mason navarro pledge

Bancroft Court
Hitchin
Hertfordshire SG5 1LH

Telephone: 01462 632012
Email: office@mnp.co.uk
www.mnp.co.uk

DRAINAGE STRATEGY REPORT

AT

SOHO FARMHOUSE – GYM EXTENSION

REF: 219467 – C – RP005 – P01

JUNE 2021

CONTENTS

APPENDICES

Report prepared by:

Andrew Quinn
BEng (Hons)
Project Engineer

1. INTRODUCTION

1.1. Mason Navarro Pledge Ltd have been commissioned by Soho House Group to develop a surface & foul water drainage strategy for the proposed extension to the existing gym building at Soho Farmhouse in Great Tew, Oxfordshire.

1.2. The purpose of this report is to demonstrate that a viable and sustainable strategy for the management and disposal of surface water runoff with climate change allowances for the development can be achieved whilst simultaneously achieving a viable solution for foul water disposal.

1.3. This report has been prepared using the following data/information from various sources including:

- The Flood Risk and Flood Zone Maps published by the Environment Agency (EA);
- Geological information published on the British Geological Survey (BGS) website;
- West Oxfordshire District Council Local Plan 2031, September 2018;
- Proposed & Existing Plans by 31/44 Architects;
- GEA Ground Investigation Report Ref J14011 Dated February 2014;
- Hill Groundworks Infiltration testing results dated 12th February 2021

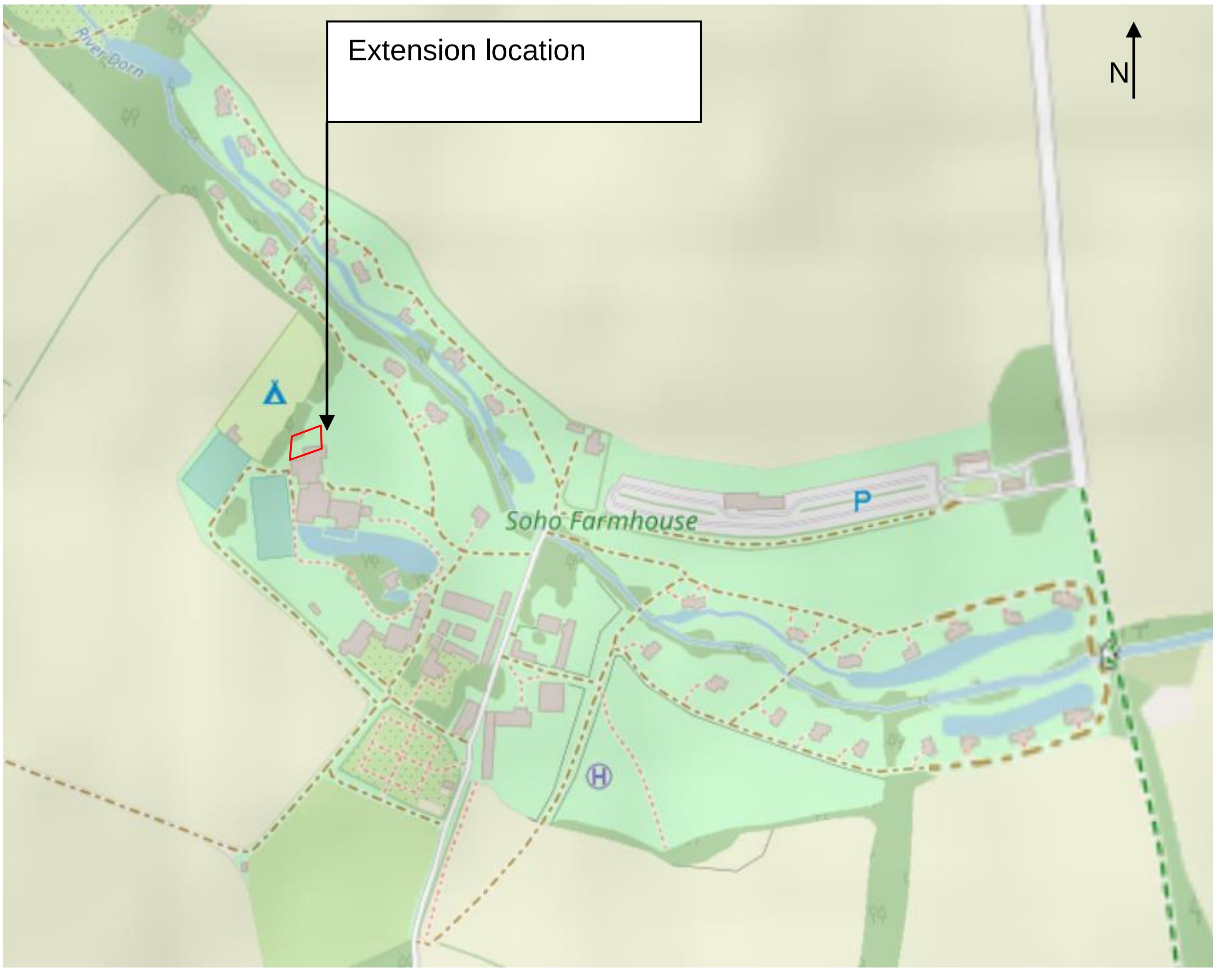
1.4. This report has been prepared by Andrew Quinn BEng (Hons).

2. SITE CONDITIONS

SITE LOCATION & USE

2.1. The 0.0308Ha (308sqm) extension is located within the demise of the Soho Farmhouse hotel & leisure facility. Soho Farmhouse is a hotel & leisure facility located between Great Tew and Enstone, approximately 8 kilometres to the east of Chipping Norton within the northern portion of the West Oxfordshire District, Oxfordshire.

FIGURE 1: SITE LOCATION PLAN



Soho Farmhouse is located off Tracey Lane, Great Tew, Oxfordshire, OX7 4JS. The Gym is located to the east of the complex. Please refer to the overall site plan in Appendix A and Appendix B for an existing plan of the gym.

SITE GEOLOGY

2.2. The conditions at the site are detailed below in Table 1 and are based on the findings noted on the British Geological Survey (BGS) Viewer this is concurrent with the information provided in the GEA Ground Investigation Report. The focus of a study on geology is to examine the potential movement of water through the local geology.

TABLE 1: GEOLOGICAL GROUND CONDITIONS

Formation	**Description**
Superficial Deposits (Drift Deposits)	In accordance with the BGS viewer there are no superficial deposits within the confines of the site boundary.
Bedrock	Sharp's Hill Formation - Varied sequence of greenish grey, silty, moderately shelly and calcareous mudstones, pale greenish grey shelly marls and fine-grained shelly limestones with marine and freshwater faunas

2.3. GEA's Ground Investigation Report notes "No concentrations of contaminants are above typical 'normal background' concentrations."

SITE HYDROGEOLOGY

2.4. The hydrogeological features of the site are provided in summary in Table 2. Hydrogeological features of the site have been identified from the DEFRA Magic Map application.

TABLE 2: HYDROGEOLOGICAL GROUND CONDITIONS

Map Dataset	Designation	Comment
Groundwater Vulnerability Zone	High (Soluble Rock Risk)	This describes the vulnerability of the underlying groundwater body from activities carried out on the surface. High: areas able to easily transmit pollution to groundwater. They are characterised by high-leaching soils and the absence of low-permeability superficial deposits.
Aquifer Maps: Bedrock Deposits Designation	Secondary A (Sharps Hill Formation)	These are Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
	Principal (Chipping Norton Formation)	These are layers of rock high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Aquifer Maps: Superficial Deposits Designation	Unproductive	This identifies the type of aquifer present in the permeable unconsolidated (loose) deposits. Unproductive: These rocks have negligible significance for water supply or baseflow. They consist of bedrock or superficial deposits with low permeability that naturally offer protection to any aquifers that may be present beneath.
Groundwater Source Protection Zone	None	Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. The closer the activity, the greater the risk of contamination. No designation means: no groundwater source zone is present.

2.5. A nearby BGS borehole Ref: SP42NW29 (Appendix C), dated August 2018 recorded the resting water level as 15 metres below existing ground level.

2.6. The GEA Ground Investigation Report notes “that groundwater was generally encountered as seepages and slow inflows.”

2.7. Soakage rate testing carried out on the site in accordance with BRE digest 365, indicates that the underlying soils exhibit a reasonable permeability of 1.42 x 10^{-5} m/s or greater. A copy of the results from the infiltration testing and the calculation of the associated infiltration rate are included as Appendix E.

2.8. The location of the infiltration testing is shown in Appendix E and on the proposed drainage plan in Appendix F and it can be seen that one of the test pit locations (pit 3) is located adjacent to the extension

2.9. All test pits were undertaken in accordance with the requirements of BRE digest 365.

3. PROPOSED DEVELOPMENT

3.1. The proposal for the site primarily consists of the erection of an extension to the existing gym building to house new plant. The extension extends over an area of 308m^2.

3.2. Refer to Appendix D for a copy of the Proposed Plan.

4. FLOOD RISK

4.1. The NPPF and the SFRA identifies several potential sources of flooding that must be considered when assessing flood risk, these are considered below in the following order:-

- Flooding from rivers (fluvial flooding)
- Flooding from the sea (tidal flooding)
- Flooding from land
- Flooding from reservoirs, canals, and other artificial sources

4.2. The assessment of flood risk in this report is based on the definitions in paragraph 65 of the Planning Practice Guidance, which recognises the following Flood Zones below in Table 3.

TABLE 3: FLOOD ZONE DEFINITIONS

Flood Zone	**Annual probability of river or sea flooding**
Zone 1 *Low Probability*	■ Land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%)
Zone 2 *Medium Probability*	■ Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or ■ Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a *High Probability*	■ Land having a 1 in 100 or greater annual probability of river flooding; or ■ Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b *The Functional Floodplain*	■ This zone comprises land where water has to flow or be stored in times of flood. ■ Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

FLOODING FROM RIVERS (FLUVIAL FLOODING) & SEA (TIDAL FLOODING)

4.3. The indicative flood maps published by the Environment Agency (EA) identify that the site is located within Flood Zone 1.

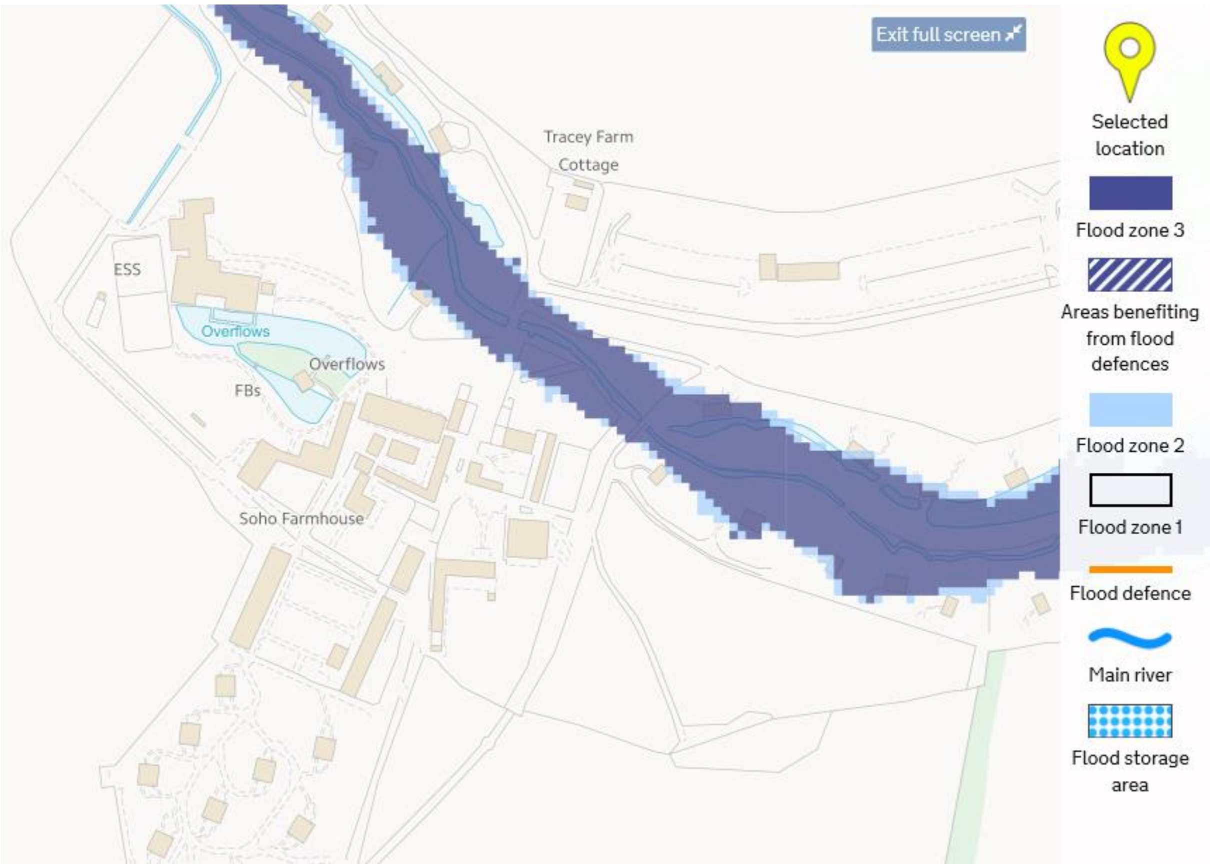


FIGURE 2: ENVIRONMENT AGENCY ONLINE FLOOD MAP EXTRACT

4.4. In summary the site is considered to be at very low risk of flooding from rivers and seas.

FLOODING FROM SURFACE WATER

4.5. The EA Risk of Flooding from Surface Water map is published on their website to identify areas potentially at risk of flooding from surface water. This mapping identifies overland flow and surface water flooding which typically arises following periods of intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems, it can run quickly off land and result in localised flooding.

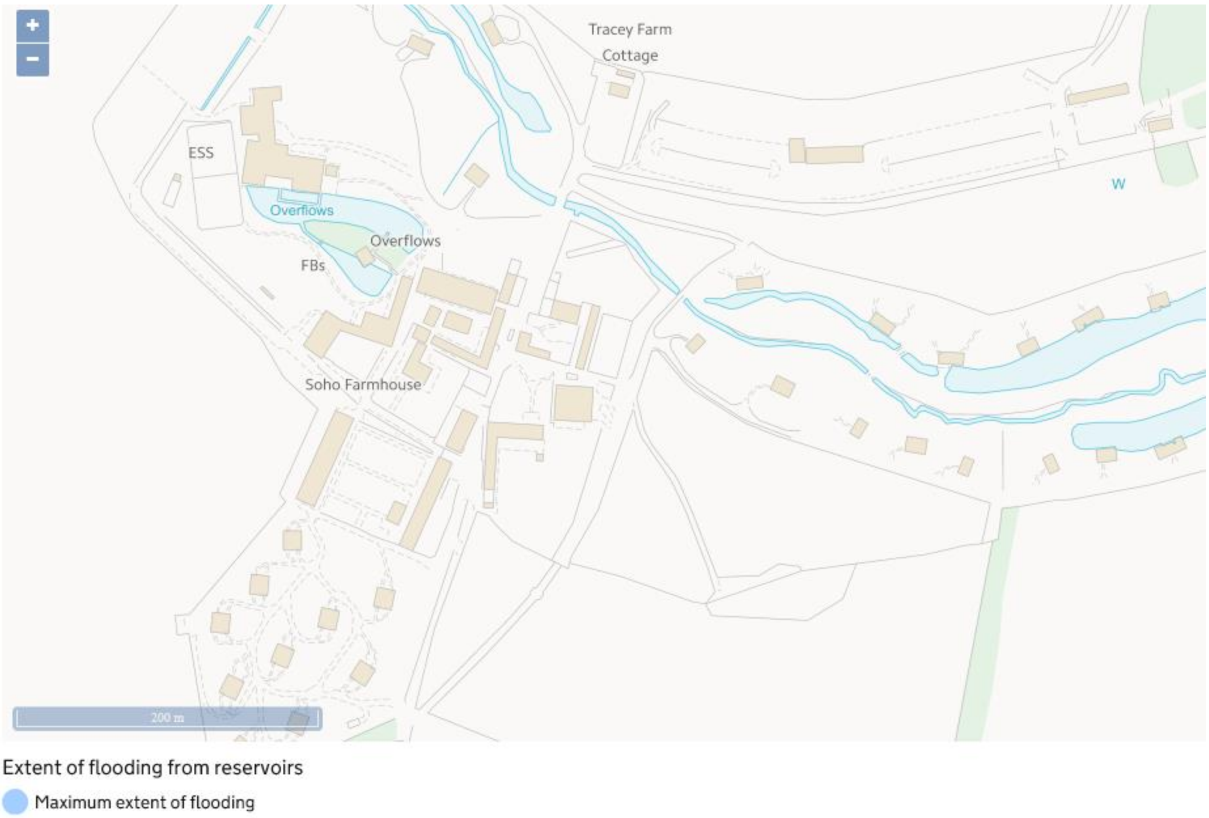
FIGURE 3: ENVIRONMENT AGENCY ONLINE FLOOD MAP EXTRACT

4.6. In summary the area where the extension is to be sited is deemed at very low risk of flooding from surface water.

FLOODING FROM RESERVOIRS

4.7. The EA Risk of Flooding from Reservoirs Map is published on their website to identify areas potentially at risk of flooding from large reservoirs (>25,000 m^3 of water), if they were to fail and release the water they hold. It does not display data for smaller reservoirs.

FIGURE 4: ENVIRONMENT AGENCY ONLINE FLOOD MAP EXTRACT



4.8. The EA Risk of Flooding from Reservoirs Map notes no large reservoirs that may affect the site in a breach event.

5. SURFACE WATER DRAINAGE DESIGN

EXISTING RUN-OFF RATES

5.1. The area where the extension is to be constructed is currently soft landscaping and is therefore classed as greenfield. Refer to the Existing layout Plan in Appendix B.

5.2. It is understood that the existing building surface water drains to a soakaway.

LOCAL CONSTRAINTS & PLANNING POLICIES

5.3. In conjunction with The West Oxfordshire Council Local Plan and The Oxfordshire County Council Local Standards and Guidance for Surface Water Drainage on Developments in Oxfordshire, the following policies are applicable to flood risk and drainage.

Policy EH7 of the Local Plan – Flood Risk

"In assessing proposals for a development:

- *Sustainable drainage systems to manage run-off and support improvements in water quality and pressures on sewer infrastructure will be integrated into the site design, maximising their habitat value and ensuring their long-term maintenance.*

Section 8.60 of the Local Plan – Flood Risk

Development should not result in an increase in surface-water run-off and, where possible, should demonstrate betterment in terms of rate and volumes of surface water.

Surface Water Guidance Document – Local Standard L6

Flow across the site must be diverted away from buildings and main access-egress routes. This flooding should be assessed to ascertain if it is safe for the sites users. All drainage schemes must suitably demonstrate that flooding will not occur to any habitable building for the worst case 1:100yr +40% climate change event.

Surface Water Guidance Document – Local Standard L8

Any infiltration storage features should be capable of half emptying within 24 hours of the rainfall event. This is to ensure capacity for further rainfall events.

Surface Water Guidance Document – Local Standard L13

Prior to discharge into any underground infiltration system, measures should be provided to remove silt, suspended or floating matter.

Surface Water Guidance Document – Local Standard L15

The designs of all elements of the surface water drainage system must be accompanied by a maintenance schedule that sets out how and when each element of the system should be inspected and maintained, who is responsible for the maintenance, and when each element may need replacement. The layout of the development must demonstrate that access for maintenance of all elements is possible.

Surface Water Guidance Document – Local Standard L20

To ensure protection of groundwater quality, there should be at least 1.0m between the maximum recorded groundwater level and the base of the infiltration system. The Environment Agency may have additional requirements.

Surface Water Guidance Document – Local Standard L21

Soakaways and other infiltration SuDS must not be constructed in contaminated ground.

CLIMATE CHANGE ALLOWANCES

5.4. DEFRA recommends an allowance of 20%-40% to be made to account for the increase in rainfall intensity. With reference to the Oxfordshire County Council local standard L6 requires (refer to section 5.5 of this report) an additional 40% for climate change where there is a habitable building. Although the proposal does not comprise of a habitable building a conservative allowance of 40% will be applied.

TABLE 6: PEAK RAINFALL INTENSITY CLIMATE CHANGE ALLOWANCE

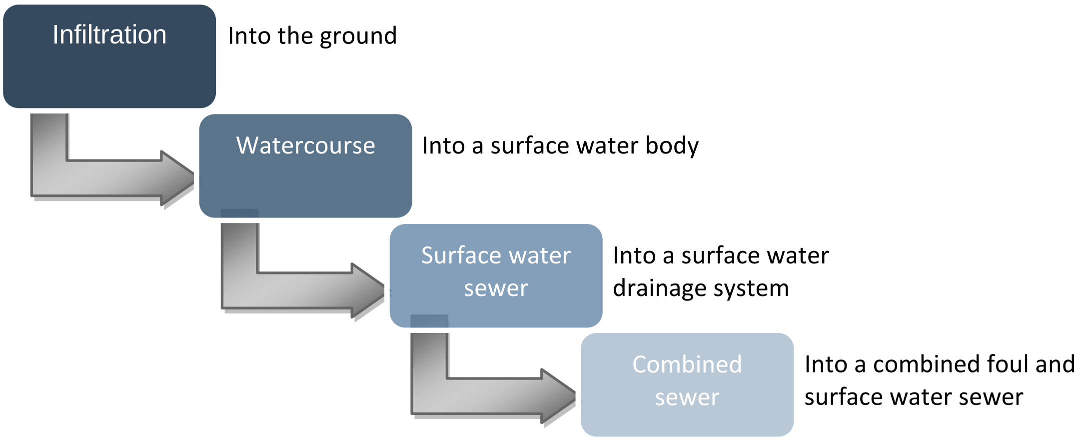
Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

5.5. The drainage assessment in this report will ensure that any proposals for additional drainage are assessed and mitigated, against flood risk, and incorporate good SuDS practices where possible.

PROPOSED SURFACE WATER DRAINAGE

5.6. The aim of sustainable drainage systems is to dispose of surface water using the following hierarchy where reasonably practicable.

FIGURE 5: SURFACE WATER DISPOSAL HIERARCHY



5.7. With reference to Section 5.2, it is understood that the existing building drains to a soakaway.

5.8. In line with the surface water disposal hierarchy above this is the most viable and sustainable method of discharging surface water.

5.9. As outlined in section 5.1, the developable site is classified as ‘Greenfield’. It is proposed that the proposed extension will drain to a new suitably sized soakaway.

5.10. Given the underlying geology and hydrogeology and the Infiltration testing carried out on the site, it can be seen that the underlying soils exhibit a permeability of 1.42 x 10^{-5} m/s and therefore the use of infiltration drainage is viable for the development. A copy of the results from the infiltration testing and the calculation of the associated infiltration rate are included as Appendix E.

5.11. 3no. infiltration tests were undertaken at the soakaway location on the site. The rate obtained from the test for pit 1(Pit 1) was used in the drainage calculations to size the proposed soakaway for the extension.

5.12. A storage calculation has been run for the extension, where a geo-cellular infiltration tank 4m x 6m by 1.0m deep will provide the required storage prior to discharge via infiltration for all events up to and including the 1 in 100-year event plus a 40% allowance for climate change. Please refer to Appendix G for a copy of the surface water drainage calculations.

5.13. Should the drainage system serving the building become overwhelmed then the exceedance flood flow routes have been shown on the proposed drainage strategy in appendix F, any overland flow will generally run to the low point of the site with the building being set above the surrounding ground level so it is protected, in addition there is a significant area of soft landscaping on the site that will assist in containing any overland flow.

6. FOUL WATER DRAINAGE DESIGN

6.1. The foul water from the existing gym area drains to a pump chamber where it is pumped up to the on-site sewerage treatment plant. The location of the existing foul drainage manhole is shown on the proposed drainage layout drawing contained in Appendix F

6.2. Any foul drainage generated is to discharge in to the nearby existing below ground system system.

6.3. Given the nominal flow anticipated from the extension to the gym area (condensate drainage and plant room gullies) there is no issue with capacity of the existing drainage system serving the site.

6.4. Refer to Appendix F for a proposed Drainage General Arrangement drawing.

7. SUDS MAINTENANCE AND MANAGEMENT

7.1. The responsibility for the enacting of this SuDS Maintenance and Management Plan will be the responsibility of the property owner.

CATCHPITS/PIPES/MANHOLES

7.2. All components are to be periodically cleaned of foreign particles and silt accumulation. Components located in un-adopted areas will be maintained by the landowner. Those located in adopted areas will be maintained by the adopting authority.

CONSTRUCTION PHASE

7.3. **Sediment** - During the construction phase sediment is one of the major sources of construction site pollution.

7.4. The effects of erosion on a stockpile will depend on the type of material being stored. Fine sand and topsoil stockpiles will be eroded far more readily than heavy granular materials. Stockpiles should be located away from a watercourse or site drainage system. Protective coverings will help prevent runoff stripping the stockpile.

7.5. Sediment controls used during construction include straw bale barriers, geotextile silt fences and sediment basins. The type of sediment control system to be used depends on the catchment area and the site slope.

7.6. Plant and wheel washing should take place in designated locations. The area should be tanked and should not be allowed to discharge into a watercourse or infiltrate groundwater, as the wastewater from these devices is highly contaminated with silts, sands and hydrocarbons. The solid waste materials from this process need to be treated as contaminated waste due to the high hydrocarbon content.

7.7. **Oils & Hydrocarbons** - The use of oils and hydrocarbons on construction sites creates an inherent risk of leakages and spillages, which could potentially lead to pollution incidents.

7.8. Simple measures can be taken to prevent oil and hydrocarbons becoming entrained in surface runoff, such as:

- appropriate maintenance of machinery and plant
- drip trays
- regular checking of machinery and plant for oil leaks
- correct storage facilities
- checking for signs of wear and tear on tanks
- care with specific procedures when refuelling

- designated areas for refuelling
- emergence spill kit located near refuelling area
- regular emptying of bunds
- tanks located in secure areas to stop vandalism

8. RECOMMENDATIONS AND CONCLUSIONS

8.1. The proposal for the site primarily consists of the extension to the existing gym building to provide extra flexible studio space and to house storage and plant facilities.

8.2. Conditions at the site are based on the findings noted on the British Geological Survey (BGS) Viewer, where the site is underlain by no superficial deposits, a Sharp's Hill formation and Chipping Norton Limestone bedrock.

8.3. The proposed site is not located in a groundwater source protection zone. It is located within a 'Secondary A' & 'Principal' aquifer designation for bedrock deposits and a 'Unproductive' designation for superficial deposits. The site is also located over a high (soluble rock risk) groundwater vulnerability zone.

8.4. The proposed development site is located within Flood Zone 1. The EA published flood risk from surface water map shows that there is a very low risk of flood, and the site is outside the maximum extent area in the event of a breach of any reservoirs.

8.5. Oxfordshire County Council local standard L6 requires an additional 40% for climate change where there is a habitable building. Although the proposal does not comprise of a habitable building a conservative allowance of 40% will be applied.

8.6. The existing site consists of soft landscaping with the new building extending over an area of 308m^2.

8.7. It is understood that the existing gym building currently drains to a soakaway.

8.8. In line with the surface water disposal hierarchy the most viable method to suit the proposed extension is to provide a new soakaway picking up the additional roof area.

8.9. Infiltration testing undertaken at the site confirms the underlying soils exhibit a permeability of 1.42 x 10^{-5} m/s and therefore the use of infiltration drainage is viable for the development.

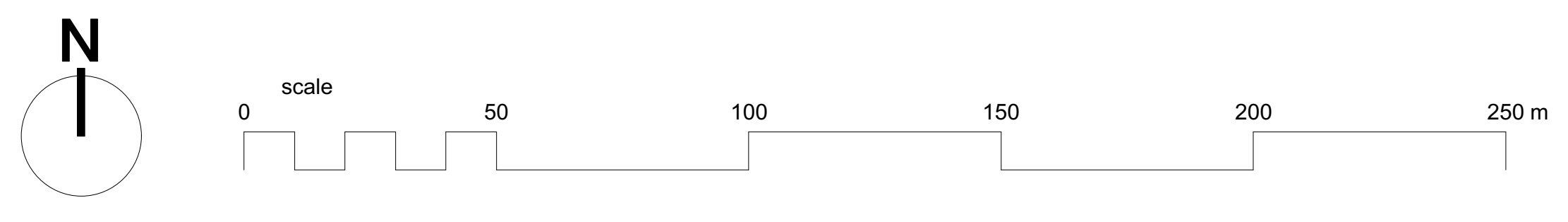
8.10. Foul water flows that are generated from the proposed development are to drain via gravity below ground and connect in to the existing foul water network next to the existing gym building.

8.11. The responsibility for the enacting of this SuDS Maintenance and Management Plan will be the responsibility of the property owner.

APPENDICES

APPENDIX A

Soho Farmhouse Master Plan



Revisions

Rev*	Phase 2 Landscape Masterplan	10/04/14
Rev A	Phase 2 Planning application	02/05/14
Rev B	Amended designs for cabins and ponds (draft)	13/04/15
Rev C	Revised design for sewage treatment plant, staff car park added, amendments to Barwell Barn, access track, farmhouse garden, kitchen garden, orchard & other minor landscape amendments	26/05/15
Rev D	Notes amended	27/05/15
Rev E	Western watercourse amended	29/05/15
Rev F	Updated to incorporate approved changes to main car park, check-in area, gym, ice rink, tennis courts, electric barn, farmhouse garden, main courtyard, staff car park, & LPG tanks. New hay barn, stables, manege, teeny barn, teeny camp, crazy golf, cabin 31, check-out, farmhands luggage store. Also minor changes to landscape design including additional footpaths & fencing.	26.08.16
Rev G	Masterplan updated to show consented Walled Garden, Pig Arcs and New staff accomodation	27.11.17
Rev H	Masterplan updated to show overflow car park, amended main barn, piglets, walled garden, Teeny Barn, Hay Barn & Electric Barn	22.07.19
Rev i	New Staff Accomodation amended	11.09.19
Rev J	5 new cabins added	20.09.19
Rev K	Grow & Store & Farm Camp added, Main Barn & staff car park amended	10.09.20
Rev L	Farm Camp changed to Farmhouse Huts	17.12.20
Rev M	Boathouse and gym amended to as-built location	07.06.21
Rev N	Proposed gym extension added	07.06.21
Rev O	Updated tree survey for proposed gym extension	10.06.21

Portus+
Whitton
landscape architects

Portus+Whitton LLP
58 Ashcroft Road Cirencester
Gloucestershire GL7 1QX
T. 01285 644335 F. 01285 644336
E. contact@portusandwhitton.co.uk

client
SOHO HOUSE UK LTD

project
SOHO FARMHOUSE, TRACEY FARM, GREAT TEW

drg
Landscape Masterplan

scale	scale at size	date	project no.	prefix	drg no.	rev
1:1250	A0.	Apr '14	1351	L	10	O

purpose of issue
PLANNING

APPENDIX B

Existing Gym Plan

N

0 5 10 25m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

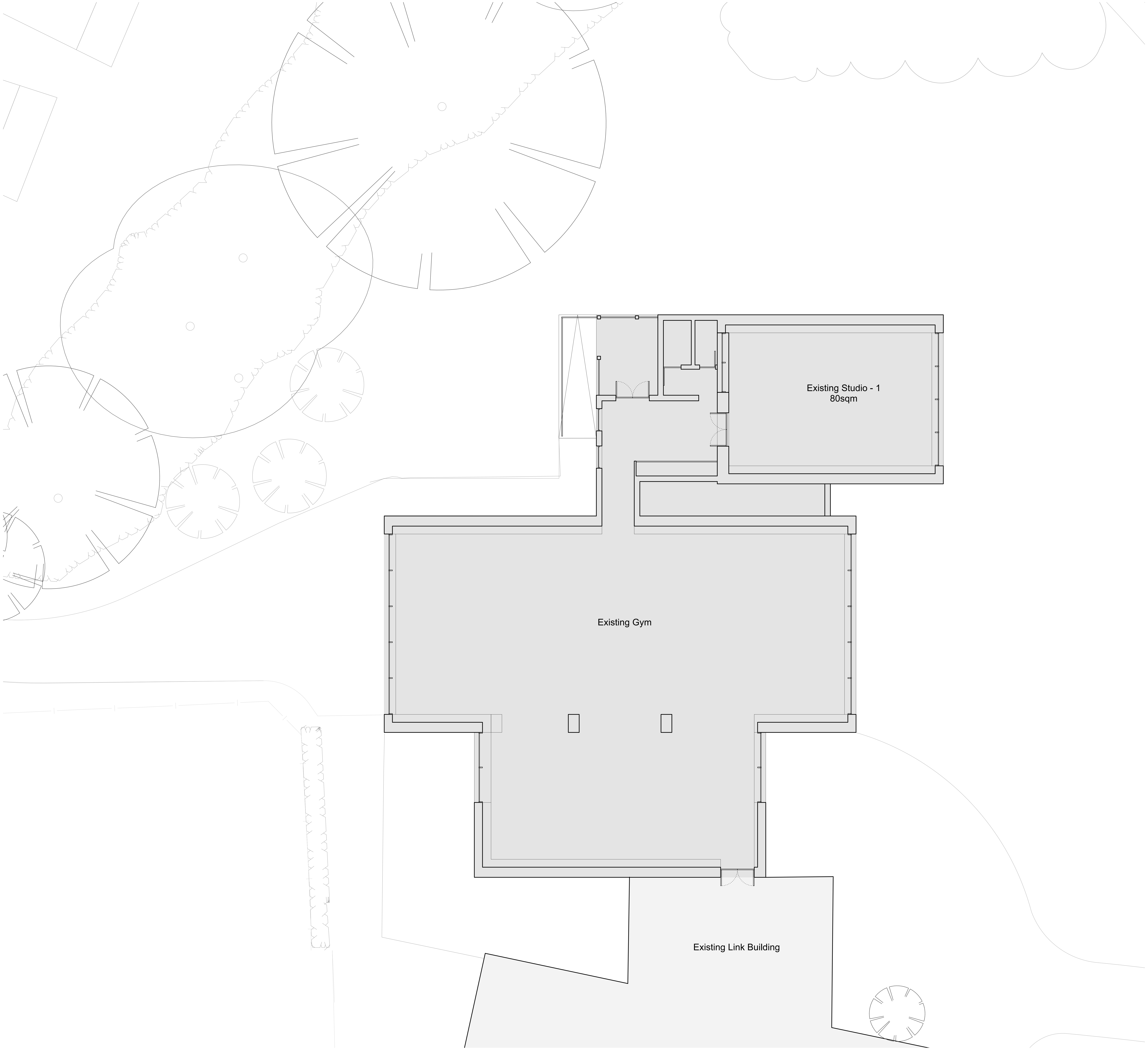
Drawn Checked
JF SD

Drawing name
Existing Site Plan

Scale / Format
1:500 / A3

Drawing number
44/2015/PL 000

Rev. Date	Description	Drawn / Checked



31/44
Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

Drawn JF
Checked SD

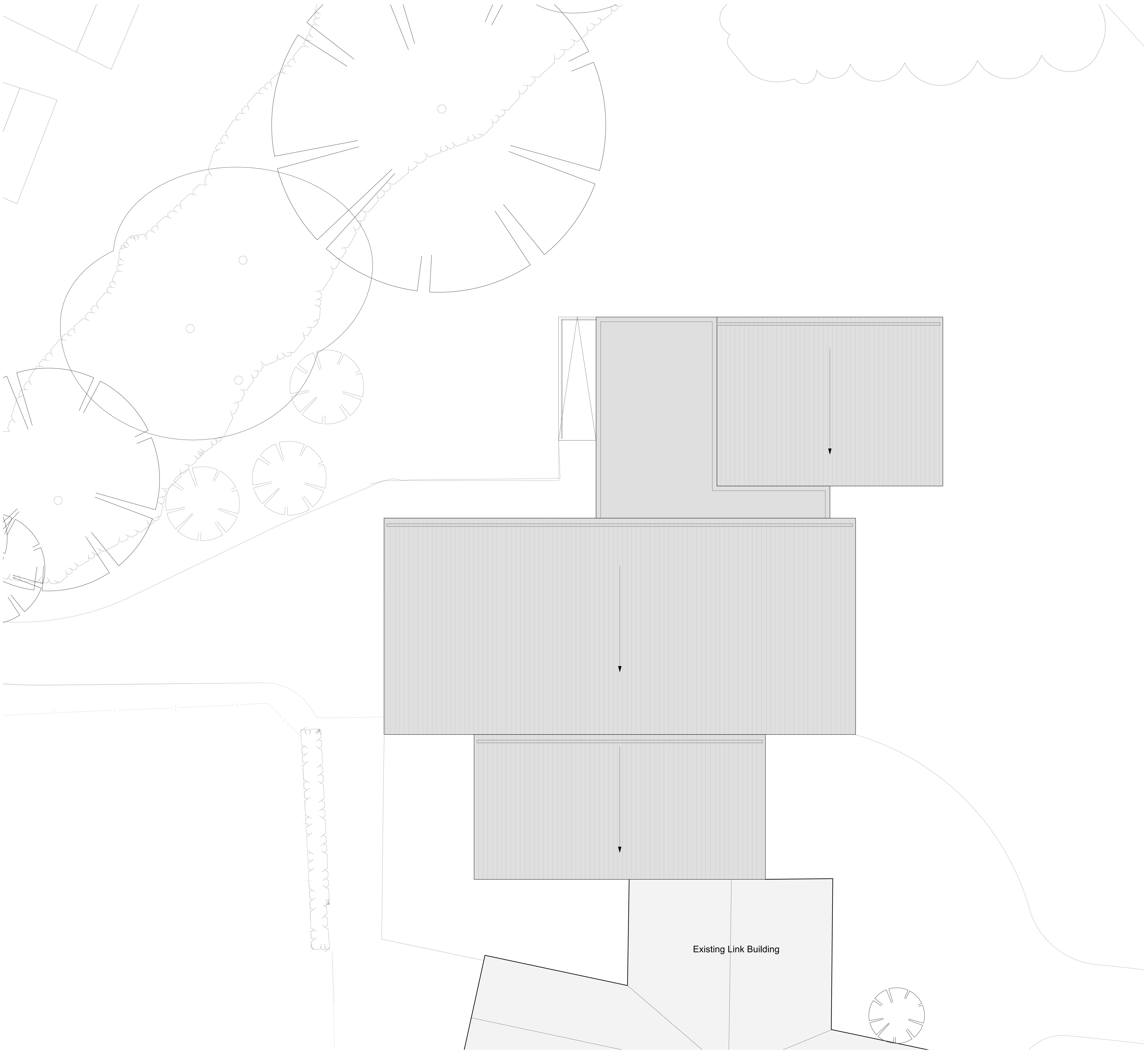
Drawing name
Existing Plan - Ground Floor

Scale / Format
1:100 / A1
1:200 / A3

Drawing number
44/2015/PL 001

Rev.	Date	Description	Drawn / Checked

Drawing may be scaled for planning purposes.



N

0 1 2.5 5m

31/44
Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

Drawn JF
Checked SD

Drawing name
Existing Plan - Roof

Scale / Format
1:100 / A1
1:200 / A3

Drawing number
44/2015/PL 002

Rev.	Date	Description	Drawn / Checked

Drawing may be scaled for planning purposes.

APPENDIX C

BGS Borehole Log

ENVIRONMENT AGENCY

Form WR – 38	*Ref: sp401 271 soho farmhouse, great tew (carter pumps) log 2737*	Agency No.

BOREHOLE RECORD

A. SITE DETAILS

Borehole drilled for:	Carlton Tarrant, Carter Pumps Ltd.			
Location:	Soho Farmhouse, Great Tew, Chipping Norton, Oxon, OX7 4NS			
N.G.R.:	SP401 271			
Ground Level (if known):	SURFACE			
Drilling Company:	W.B. & A.D. MORGAN LTD., PRESTEIGNE, POWYS. LD8 2UF			
Date of Drilling:	**Commenced:**	16/7/18	**Completed:**	13/8/18

B. CONSTRUCTION DETAILS

Borehole datum (if not ground level) GROUNDLEVEL
(Point from which all measurements of depth are taken e.g. flange, edge of chamber, etc.)

Borehole drilled diameter................		450	mm from	Surface	to	75	m/depth
			mm from		to		m/depth
			mm from		to		m/depth
Casing material: u.P.V.C. and type (e.g. plain steel, plastic slotted)	diameter	300	mm from	Surface	to	75	m/depth
Plain	diameter	300	mm from	Surface	to	38	m/depth
Slotted	diameter	300	mm from	38	to	72.5	m/depth
Plain	diameter	300	mm from	72.5	to	75	m/depth

Grouting details:	10m	to surface
Water struck at:	-	m (depth below datum – mbd)
Rest water level on completion:	15	m (depth below datum – mbd)
Estimated blowout yield:	2,000+	Gallons per hour

C. STRATA LOG

Description of Strata	**Thickness (m)**	**Depth (m)**
Weathered limestone	1	1
Grey clays	4	5
Yellow limestone	1	6
Grey clays	2	8
Yellow limestone	3	11
Grey clays	1	12
Yellow limestone	5	17
Grey clays	1	18
Yellow limestone	1	19
Grey clays	10	29
Grey gritty clay	2	31
Grey clays	7	38
Yellow limestone	7	45
Grey clays	6	51
Yellow limestone	2	53
Grey clays	22	75

Other Comments (e.g. gas encountered, saline water intercepted, etc.)		Mud flush drilled	
Gravel Pack Quantity:	8,750kg	Temp Steel Casing: Depth and Diameter	1.5m x 500mm
Cement:	1,350kg		
Rig & Crew:	Klemm 709, R. Mills, J. Scott		

APPENDIX D

Proposed Gym Plan

N

0 5 10 25m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

Drawn Checked
JF SD

Drawing name
Proposed Site Plan

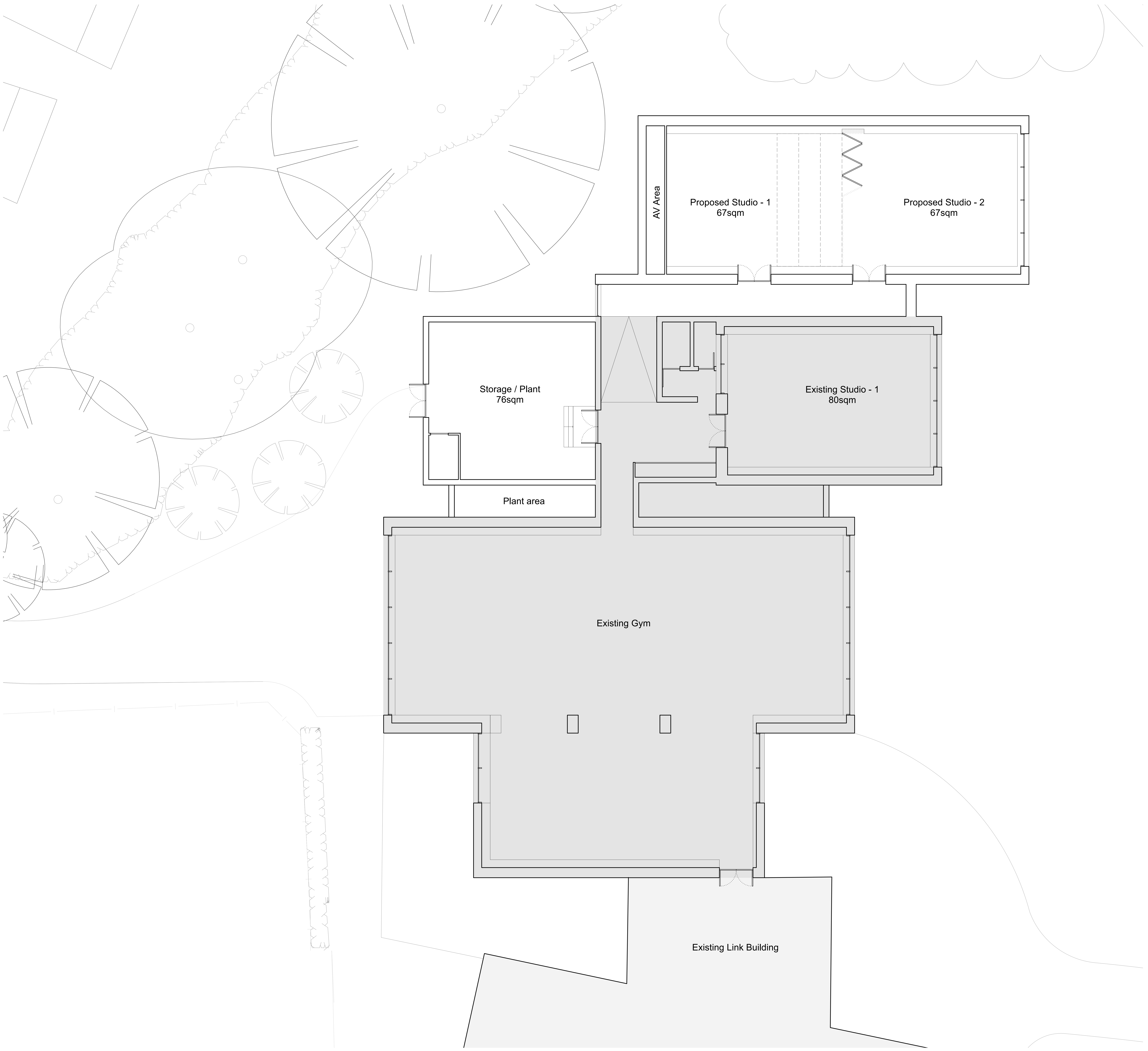
Scale / Format
1:500 / A3

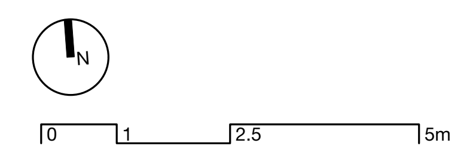
Drawing number
44/2015/PL 100

Rev. Date Description Drawn / Checked

Do not scale from this drawing.
All dimensions to be verified on site.
This drawing is to be read in conjunction with all consultants information.
Any discrepancies to be reported immediately to the Architect.

Drawing may be scaled for planning purposes.





31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

Drawn JF
Checked SD

Drawing name
Proposed Plan - Ground Floor

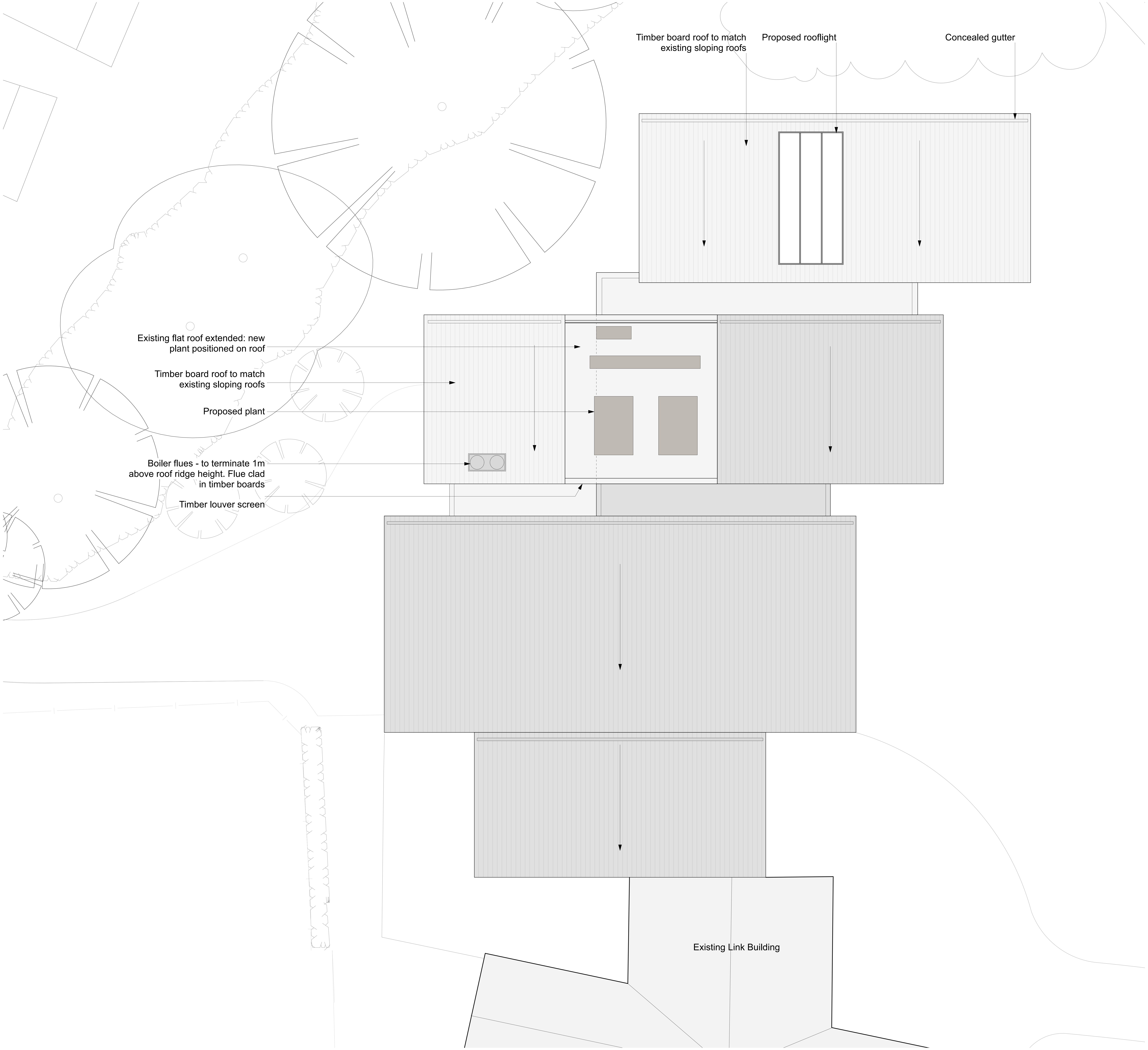
Scale / Format
1:100 / A1
1:200 / A3

Drawing number
44/2015/PL 101

Rev.	Date	Description	Drawn / Checked

Do not scale from this drawing.
All dimensions to be verified on site.
This drawing is to be read in conjunction with all consultants information.
Any discrepancies to be reported immediately to the Architect.

Drawing may be scaled for planning purposes.



N

0 1 2.5 5m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
Soho House Group

Project
Soho Farmhouse - Gym

Status

Date
03/06/2021

Drawn JF
Checked SD

Drawing name
Proposed Plan - Roof Floor

Scale / Format
1:100 / A1
1:200 / A3

Drawing number
44/2015/PL 102

Rev.	Date	Description	Drawn / Checked

Do not scale from this drawing.
All dimensions to be verified on site.
This drawing is to be read in conjunction with all consultants information.
Any discrepancies to be reported immediately to the Architect.

Drawing may be scaled for planning purposes.

APPENDIX E

Infiltration Test Results and Calculations

Soho Farmhouse Farm Camp Soakage Rate Calculations

In accordance with BRE Digest 365, 3 No soakage rate tests were undertaken at the site in three separate locations by Hill Groundworks

For each of the test locations the infiltration rate can be calculated as follows:

Pit 1

Using a 1000mm x 300mm x 300mm pit the worst time to drain with the 75% to 25% (150mm) being recorded as taking 148mins

Referring to BRE Digest 365, the infiltration rate can be calculated as follows:

Lower trail pit size 1.0m long x 0.3m wide x 0.3m deep.

Effective depth taken as 0.3m

Volume outgoing between 75% and 25% effective depth:

$V_{p75\text{-}25} = 1\text{x}0.3\text{x } 0.15 = 0.045\text{m}^3$

The mean surface area through which the outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit:

$a_{p50} = (0.3\text{x}0.15\text{x}2) + (0.3\text{x}0.15\text{x}2) + 1\text{x}0.3$

$a_{p50} = 0.48\text{m}^2$

The worst drain down time for the outflow between 75% and 25% effective depth tp75-25 was 148 minutes and therefore the soil infiltration rate can be calculated as follows;

Soil Infiltration Rate

$$f = \frac{V_{p75\text{-}25}}{a_{p50} \times t_{p75\text{-}25}}$$

$$f = \frac{0.045}{0.48 \times 148 \times 60} = \quad 1.056 \times 10^{-5} \text{ m/s or } 0.038 \text{ m/hour}$$

Pit 2

Using a 1000mm x 300mm x 300mm pit the worst time to drain with the 75% to 25% (150mm) being recorded as taking 130mins

Referring to BRE Digest 365, the infiltration rate can be calculated as follows:

Lower trail pit size 1.0m long x 0.3m wide x 0.3m deep.

Effective depth taken as 0.3m

Volume outgoing between 75% and 25% effective depth:

$V_{p75\text{-}25} = 1\text{x}0.3\text{x}\ 0.15 = 0.045\text{m}^3$

The mean surface area through which the outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit:

$a_{p50} = (0.3\text{x}0.15\text{x}2) + (0.3\text{x}0.15\text{x}2) + 1\text{x}0.3$

$a_{p50} = 0.48\text{m}^2$

The worst drain down time for the outflow between 75% and 25% effective depth tp75-25 was 130 minutes and therefore the soil infiltration rate can be calculated as follows;

Soil Infiltration Rate

$$f = \frac{V_{p75\text{-}25}}{a_{p50}\ \text{x}\ t_{p75\text{-}25}}$$

$$f = \frac{0.045}{0.48 \text{ x } 130 \text{ x } 60} = \quad 1.2 \text{ x } 10^{-5} \text{ m/s or } 0.043 \text{ m/hour}$$

Pit 3

Using a 1000mm x 300mm x 300mm pit the worst time to drain with the 75% to 25% (150mm) being recorded as taking 117mins

Referring to BRE Digest 365, the infiltration rate can be calculated as follows:

Lower trail pit size 1.0m long x 0.3m wide x 0.3m deep.

Effective depth taken as 0.3m

Volume outgoing between 75% and 25% effective depth:

V_{p75-25} = 1x0.3x 0.15 = 0.045m^3

The mean surface area through which the outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit:

a_{p50} = (0.3x0.15x2) + (0.3x0.15x2) +1x0.3

a_{p50} = 0.48m^2

The worst drain down time for the outflow between 75% and 25% effective depth tp75-25 was 117 minutes and therefore the soil infiltration rate can be calculated as follows;

Soil Infiltration Rate

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = \frac{0.045}{0.48 \times 117 \times 60} = \quad 1.42 \times 10^{-5} \text{ m/s or } 0.051 \text{ m/hour}$$

Pit 1 and Pit 2 were located within the Farm Camp Field and therefore the lowest rate obtained for these tests of 1.056x10^{-5} m/s has been used in the Microdrainage calculations to size the proposed soakaways for each unit.

The calculations show that a 2mx3mx0.5mdeep soakaway can easily accommodate the run off for all events up to an including the 1in 100-year storm event including 40% climate climate change storm event.

PIT 1

HILL GROUNDWORKS

BRE365 Permeability Test Result Form Date 12-02-21

Project SOHO FARMHOUSE, OX7 4JS – TENT FIELD NEW CABINS PROJECT

Weather conditions during test NO RAIN – DAMP

Description of Soil Excavated VERY WET – STONEY WITH CLAY POCKETS

Ground water level recorded NO G.W. DETECTED mm below Ground level 540 mm TO WATER LEVEL IN EXCAVATED PIT. (1000 LITRES)

Dimensions of hole LOWER HOLE 1000 mm long x 300 mm wide x 300 mm deep
UPPER HOLE 1000 " " x 1000 " " x 1500 mm DEEP.

1·0M3

\+ LOWER SUMP 300mm x 300mm x 1000mm LENGTH

Test 1 (10.02.21)

Time (minutes)	Depth (mm below GL)
258 MINS	540 MM
$\frac{258 \times 60}{960}$ =	16.12 Vp
94 MINS	300mm 90LITRES
	TIMED FOR 150MM DEPTH
	TOP 75mm + BOTTOM 75mm
	IGNORED FOR TEST TIME
∴ 94 mins	x 60 SECS
150mm	
= 37.6 Vp	

(SAME) + (SAME)

Test 2 (10. 02. 21)

Time (minutes)	Depth (mm below GL)
307 MINS	540 mm
$\frac{307 \times 60}{960}$ =	19.18 Vp
132 MINS	300 mm
	TIMED FOR MIDDLE
	150 mm FOR TEST
∴ 132 MINS	x 60 Secs
150 mm	
= 52.8 Vp.	

(SAME) + (SAME)

Test 3 (11. 02. 21)

Time (minutes)	Depth (mm below GL)
308 MINS	540 mm
$\frac{308 \times 60}{960}$ =	19.25 Vp
148 MINS	300 mm
	TIMED FOR 150 mm
	MIDDLE ZONE FOR TEST
∴ 148 MINS	x 60 SECS
150 mm	
= 59.2 Vp	

PIT SIZE IN VOLUME = 1·59 M3 – (1590 LITRES) – 1·0M3 (1000 LITRES) POURED INTO HOLE ON FIRST TEST AND SUBSEQUENT TESTS.
1500mm DEEP, LESS 540mm = 960mm LEVEL OF WATER IN PIT.

PIT 2

HILL GROUNDWORKS

BRE365 Permeability Test Result Form Date 12.02.21

Project SOHO FARMHOUSE, OX7 4JS – TENT FIELD NEW CABIN PROJECT

Weather conditions during test NO RAIN – DAMP

Description of Soil Excavated VERY WET – STONEY WITH CLAY POCKETS

Ground water level recorded NO. G.W. DETECTED mm below Ground level

540 mm TO WATER LEVEL FILLED INTO EXCAVATED PIT. (1000 LITRES)

Dimensions of hole LOWER HOLE 1000 mm long x 300 mm wide x 300 mm deep
UPPER HOLE 1000 " " x 1000 " " x 1500 " DEEP

Test 1 (10. 02.21) Test 2 (10. 02. 21) Test 3 (11. 02.21)

	Time (minutes)	Depth (mm below GL)		Time (minutes)	Depth (mm below GL)		Time (minutes)	Depth (mm below GL)
• 1.0 M3	288 MINS	540MM	• (SAME)	330	540	• (SAME)	320	540
	$\frac{288 \times 60}{960}$	= 18 Vp		$\frac{330 \times 60}{960}$	= 20.6 Vp		$\frac{320 \times 60}{960}$	= 20 Vp
+ LOWER SUMP TEST 300 MM x300MM x1000 LENGTH	112 MINS	300 MM DEPTH	+ (SAME)	118 MINS	300 MM	+ (SAME)	130 MINS	300 MM
		TIMED FOR 150MM DEPTH. THE TOP 75MM AND BOTTOM 75MM INGNORED FOR THE TEST TIME			TIMED FOR ~~MIDDLE~~ 150 MM ON THE TEST.			
	∴ 112 MINS x 60 SECS			∴ 118 MINS x 60 SECS			∴ 130 MINS x 60 SECS	
	150 MM			150 MM			150 MM	
	=	44.8 Vp		=	47.2 Vp		=	52 Vp

PIT SIZE VOLUME = (1500 LITRES) 1.59M3 – 1500MM DEEP, LESS 540 = 960 MM LEVEL OF WATER IN THE PIT.

1.0M3 (1000 LITRES) POURED INTO HOLE ON FIRST TEST AND SUBSEQUENT TESTS

HILL GROUNDWORKS

PIT 3

BRE365 Permeability Test Result Form Date 12.02.21

Project SOHO FARMHOUSE, OX7 4JS – TENT FIELD NEW CABIN PROJECT

Weather conditions during test NO RAIN – DAMP

Description of Soil Excavated VERY WET – STONEY (WITH SOME CLAY POCKETS)

Ground water level recorded NO G.W. DETECTED mm below Ground level 540 mm TO WATER LEVEL FILLED INTO EXCAVATED PIT (1000 LITRES)

Dimensions of hole LOWER HOLE 1000 mm long x 300 mm wide x 300 mm deep.
UPPER HOLE 1000 " " x 1000 mm " x 1500 mm deep.

	Test 1 (10.02.21)			Test 2 (10.02.21)			Test 3 (11.02.21)	
	Time (minutes)	Depth (mm below GL)		Time (minutes)	Depth (mm below GL)		Time (minutes)	Depth (mm below GL)
• 1.0 M3	220 MINS	540	• (SAME)	248 MINS	540	• (SAME)	218 MINS	540
	$\frac{220 \times 60}{960}$	= 13.75 Vp		$\frac{248 \times 60}{960}$	= 15.5 Vp		$\frac{218 \times 60}{960}$	= 13.6 Vp
+ LOWER SUMP 300 mm x 300 mm x 1000 mm LENGTH	90 MINS	300 mm 90 LITRES + TIMED FOR 150 mm DEPTH. THE TOP 75 mm + BOTTOM 75 mm IGNORED FOR TEST TIME	+ (SAME)	117 MINS	300 mm TIMED FOR MIDDLE 150 mm FOR TEST TIMING	+ (SAME)	115 MINS	300 mm TIMED FOR 150 mm MIDDLE ZONE FOR TEST TIMING
	∴ $\frac{90 \text{ MINS} \times 60 \text{ SECS}}{150 \text{ mm}}$			∴ $\frac{117 \text{ MINS} \times 60 \text{ SECS}}{150 \text{ mm}}$			∴ $\frac{115 \text{ MINS} \times 60 \text{ SECS}}{150 \text{ mm}}$	
	=	Vp		=	Vp		=	Vp.

PIT SIZE IN VOLUME = 1.59 M (1590 LITRES) – 1500 mm DEEP, LESS 540 mm = 960 mm LEVEL OF WATER IN PIT.

1.0 M3 (1000 LITRES) POURED INTO THE HOLE. ON THE FIRST TEST AND THEN SUBSEQUENT TESTS.

Hill Groundworks & Waterworks Ltd
The Wychwood, Lyneham, Oxfordshire, OX7 6QQ
01993 830514/ [illegible]
Sort Code: [illegible] Account No.: [illegible]

HILL GROUNDWORKS HILL WATERWORKS HILL CONSTRUCTION SERVICES Trading as HILL GROUNDWORKS WATERWORKS

Document Title:– Soil Infiltration Test for Soakaways to BRE365

1. **Locate site of proposed soakaway**

2. **Excavate hole to dimensions given**
   It should be possible to construct a suitably dimensioned pit with a backhoe loader or mini-excavator.

3. **Record Size**
   Measure actual size of excavated hole

4. **Pour in min 1m³ water (Instantaneously)**
   Use Water bowser, with a large outlet pipe, or excavator scoop or large container.

5. **Record Time & Depth**
   Give dimension from water level to ground level.
   Keep hole covered when unattended.

6. **Repeat test twice**
   When hole is empty repeat test, on same day or consecutive days depending on flow.

7. **Excavate a further metre below** to find ground water and record depth found.

✱ EXCAVATED TO 2500 MM AT ALL 3 NO. TRIAL PITS (1.2 & 3)
NO INGRESS OR SIGN OF WATER.
THE 3 NO. EXCAVATED HOLES FOUND ALL VERY SODDEN
AND ON THE STONE AREA, IT WAS VERY CRUMBLEY.

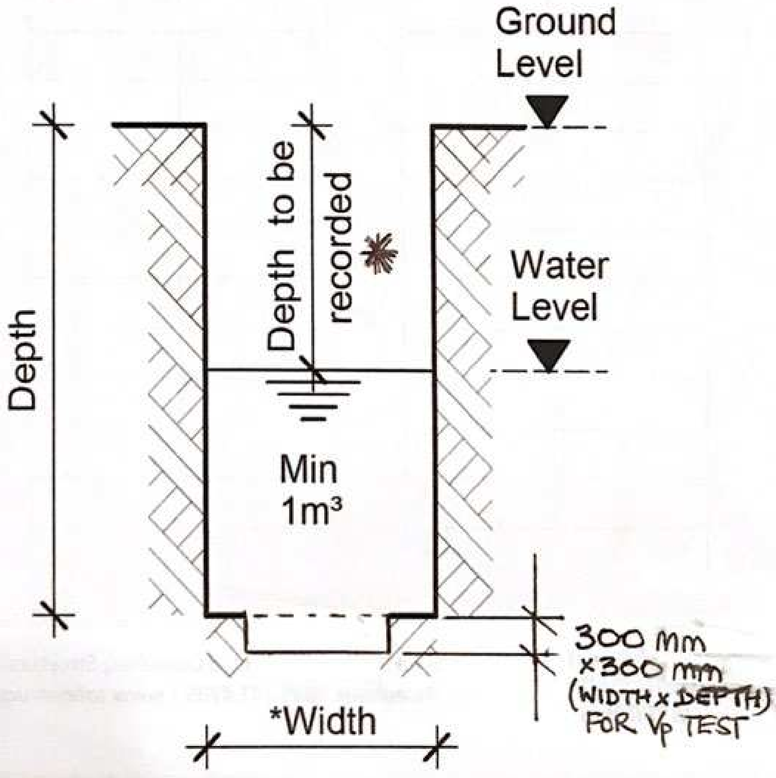
HOLE DIMENSIONS

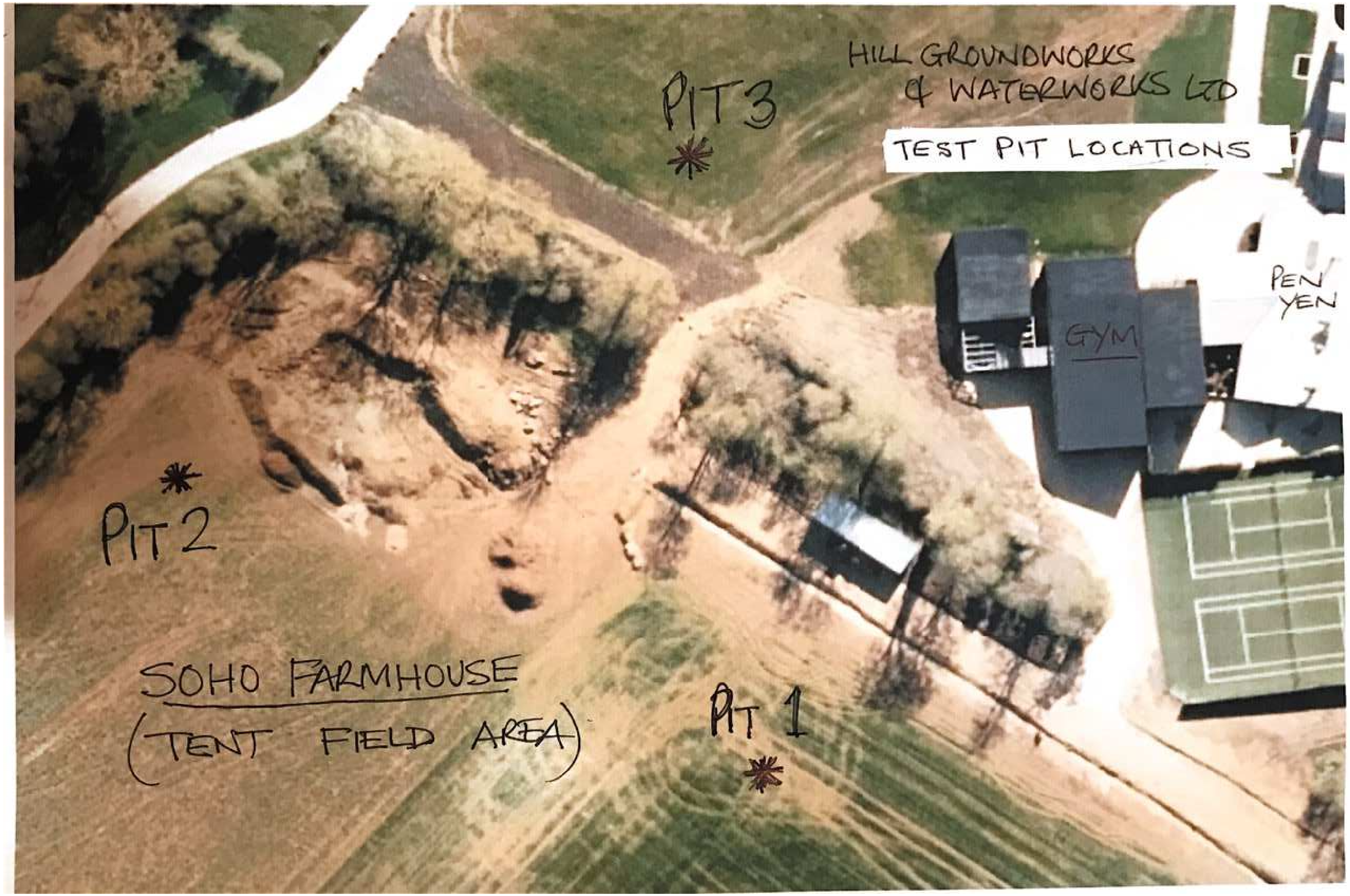
LENGTH = 1000 mm

WIDTH = 1000 mm

DEPTH = 1500 mm

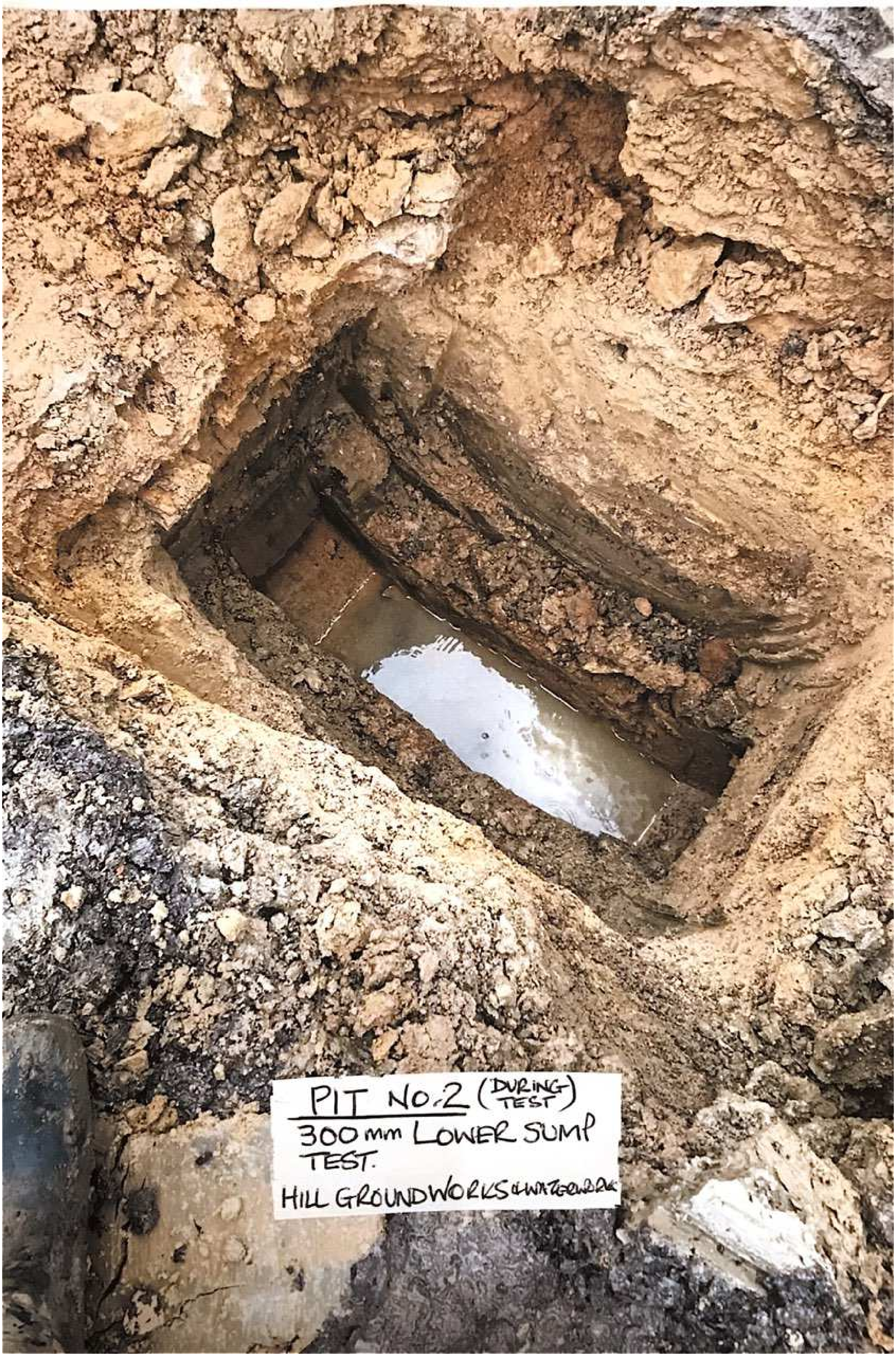
✱ DEPTH = 540 mm




HILL GROUNDWORKS
& WATERWORKS LTD
TEST PIT LOCATIONS
PIT 3
PEN
YEN
GYM
PIT 2
SOHO FARMHOUSE
(TENT FIELD AREA)
PIT 1


PIT NO. 1
300 mm LOWER SUMP TEST
(MAKING READY FOR TEST)
HILL GROUNDWORKS & WATERWORKS

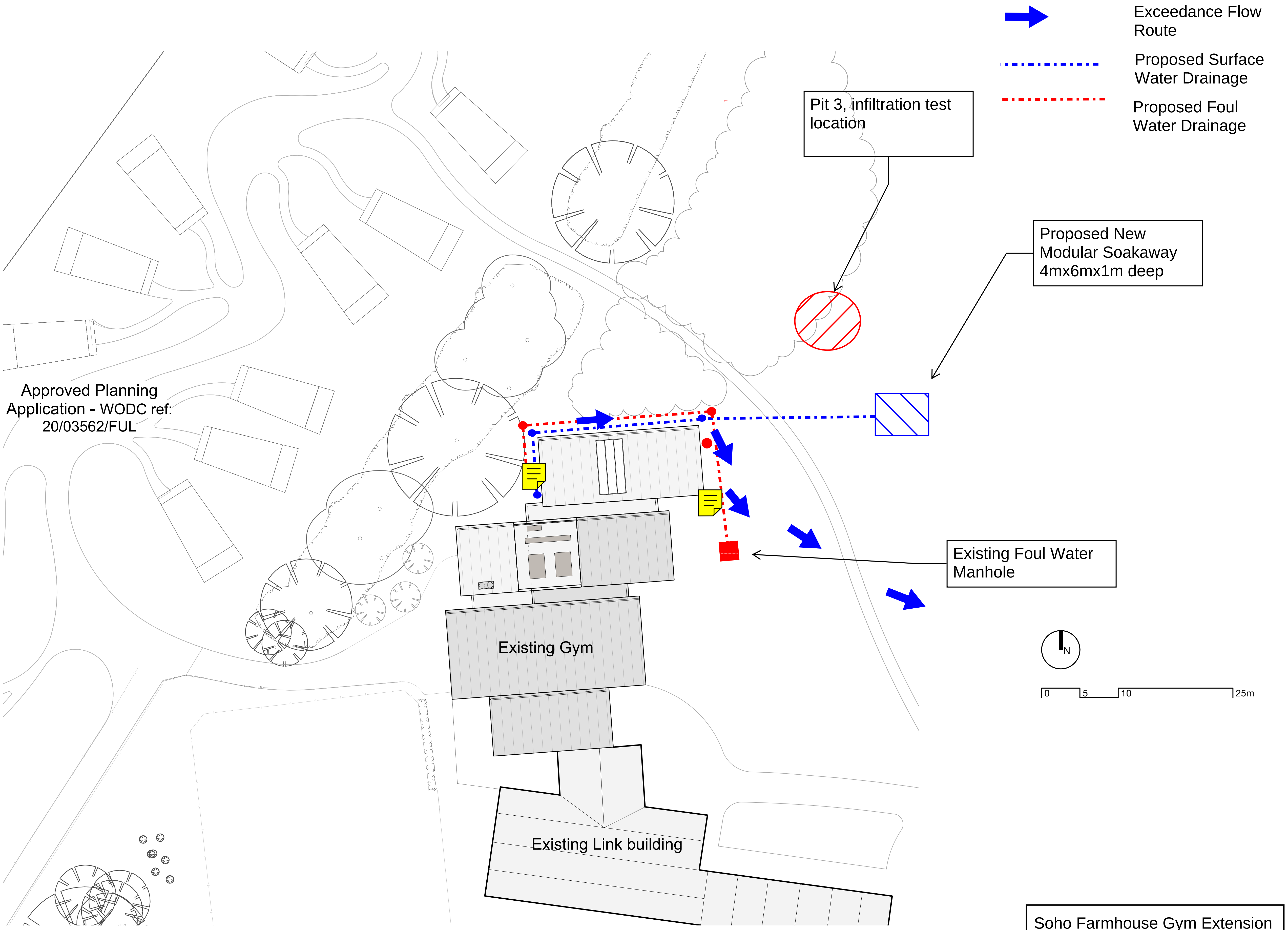

PIT NO. 2 (TEST START)
300mm LOWER SUMP
TEST
HILL GROUNDWORKS & WATERWORKS


PIT NO.2 (DURING TEST)
300 mm LOWER SUMP TEST.
HILL GROUNDWORKS & WATERWORKS


PIT No. 3.
FIRST TEST - HALFWAY THROUGH
HILL GROUNDWORKS & WATERWORKS

APPENDIX F

Proposed Drainage Plan



Soho Farmhouse Gym Extension

Proposed Drainage Strategy

219467-C-SK1000 Rev P01

APPENDIX G

Proposed Surface water Drainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 695 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	142.159	0.409	0.2	9.3	O K
30 min Summer	142.283	0.533	0.2	12.2	O K
60 min Summer	142.405	0.655	0.3	14.9	O K
120 min Summer	142.514	0.764	0.3	17.4	O K
180 min Summer	142.564	0.814	0.3	18.6	O K
240 min Summer	142.588	0.838	0.3	19.1	O K
360 min Summer	142.606	0.856	0.3	19.5	O K
480 min Summer	142.603	0.853	0.3	19.4	O K
600 min Summer	142.592	0.842	0.3	19.2	O K
720 min Summer	142.581	0.831	0.3	18.9	O K
960 min Summer	142.556	0.806	0.3	18.4	O K
1440 min Summer	142.505	0.755	0.3	17.2	O K
2160 min Summer	142.435	0.685	0.3	15.6	O K
2880 min Summer	142.372	0.622	0.3	14.2	O K
4320 min Summer	142.262	0.512	0.2	11.7	O K
5760 min Summer	142.168	0.418	0.2	9.5	O K
7200 min Summer	142.090	0.340	0.2	7.7	O K
8640 min Summer	142.023	0.273	0.2	6.2	O K
10080 min Summer	141.968	0.218	0.2	5.0	O K
15 min Winter	142.209	0.459	0.2	10.5	O K
30 min Winter	142.349	0.599	0.3	13.7	O K
60 min Winter	142.487	0.737	0.3	16.8	O K
120 min Winter	142.613	0.863	0.3	19.7	O K
180 min Winter	142.673	0.923	0.3	21.0	O K
240 min Winter	142.704	0.954	0.3	21.7	O K
360 min Winter	142.730	0.980	0.3	22.4	O K
480 min Winter	142.735	0.985	0.3	22.4	O K
600 min Winter	142.726	0.976	0.3	22.3	O K
720 min Winter	142.711	0.961	0.3	21.9	O K
960 min Winter	142.681	0.931	0.3	21.2	O K
1440 min Winter	142.615	0.865	0.3	19.7	O K
2160 min Winter	142.515	0.765	0.3	17.4	O K
2880 min Winter	142.423	0.673	0.3	15.3	O K
4320 min Winter	142.264	0.514	0.2	11.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	138.153	0.0	26
30 min Summer	90.705	0.0	41
60 min Summer	56.713	0.0	70
120 min Summer	34.246	0.0	128
180 min Summer	25.149	0.0	186
240 min Summer	20.078	0.0	246
360 min Summer	14.585	0.0	362
480 min Summer	11.622	0.0	480
600 min Summer	9.738	0.0	528
720 min Summer	8.424	0.0	590
960 min Summer	6.697	0.0	716
1440 min Summer	4.839	0.0	986
2160 min Summer	3.490	0.0	1396
2880 min Summer	2.766	0.0	1816
4320 min Summer	1.989	0.0	2600
5760 min Summer	1.573	0.0	3360
7200 min Summer	1.311	0.0	4112
8640 min Summer	1.129	0.0	4840
10080 min Summer	0.994	0.0	5552
15 min Winter	138.153	0.0	26
30 min Winter	90.705	0.0	40
60 min Winter	56.713	0.0	68
120 min Winter	34.246	0.0	126
180 min Winter	25.149	0.0	184
240 min Winter	20.078	0.0	240
360 min Winter	14.585	0.0	354
480 min Winter	11.622	0.0	466
600 min Winter	9.738	0.0	572
720 min Winter	8.424	0.0	668
960 min Winter	6.697	0.0	754
1440 min Winter	4.839	0.0	1062
2160 min Winter	3.490	0.0	1516
2880 min Winter	2.766	0.0	1956
4320 min Winter	1.989	0.0	2772

Summary of Results for 100 year Return Period (+40%)

Storm Event	**Max Level (m)**	**Max Depth (m)**	**Max Infiltration (l/s)**	**Max Volume (m³)**	**Status**
5760 min Winter	142.134	0.384	0.2	8.8	O K
7200 min Winter	142.028	0.278	0.2	6.3	O K
8640 min Winter	141.942	0.192	0.2	4.4	O K
10080 min Winter	141.874	0.124	0.2	2.8	O K

Storm Event	**Rain (mm/hr)**	**Flooded Volume (m³)**	**Time-Peak (mins)**
5760 min Winter	1.573	0.0	3576
7200 min Winter	1.311	0.0	4320
8640 min Winter	1.129	0.0	5016
10080 min Winter	0.994	0.0	5656

Rainfall Details

Rainfall Model	FSR	Ratio R	0.400	Cv (Winter)	0.840
Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15
Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080
M5-60 (mm)	20.000	Cv (Summer)	0.750	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.037

Time From:	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**
0	4	0.012	4	8	0.012	8	12	0.012

Model Details

Storage is Online Cover Level (m) 143.500

Cellular Storage Structure

Invert Level (m) 141.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.05112 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.05112

Depth (m)	**Area (m²)**	**Inf. Area (m²)**	**Depth (m)**	**Area (m²)**	**Inf. Area (m²)**	**Depth (m)**	**Area (m²)**	**Inf. Area (m²)**
0.000	24.0	24.0	1.000	24.0	44.0	1.100	0.0	44.0