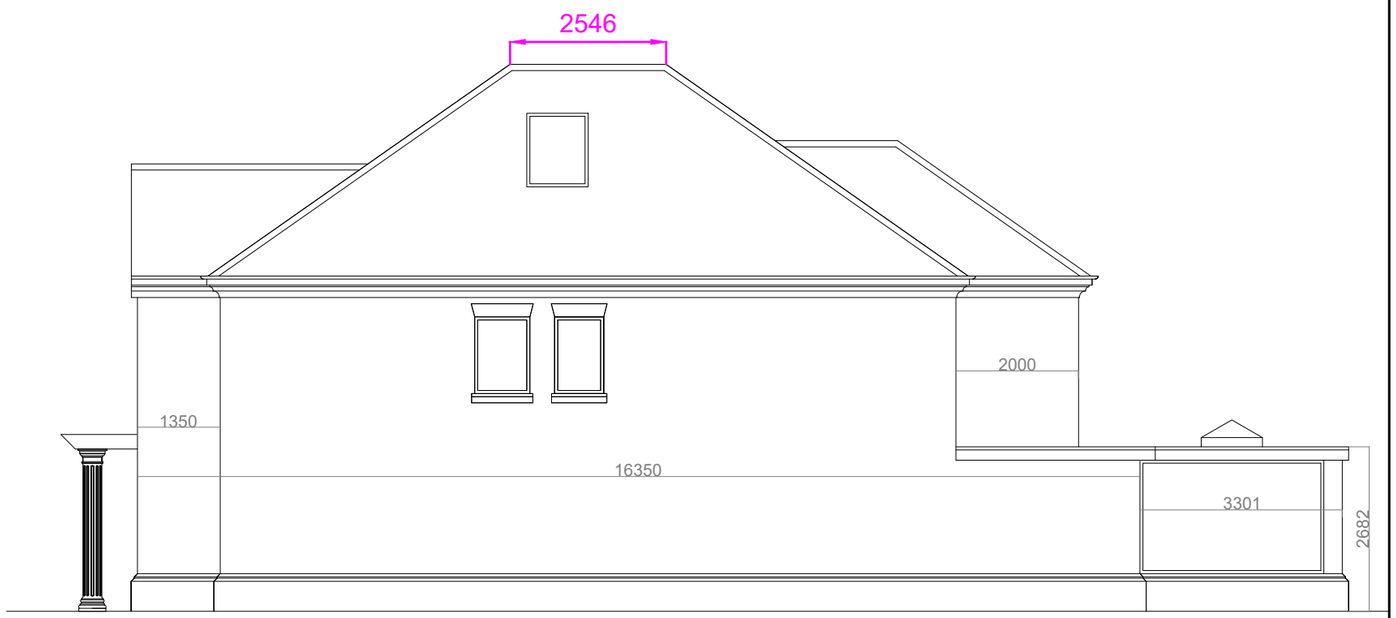
Revisions:

Rev	Revision	Date

PROPOSED FRONT ELEVATION

PROPOSED SIDE ELEVATION

PROPOSED REAR ELEVATION



PROPOSED SIDE ELEVATION

1:100

0 1 2 5 10 Meter

BANCIL PARTNERSHIP LTD

Dimensions to be verified on site
DO NOT SCALE FROM THIS DRAWING.
Any areas indicated on this drawing are for guidance only.
No responsibility is taken for their accuracy.

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:

48, Warren Road,
Ickenham,
UB10 8AD.

Client Detail:

48, Warren Road,
Ickenham,
UB10 8AD.

Title:

Proposed Elevations

Scale:	1:100	Paper Size:	A3

Drawn By:	NM
Checked By:	PP
Date:	02/2022
Drawing No.	PL2/PP/2765 - 09

Revisions:

Rev	Revision	Date
A	Dimension added.	08.08.2022

No 50 | No 48 | No 46

EXISTING FRONT ELEVATION

No 50 | No 48 | No 46

PROPOSED FRONT ELEVATION

1:100

0 1 2 5 10 Meter

BANCIL PARTNERSHIP LTD

27-29 The Broadway, Southall, Middx, UB1 1JY Tel: 020 8574 4546 Fax: 020 8574 4526

Site Address:	Client Detail:
48, Warren Road, Ickenham, UB10 8AD.	48, Warren Road, Ickenham, UB10 8AD.

Title: Proposed Street Elevations

Scale: 1:100 Paper Size: A3

Drawn By: NM
Checked By: PP
Date: 04/2022
Drawing No. PL2/PP/2765 - 10

Revisions:

Rev	Revision	Date

Appendix B: Site Location Plan

NOTES

GENERAL NOTES :–

ALL LEVELS ARE IN METRES DERIVED FROM GPS TRANSFORMATION.

GRID COORDINATES ARE ORDNANCE SURVEY NATIONAL GRID DERIVED FROM GPS TRANSFORMATION. GPS COORDINATES AND LEVELS SET AT ST05. (NO SCALE FACTOR APPLIED)

THIS DRAWING HAS BEEN PRODUCED WITH A PLOT SCALE ACCURACY OF 1:100

SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS / DETAILS SURVEYED FROM SURFACE INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED

TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL.

OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL VARIATION, AND SHOULD BE TREATED AS APPROXIMATE.

SERVICE COVERS LOCATED UNDER PARKED VEHICLES/MOBILE STRUCTURES MAYBE OMITTED.

BURIED SERVICE COVERS WILL NOT BE INDICATED.

TOPOGRAPHICAL SURVEY/UTILITY KEY :–

(ht) – height
ø – diameter
◉ – pea trap
a/g – above ground
a/r – assumed route
av – air valve
bb – belisha beacon
bd – back drop
bl – bed level
boll – bollard
bos – bottom of shaft
bt – telecom
c/b fence – closeboard fence
c/box – control box
catv – cable television
cl – cover level
con – conifer
cr – cable riser
cws – combined water sewer
d/chan – drainage channel
ejb – electric junction box
elec – electric
eot – end of trace
ep – electric pole
er – earth rod
f/bed – flower bed
fh – fire hydrant
fl – floor level
fs – fire switch
fws – foul water sewer
g – gully
g/run – gully run
gr – gas riser
h/chestnut – horse chestnut
h/thorn – hawthorn
ic – inspection cover
il – invert level
ill – illuminated
int – interceptor
lp – lamp post
mh – manhole cover
mkr – marker
o/h – over head
ol – off let
osa – off survey area
OSBM – ordnance survey bench mark
p & r fence – post & rail fence
pd – pit depth
pr – pipe riser
ptg – pipe to ground
pts – pipe to surface
re – rodding eye
ret wall – retaining wall
rs – road sign
rwp – rain water pipe
s/birch – silver birch
s/p – safety paving
sap – sapling
sec fence – security fence
sfc – soil filled chamber
sl – spot light
sp – soil pipe
st – stop tap
sv – stop valve
svp – soil vent pipe
sws – storm water sewer
TBM – temporary bench mark
tfr – taken from records
tl – threshold level
toc – top of cap
top – top of pipe
tot – top of tank
tp – telecom pole
ts – traffic signal
t/s – trench scar
u/s – underside
utl – unable to lift
utr – unable to rod
uts – unable to survey
utt – unable to trace
vp – vent pipe
wfc – water filled chamber
wl – water level
wm – water meter
wp – waste pipe
wr – water riser

SURVEY CONTROL :–

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	506748.981	185585.744	40.849
ST02	506744.409	185604.621	40.796
ST03	506744.096	185613.625	40.840
ST04	506744.711	185624.493	40.973
ST05	506754.896	185639.703	40.967
ST06	506733.716	185631.046	41.734

SHEET LAYOUT :–

NORTH

UTILITY SURVEY KEY :–

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

ELECTRIC CABLE
WATER PIPE
FOUL SEWER
STORM SEWER
COMBINED SEWER
DUCTS
CABLE TELEVISION
DATA CABLE
TELECOM CABLE
GAS PIPE
UNIDENTIFIED SERVICE
OTHER
CCTV
TRAFFIC LIGHT
OFFSET FILL
VENT
FUEL PIPE
GAUGE LINES
PIPE
ASSUMED ROUTE
TAKEN FROM RECORDS

DISCLAIMER :–

Electromagnetic techniques have been used in the location of underground services. The results are not infallible and trial excavations should be carried out to confirm service identification, positions and particularly depths, where these are critical. The completeness of the underground services information cannot be guaranteed.

This method of survey does not differentiate between live and dead services, and as such all services should be treated as live. This drawing may not include the location of all public services that may cross the site, therefore the relevant service drawings should be obtained from the appropriate utility company and used in conjunction with this drawing.

Private service pipes and cables in highways are not shown, but there presence should be anticipated.

Additional below ground structures or obstructions not shown on this drawing may be present. Reference should be made to historical plans and as–built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document avoiding dangers from underground services

Please note that factors such as ground conditions, proximity of other utilities, material and method of construction have an influence on the quality of the data collected on site.

TSA Standards – "A utility mapping survey can be considered a 100% accurate depiction of the sub–surface environment, and the use of these drawings does not remove the requirement for the use of safe digging techniques at all times, in line with requirements of HSG47 and current CDM regulations".

UTILITY NOTES

0 1 2 4 6 8 10

JOMAS ENGINEERING ENVIRONMENTAL

Project	48 WARREN ROAD, ICKENHAM, UB10 8AD
Title	TOPOGRAPHICAL SURVEY
Date	JUNE 2023
Scale	1:100@A1
Dwg No	U09717 –
Surveyor	T.F
Checked	M.W

Revisions

Appendix C: Drainage Drawings and Calculations

Asset location search

Thames Water Property Searches

andrew wallace
22Park Rise
HARPENDEN
AL5 3AL

Search address supplied

48
Warren Road
Ickenham
Uxbridge
UB10 8AD

Your reference Warren

Our reference ALS/ALS Standard/2023_4856590

Search date 12 July 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: 48, Warren Road, Ickenham, Uxbridge, UB10 8AD

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Asset location search

Thames Water Property Searches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel: 0345 3572401

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4856590

The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 506751,185610

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
661B	n/a	n/a
6601	44.27	43.29
6602	44.04	42.18
7601	42.43	41.05
761A	n/a	n/a
761B	n/a	n/a
7602	40.68	39.35
7603	n/a	n/a
761C	n/a	n/a
8601	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**
Please Call **0800 009 4540** quoting your invoice number starting CBA or ADS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	andrew wallace
Site name:	Warren rd
Site location:	Ickenham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.55952° N
Longitude:	0.46178° W
Reference:	3639942513
Date:	Jul 17 2023 18:04

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	.0842

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	639	639
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

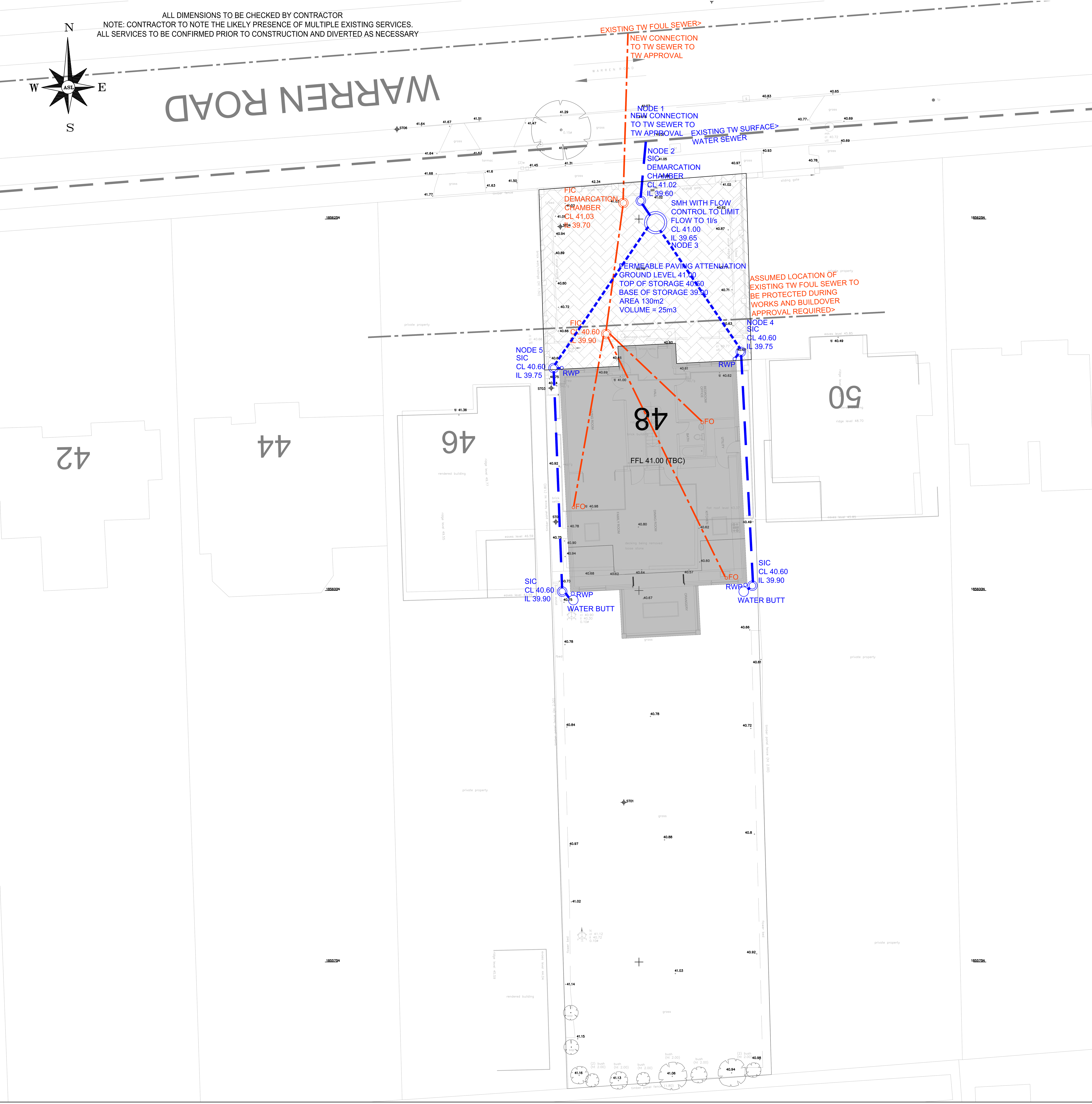
(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	0.37	0.37
1 in 1 year (l/s):	0.31	0.31
1 in 30 years (l/s):	0.84	0.84
1 in 100 year (l/s):	1.17	1.17
1 in 200 years (l/s):	1.37	1.37



DRAINAGE CONCEPT LEGEND

Symbol	Description
Ø100@1:100>	Stormwater Pipe - Diameter and fall
Ø100@1:100>	Perforated Pipe
SWIC Ø450	Polypropylene Inspection Chamber (PPIC)
Ø100@1:80>	Foul Pipe - Diameter and fall
FWIC Ø450	Polypropylene Inspection Chamber (PPIC)
FO	Sewer Vent Pipe/Sub Stack/Outlet
18.30+	Proposed Level
FFL 80.90	Finished floor level
Ø150@1:100>	Ex. SW Pipe - Diameter and fall
Ø100@1:80>	Ex. Foul Pipe - Diameter and fall
	Tanked Permeable Paving

Job. No. **P1173JJ1219** Rev.

DRAINAGE NOTES

1. THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
4. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
5. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
6. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1, SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
7. ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.
8. NODE NUMBERS REFER TO DRAINAGE MODEL
9. UNLESS NOTED OTHERWISE, PIPES TO BE:
   FOUL PIPES UNDER BUILDING Ø100@1:40,
   FOUL PIPES EXTERNAL Ø100@1:80,
   SURFACE WATER PIPES Ø100@1:100

Notes.

Key dimensions to be checked by engineer before major structural works commence on site.

1. This survey has been computed and drawn about O S National Grid.
2. All levels are in metres and relate to O S National Datum by GPS instruments.
3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd

JOMAS
ENGINEERING
ENVIRONMENTAL
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Project

48 Warren Rd, Ickenham

Drawing

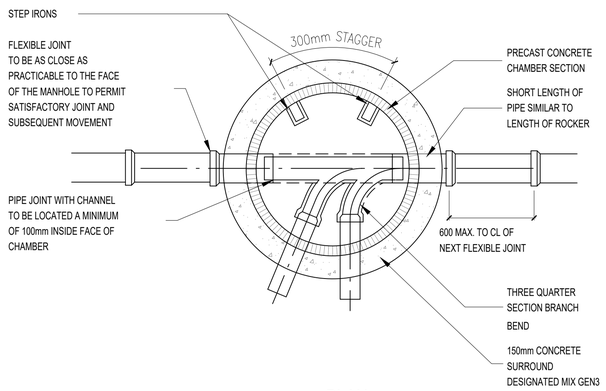
Proposed Drainage Plan

Dwg no	Checked	Surveyor
C01	AW	NA
Date 18.07.23	Scale 1:125 @ A1	

Job No. **P1173JJ1219** Rev. -

Grid	Contours	Level Datum

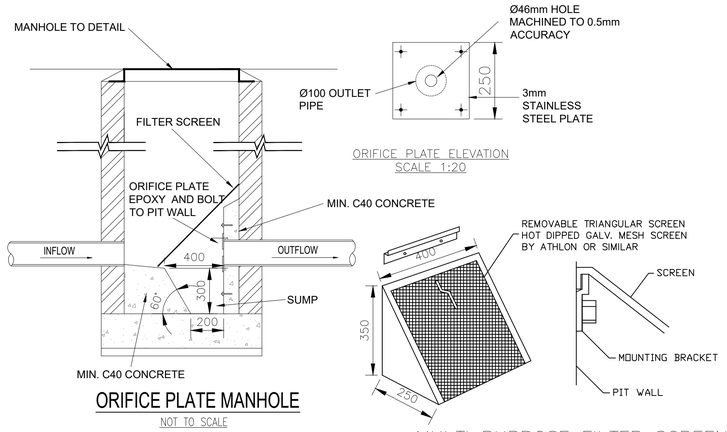
ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR



PLAN

PRECAST CONCRETE MANHOLE EXTERNAL AREAS DETAIL

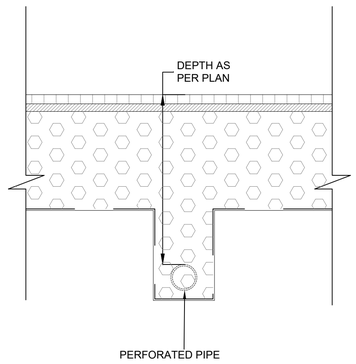
SCALE 1:20



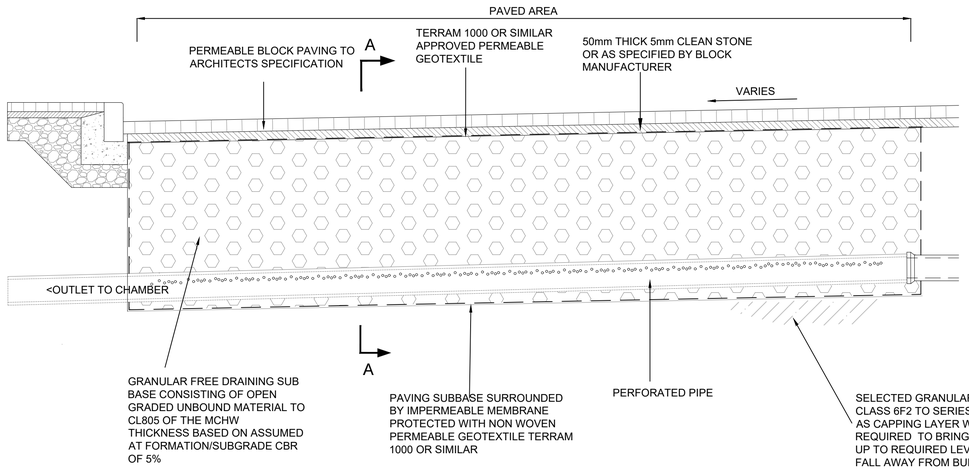
ORIFICE PLATE MANHOLE

NOT TO SCALE

MULTI PURPOSE FILTER SCREEN

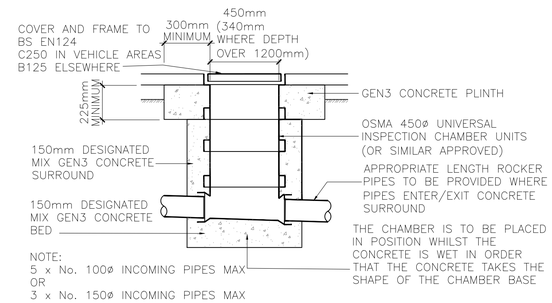


SECTION A-A



TANKED PERMEABLE PAVING DETAIL

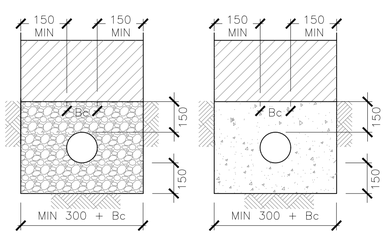
SCALE 1:20



EXTERNAL POLYPROPYLENE INSPECTION CHAMBER (PPIC)

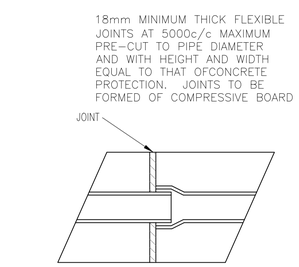
MAXIMUM DEPTH TO INVERT OF CHAMBER TO BE 1200mm (3000mm FOR REDUCED ACCESS)
CUT TO INTERMEDIATE SIZES

SCALE 1:20



PIPE BEDDING DETAIL

SCALE 1:10



FLEXIBLE JOINTS IN CONCRETE PROTECTION

SCALE 1:10

Job. No.	P1173JJ1219	Rev.

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
3. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION
4. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
5. FOR GRAVITY SEWERS, ALL DRAINAGE AND FITTINGS ARE TO BE FLEXIBLY JOINTED UPVC TO BS EN 1401-1 OR CLAYWARE TO BS EN295 OR CONCRETE TO BS5911 PART 100
6. CHAMBER WALLS 225 THICK TO BE CONSTRUCTED IN CLASS B ENGINEERING BRICKS TO SHW SERIES 2400 IN DESIGNATION (i) MORTAR OR IN-SITU STRENGTH CLASS C16/20 CONCRETE TO CLAUSE 2602
7. CHAMBER WALLS AND COVER SLAB TO BE CONSTRUCTED IN PRECAST CONCRETE TO BS EN 1917 AND BS 5911-3.
8. CONCRETE MIXES INDICATED ON THIS DRAWING ARE DESIGNATED MIXES IN ACCORDANCE WITH BS8500-1:2006. ALL CONCRETE TO BE SULPHATE RESISTANT
9. BACKFILL TO ALL TRENCHES UNDER CARRIAGEWAYS TO BE TYPE 1 SUB-BASE MATERIAL, ELSEWHERE BACKFILL TO BE IN ACCORDANCE WITH THE SPECIFICATION, FREE DRAINING READILY COMPACTIBLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER, FROZEN SOIL CLAY LUMPS AND LARGE STONES. TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK.
10. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS FEASIBLE TO OUTSIDE FACE OF ANY STRUCTURE INTO WHICH A PIPE IS BUILT, IN ACCORDANCE WITH THE DETAIL.
11. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1, SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
12. ALL PIPES TO BE LAID SOFFIT TO SOFFIT UNLESS NOTED OTHERWISE.
13. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH BS EN124 AND SHALL BE OF A NON-ROCKING DESIGN WHICH DOES NOT RELY ON THE USE OF CUSHION INSERTS. CLASS D COVERS SHALL BE USED IN CARRIAGEWAYS, HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPE OF ROAD VEHICLES. CLASS C SHALL BE USED IN FOOTWAYS, PEDESTRIAN AREAS AND ALL COMPARABLE LOCATIONS.

Notes.

Key dimensions to be checked by engineer before major structural works commence on site.

1. This survey has been computed and drawn about O S National Grid.
2. All levels are in metres and relate to O S National Datum by GPS instruments.
3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd

JOMAS
ENGINEERING
ENVIRONMENTAL
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

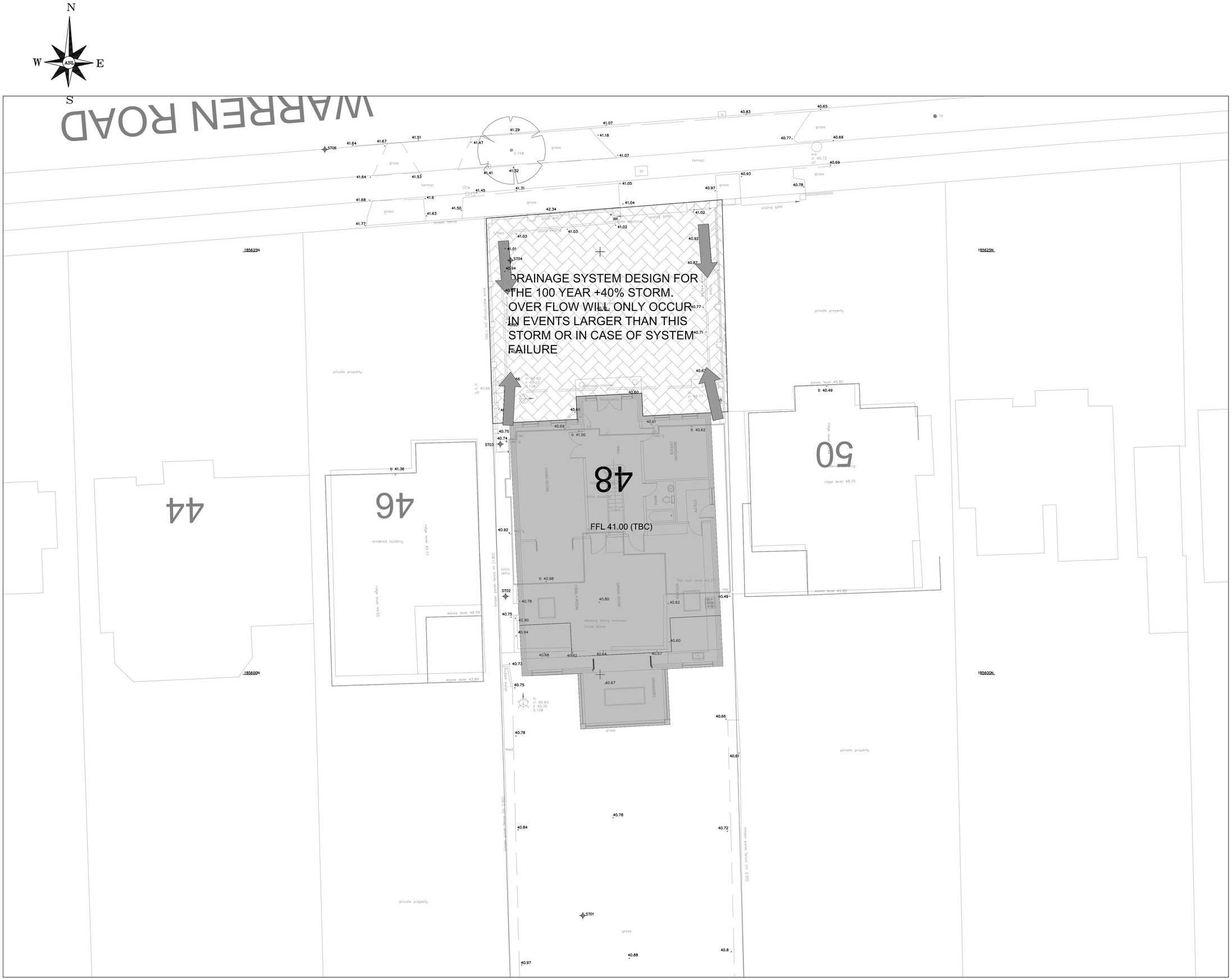
Project

48 Warren Rd, Ickenham

Drawing

Construction Details

Dwg no	Checked	Surveyor
C02	AW	NA
Date 18.07.23	Scale AS SHOWN	
Job No. P1173JJ1219		Rev. -
Grid	Contours	Level Datum



Job No.	Rev.
P1173JJ1219	

DRAINAGE NOTES

1. THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
4. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
5. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
6. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1. SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
7. ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.
8. UNLESS NOTED OTHERWISE, PIPES TO BE:
   FOUL PIPES UNDER BUILDING ø100@1:40,
   FOUL PIPES EXTERNAL ø100@1:80,
   SURFACE WATER PIPES ø150@1:100

OVERLAND FLOW LEGEND

18.30x	Proposed Level
FFL 80.90	Finished floor level
	Overland flow

Notes.

Key dimensions to be checked by engineer before major structural works commence on site.

1. This survey has been computed and drawn about O S National Grid.
2. All levels are in metres and relate to O S National Datum by GPS instruments.
3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd

JOMAS
ENGINEERING
ENVIRONMENTAL
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Project

48 Warren Rd, Ickenham

Drawing

Proposed Overland Flow

Dwg no	Checked	Surveyor
C03	AW	NA
Date 18.07.23	Scale	1:125 @ A1
Job No. P1173JJ1219		Rev. -

Grid	Contours	Level Datum

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	2.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1			41.000	450	50.000	50.000	1.500
2			41.020	450	50.000	45.000	1.420
3	0.010	2.00	41.000	1200	50.000	43.000	1.400
4	0.020	2.00	40.600	450	55.000	33.000	0.850
5	0.020	2.00	40.600	450	45.000	33.000	0.850

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.002	2	1	5.000	0.600	39.600	39.500	0.100	50.0	100	2.30	50.0
1.001	3	2	2.000	0.600	39.650	39.600	0.050	40.0	100	2.22	50.0
1.000	4	3	11.180	0.600	39.750	39.650	0.100	111.8	150	2.20	50.0
2.000	5	3	11.180	0.600	39.750	39.600	0.150	74.5	150	2.16	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.002	1.092	8.6	6.8	1.320	1.400	0.050	0.0	67	1.208
1.001	1.223	9.6	6.8	1.250	1.320	0.050	0.0	62	1.325
1.000	0.949	16.8	2.7	0.700	1.200	0.020	0.0	41	0.699
2.000	1.166	20.6	2.7	0.700	1.250	0.020	0.0	37	0.808

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.002	5.000	50.0	100	Circular	41.020	39.600	1.320	41.000	39.500	1.400
1.001	2.000	40.0	100	Circular	41.000	39.650	1.250	41.020	39.600	1.320
1.000	11.180	111.8	150	Circular	40.600	39.750	0.700	41.000	39.650	1.200
2.000	11.180	74.5	150	Circular	40.600	39.750	0.700	41.000	39.600	1.250

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	2	450	Manhole	Adoptable	1	450	Manhole	Adoptable
1.001	3	1200	Manhole	Adoptable	2	450	Manhole	Adoptable
1.000	4	450	Manhole	Adoptable	3	1200	Manhole	Adoptable
2.000	5	450	Manhole	Adoptable	3	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	50.000	50.000	41.000	1.500	450	1	1.002	39.500	100
2	50.000	45.000	41.020	1.420	450	1 0	1.001 1.002	39.600 39.600	100 100
3	50.000	43.000	41.000	1.400	1200	1 2 0	2.000 1.000 1.001	39.600 39.650 39.650	150 150 100
4	55.000	33.000	40.600	0.850	450	0	1.000	39.750	150
5	45.000	33.000	40.600	0.850	450	0	2.000	39.750	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	5.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node 3 Online Orifice Control

Flap Valve	x	Invert Level (m)	39.650	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.046		

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	39.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	17

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	130.0	0.0	0.600	130.0	0.0	0.601	1.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991
1 year 15 minute winter	76.857	30.991
1 year 30 minute summer	71.439	20.215
1 year 30 minute winter	50.133	20.215
1 year 60 minute summer	48.435	12.800
1 year 60 minute winter	32.179	12.800

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 120 minute summer	30.053	7.942
1 year 120 minute winter	19.966	7.942
1 year 180 minute summer	23.233	5.979
1 year 180 minute winter	15.102	5.979
1 year 240 minute summer	18.475	4.882
1 year 240 minute winter	12.274	4.882
1 year 360 minute summer	14.169	3.646
1 year 360 minute winter	9.210	3.646
1 year 480 minute summer	11.185	2.956
1 year 480 minute winter	7.431	2.956
1 year 600 minute summer	9.182	2.511
1 year 600 minute winter	6.274	2.511
1 year 720 minute summer	8.203	2.199
1 year 720 minute winter	5.513	2.199
1 year 960 minute summer	6.768	1.782
1 year 960 minute winter	4.483	1.782
1 year 1440 minute summer	4.949	1.326
1 year 1440 minute winter	3.326	1.326
1 year 2160 minute summer	3.574	0.988
1 year 2160 minute winter	2.462	0.988
1 year 2880 minute summer	2.986	0.800
1 year 2880 minute winter	2.007	0.800
1 year 4320 minute summer	2.276	0.595
1 year 4320 minute winter	1.499	0.595
1 year 5760 minute summer	1.885	0.483
1 year 5760 minute winter	1.220	0.483
1 year 7200 minute summer	1.609	0.410
1 year 7200 minute winter	1.038	0.410
1 year 8640 minute summer	1.409	0.359
1 year 8640 minute winter	0.910	0.359
1 year 10080 minute summer	1.260	0.322
1 year 10080 minute winter	0.813	0.322
10 year 15 minute summer	211.819	59.937
10 year 15 minute winter	148.645	59.937
10 year 30 minute summer	136.831	38.718
10 year 30 minute winter	96.022	38.718
10 year 60 minute summer	90.826	24.003
10 year 60 minute winter	60.342	24.003
10 year 120 minute summer	54.899	14.508
10 year 120 minute winter	36.474	14.508
10 year 180 minute summer	41.666	10.722
10 year 180 minute winter	27.084	10.722
10 year 240 minute summer	32.645	8.627
10 year 240 minute winter	21.689	8.627
10 year 360 minute summer	24.632	6.339
10 year 360 minute winter	16.012	6.339
10 year 480 minute summer	19.260	5.090
10 year 480 minute winter	12.796	5.090
10 year 600 minute summer	15.690	4.291
10 year 600 minute winter	10.720	4.291
10 year 720 minute summer	13.925	3.732
10 year 720 minute winter	9.358	3.732

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 960 minute summer	11.365	2.993
10 year 960 minute winter	7.528	2.993
10 year 1440 minute summer	8.174	2.191
10 year 1440 minute winter	5.493	2.191
10 year 2160 minute summer	5.799	1.603
10 year 2160 minute winter	3.996	1.603
10 year 2880 minute summer	4.788	1.283
10 year 2880 minute winter	3.218	1.283
10 year 4320 minute summer	3.587	0.938
10 year 4320 minute winter	2.362	0.938
10 year 5760 minute summer	2.932	0.751
10 year 5760 minute winter	1.898	0.751
10 year 7200 minute summer	2.475	0.631
10 year 7200 minute winter	1.597	0.631
10 year 8640 minute summer	2.148	0.548
10 year 8640 minute winter	1.387	0.548
10 year 10080 minute summer	1.906	0.486
10 year 10080 minute winter	1.230	0.486
30 year 15 minute summer	268.706	76.035
30 year 15 minute winter	188.566	76.035
30 year 30 minute summer	174.929	49.499
30 year 30 minute winter	122.757	49.499
30 year 60 minute summer	116.589	30.811
30 year 60 minute winter	77.459	30.811
30 year 120 minute summer	70.438	18.615
30 year 120 minute winter	46.797	18.615
30 year 180 minute summer	53.298	13.715
30 year 180 minute winter	34.645	13.715
30 year 240 minute summer	41.604	10.995
30 year 240 minute winter	27.641	10.995
30 year 360 minute summer	31.221	8.034
30 year 360 minute winter	20.295	8.034
30 year 480 minute summer	24.324	6.428
30 year 480 minute winter	16.160	6.428
30 year 600 minute summer	19.756	5.404
30 year 600 minute winter	13.498	5.404
30 year 720 minute summer	17.490	4.687
30 year 720 minute winter	11.754	4.687
30 year 960 minute summer	14.215	3.743
30 year 960 minute winter	9.416	3.743
30 year 1440 minute summer	10.161	2.723
30 year 1440 minute winter	6.829	2.723
30 year 2160 minute summer	7.160	1.979
30 year 2160 minute winter	4.933	1.979
30 year 2880 minute summer	5.883	1.577
30 year 2880 minute winter	3.953	1.577
30 year 4320 minute summer	4.374	1.143
30 year 4320 minute winter	2.880	1.143
30 year 5760 minute summer	3.554	0.910
30 year 5760 minute winter	2.301	0.910
30 year 7200 minute summer	2.987	0.762
30 year 7200 minute winter	1.928	0.762

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 8640 minute summer	2.583	0.659
30 year 8640 minute winter	1.667	0.659
30 year 10080 minute summer	2.284	0.583
30 year 10080 minute winter	1.474	0.583
100 year 15 minute summer	348.738	98.681
100 year 15 minute winter	244.728	98.681
100 year 30 minute summer	228.965	64.789
100 year 30 minute winter	160.677	64.789
100 year 60 minute summer	153.288	40.510
100 year 60 minute winter	101.841	40.510
100 year 120 minute summer	92.562	24.461
100 year 120 minute winter	61.496	24.461
100 year 180 minute summer	69.806	17.964
100 year 180 minute winter	45.376	17.964
100 year 240 minute summer	54.269	14.342
100 year 240 minute winter	36.055	14.342
100 year 360 minute summer	40.484	10.418
100 year 360 minute winter	26.315	10.418
100 year 480 minute summer	31.414	8.302
100 year 480 minute winter	20.871	8.302
100 year 600 minute summer	25.431	6.956
100 year 600 minute winter	17.376	6.956
100 year 720 minute summer	22.452	6.017
100 year 720 minute winter	15.089	6.017
100 year 960 minute summer	18.166	4.784
100 year 960 minute winter	12.033	4.784
100 year 1440 minute summer	12.896	3.456
100 year 1440 minute winter	8.667	3.456
100 year 2160 minute summer	9.021	2.493
100 year 2160 minute winter	6.216	2.493
100 year 2880 minute summer	7.371	1.975
100 year 2880 minute winter	4.954	1.975
100 year 4320 minute summer	5.435	1.421
100 year 4320 minute winter	3.579	1.421
100 year 5760 minute summer	4.390	1.124
100 year 5760 minute winter	2.841	1.124
100 year 7200 minute summer	3.670	0.936
100 year 7200 minute winter	2.368	0.936
100 year 8640 minute summer	3.160	0.806
100 year 8640 minute winter	2.039	0.806
100 year 10080 minute summer	2.784	0.710
100 year 10080 minute winter	1.797	0.710
100 year +40% CC 15 minute summer	488.233	138.153
100 year +40% CC 15 minute winter	342.620	138.153
100 year +40% CC 30 minute summer	320.551	90.705
100 year +40% CC 30 minute winter	224.948	90.705
100 year +40% CC 60 minute summer	214.603	56.713
100 year +40% CC 60 minute winter	142.577	56.713
100 year +40% CC 120 minute summer	129.587	34.246
100 year +40% CC 120 minute winter	86.094	34.246
100 year +40% CC 180 minute summer	97.729	25.149
100 year +40% CC 180 minute winter	63.526	25.149

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 240 minute summer	75.977	20.078
100 year +40% CC 240 minute winter	50.477	20.078
100 year +40% CC 360 minute summer	56.677	14.585
100 year +40% CC 360 minute winter	36.841	14.585
100 year +40% CC 480 minute summer	43.979	11.622
100 year +40% CC 480 minute winter	29.219	11.622
100 year +40% CC 600 minute summer	35.604	9.738
100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 960 minute summer	25.432	6.697
100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 1440 minute winter	12.134	4.839
100 year +40% CC 2160 minute summer	12.630	3.490
100 year +40% CC 2160 minute winter	8.702	3.490
100 year +40% CC 2880 minute summer	10.319	2.766
100 year +40% CC 2880 minute winter	6.935	2.766
100 year +40% CC 4320 minute summer	7.609	1.989
100 year +40% CC 4320 minute winter	5.011	1.989
100 year +40% CC 5760 minute summer	6.145	1.573
100 year +40% CC 5760 minute winter	3.978	1.573
100 year +40% CC 7200 minute summer	5.137	1.311
100 year +40% CC 7200 minute winter	3.316	1.311
100 year +40% CC 8640 minute summer	4.424	1.129
100 year +40% CC 8640 minute winter	2.855	1.129
100 year +40% CC 10080 minute summer	3.897	0.994
100 year +40% CC 10080 minute winter	2.515	0.994

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	39.535	0.035	2.2	0.0000	0.0000	OK
15 minute winter	2	13	39.637	0.037	2.2	0.0058	0.0000	OK
15 minute winter	3	13	39.921	0.321	6.8	1.2316	0.0000	SURCHARGED
30 minute winter	4	22	39.922	0.172	2.3	0.0475	0.0000	SURCHARGED
30 minute winter	5	22	39.922	0.172	2.3	0.0475	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	2	1.002	1	2.2	0.880	0.257	0.0125	3.1
15 minute winter	3	Orifice	2	2.2				
30 minute winter	4	1.000	3	2.0	0.381	0.122	0.1968	
30 minute winter	5	2.000	3	2.0	0.334	0.098	0.1968	

Results for 10 year Critical Storm Duration. Lowest mass balance: 99.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	24	39.537	0.037	2.5	0.0000	0.0000	OK
30 minute winter	2	24	39.639	0.039	2.5	0.0063	0.0000	OK
30 minute winter	3	24	39.992	0.392	10.8	4.0736	0.0000	SURCHARGED
30 minute winter	4	24	39.992	0.242	4.5	0.0671	0.0000	SURCHARGED
30 minute winter	5	24	39.992	0.242	4.5	0.0671	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	2	1.002	1	2.5	0.908	0.291	0.0137	8.0
30 minute winter	3	Orifice	2	2.5				
30 minute winter	4	1.000	3	4.3	0.408	0.255	0.1968	
30 minute winter	5	2.000	3	4.3	0.339	0.208	0.1968	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	26	39.538	0.038	2.7	0.0000	0.0000	OK
30 minute winter	2	26	39.641	0.041	2.7	0.0065	0.0000	OK
30 minute winter	3	25	40.037	0.437	13.7	5.8595	0.0000	SURCHARGED
30 minute winter	4	26	40.037	0.287	5.7	0.0795	0.0000	SURCHARGED
30 minute winter	5	26	40.037	0.287	5.7	0.0795	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	2	1.002	1	2.7	0.923	0.311	0.0144	10.3
30 minute winter	3	Orifice	2	2.7				
30 minute winter	4	1.000	3	5.4	0.460	0.322	0.1968	
30 minute winter	5	2.000	3	5.4	0.399	0.262	0.1968	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	47	39.540	0.040	2.9	0.0000	0.0000	OK
60 minute winter	2	46	39.643	0.043	2.9	0.0068	0.0000	OK
60 minute winter	3	46	40.106	0.506	11.5	8.6310	0.0000	SURCHARGED
60 minute winter	4	46	40.106	0.356	4.8	0.0987	0.0000	SURCHARGED
60 minute winter	5	46	40.106	0.356	4.8	0.0987	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	2	1.002	1	2.9	0.943	0.339	0.0154	16.9
60 minute winter	3	Orifice	2	2.9				
60 minute winter	4	1.000	3	4.6	0.425	0.272	0.1968	
60 minute winter	5	2.000	3	4.6	0.394	0.222	0.1968	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	49	39.543	0.043	3.3	0.0000	0.0000	OK
60 minute winter	2	49	39.647	0.047	3.3	0.0074	0.0000	OK
60 minute winter	3	49	40.236	0.636	16.0	13.8546	0.0000	SURCHARGED
60 minute winter	4	48	40.236	0.486	6.7	0.1347	0.0000	SURCHARGED
60 minute winter	5	48	40.236	0.486	6.7	0.1347	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	2	1.002	1	3.3	0.974	0.386	0.0170	23.7
60 minute winter	3	Orifice	2	3.3				
60 minute winter	4	1.000	3	6.4	0.408	0.379	0.1968	
60 minute winter	5	2.000	3	6.4	0.384	0.309	0.1968	

Appendix D: SuDS Maintenance Report

JOMAS ENGINEERING ENVIRONMENTAL

WE LISTEN, WE PLAN, WE DELIVER
Geotechnical Engineering and Environmental Services across the UK.

DRAINAGE MAINTENANCE PLAN

48 Warren Rd, Ickenham

JOMAS ASSOCIATES LTD
Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ
www.jomasassociates.com info@jomasassociates.com

Report Title: **DRAINAGE AND SUDS MAINTENANCE PLAN**

Report Status: **Final v1.0**

Job No: **P1173JJ1219**

Date: **18.07.23**

Control: Previous Release

Version	Date	Issued By
V1.0	18-07-23	A Wallace

Prepared by: **JOMAS ASSOCIATES LTD** for Parmar Ventures Ltd

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

info@jomasassociates.com

1.0 GENERAL

1.1 Sustainable Drainage Systems (SuDS) are an environmentally friendly approach to managing rainfall. SuDS techniques use landscape features to deal with surface water with the aim to:

1.1.1 Control the flow, volume and frequency of water leaving a development.

1.1.2 Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.

1.1.3 Provide attractive surroundings for the community.

1.2 The surface water drainage strategy for this development utilises permeable paving as the main SUDS feature. The following sections provides a brief description of these features and outlines the maintenance programme that should be adopted.

2.0 CLEANING OF THE DRAINAGE SYSTEM

2.1 Drainage systems should be inspected at regular intervals and where necessary, thoroughly cleaned out at the same time. Any defects discovered should be made good.

2.2 The following operations should be carried out during the periodic cleaning of a drainage system:-

Product Type	Period	Responsibility	Maintenance Methods
Silt Trap	As necessary and before wet season	Owner/ Maintenance Company	• Sediment and debris that accumulated during summer needs to be removed before the wet season. • Inspect and clean out routinely prior to inlet pipework to minimise debris reaching the tank. • Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.
Standard Manholes/ Inspection Chambers	As necessary	Owner/ Maintenance Company	• Remove and clean any soil and vegetation that covers the manhole cover to prevent blockage of the drainage system at the manhole.

Product Type	Period	Responsibility	Maintenance Methods
			• Renew/replace any damaged/missing bolts and damaged/missing manhole covers.
Drainage Pipes	Six monthly interval	Owner/ Maintenance Company	• Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.
Orifice Plate	Monthly for 3 months	Owner/ Maintenance Company	• Inspect and identify any areas that are not operating correctly. If required, take remedial action.
	Monthly	Owner/ Maintenance Company	• Debris removal from catchment surface (where may cause risks to performance).
	Annually	Owner/ Maintenance Company	• Remove sediment from pre-treatment structures.
	Annually and after large storms	Owner/ Maintenance Company	• Inspection/check all inlets and outlets to ensure that they are in good condition and operating as designed.
Permeable Paving	Monthly for 3 months	Owner/ Maintenance Company	• Inspect and identify any areas that are not operating correctly. If required, take remedial action.
	Monthly	Owner/ Maintenance Company	• Debris removal from catchment surface (where may cause risks to performance).
	Annually	Owner/ Maintenance Company	• Remove sediment from pre-treatment structures.
	Annually and after large storms	Owner/ Maintenance Company	• Inspection/check all inlets and outlets to ensure that they are in good condition and operating as designed.
Rainwater Tank	Monthly for 3 months	Owner/ Maintenance Company	• Inspect and identify any areas that are not operating correctly. If required, take remedial action.

Product Type	Period	Responsibility	Maintenance Methods
	Monthly	Owner/ Maintenance Company	• Debris removal from catchment surface (where may cause risks to performance).
	Annually	Owner/ Maintenance Company	• Remove sediment from pre-treatment structures.
	Annually and after large storms	Owner/ Maintenance Company	• Inspection/check all inlets and outlets to ensure that they are in good condition and operating as designed.

3.0 SKETCHES AND PLANS

The locations of the above features can be found by examining Drawing P1173JJ1219-C01

JOMAS ENGINEERING ENVIRONMENTAL

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

Construction Enquirer Awards
BEST CONSULTANT TO WORK FOR
WINNER

Constructionline
Gold Member

SSIP SAFETY SCHEMES IN PROCUREMENT
Acclaim Accreditation

CSCS

CEnv
Chartered Environmentalist

National Quality Mark Scheme for Land Contamination Management

The Chartered Institution of Wastes Management

silc
SPECIALIST IN LAND CONDITION

The Geological Society

IEMA
Transforming the world to sustainability

JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex

Salisbury Rd

Uxbridge

UB8 2RZ

CONTACT US

Website: www.jomasassociates.com

Tel: 0333 305 9054

Email: info@jomasassociates.com