



Drainage Strategy Report

2 – 28 Wordsworth Way, West Drayton

Inspired Design & Build Ltd

QUALITY MANAGEMENT

Job No.	08-0050		
Project	2 – 28 Wordsworth Way, West Drayton		
Location	2 – 28 Wordsworth Way, West Drayton		
Title	Drainage Strategy Report		
Document Ref	DSR/001	Issue/Status	Planning
Date	3 rd August 2020		
Prepared by	Steven Griffiths	Signature (for file)	
Checked by	Steven Griffiths	Signature (for file)	
Authorised by	Steven Griffiths	Signature (for file)	

REVISION SCHEDULE

Drainage Strategy Report

2 – 28 Wordsworth Way, West Drayton

Rev	Date	Details	Prepared By	Approved By
A	31.01.2020	First Issue	S. Griffiths	S. Griffiths
B	03.08.2020	Report revised in line with comments from Hillingdon Borough Council	S. Griffiths	S. Griffiths

CONTRACT

The report describes work commissioned by Inspired Design & Build Ltd as outlined within fee proposal dated 13th January 2020.

PURPOSE

This document has been prepared as a Drainage Strategy Report for Inspired Design & Build Ltd. G30 Consulting Ltd accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

G30 Consulting Ltd has no liability regarding the use of this report except to Inspired Design & Build Ltd.

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Appendix B – British Geological Survey Historic Borehole Logs

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1. EXECUTIVE SUMMARY

Site Name	2 – 28 Wordsworth Way, West Drayton
Location	2 – 28 Wordsworth Way, West Drayton
Client	Inspired Design & Build Ltd
Grid Reference	506737, 178628
Area (ha)	0.186 ha
Discharge Rate (l/s)	1.5 l/s for 1 in 100 year + 40% Climate Change
Recommended SuDS	Rainwater harvesting Proprietary treatment systems Trees / vegetation Pervious pavements

2. INTRODUCTION

2.1 General

G30 Consulting Ltd have been commissioned by Inspired Design & Build Ltd to prepare a Drainage Strategy Report in relation to the proposed residential development at a former garage site to the rear of Wordsworth Way which is also accessed off Coleridge Way.

2.2 Description of the Site

The site is located off Wordsworth Way / Coleridge Way is centred about Ordnance Survey Grid reference 506737, 178628. The site occupies an area of approximately 0.186ha.

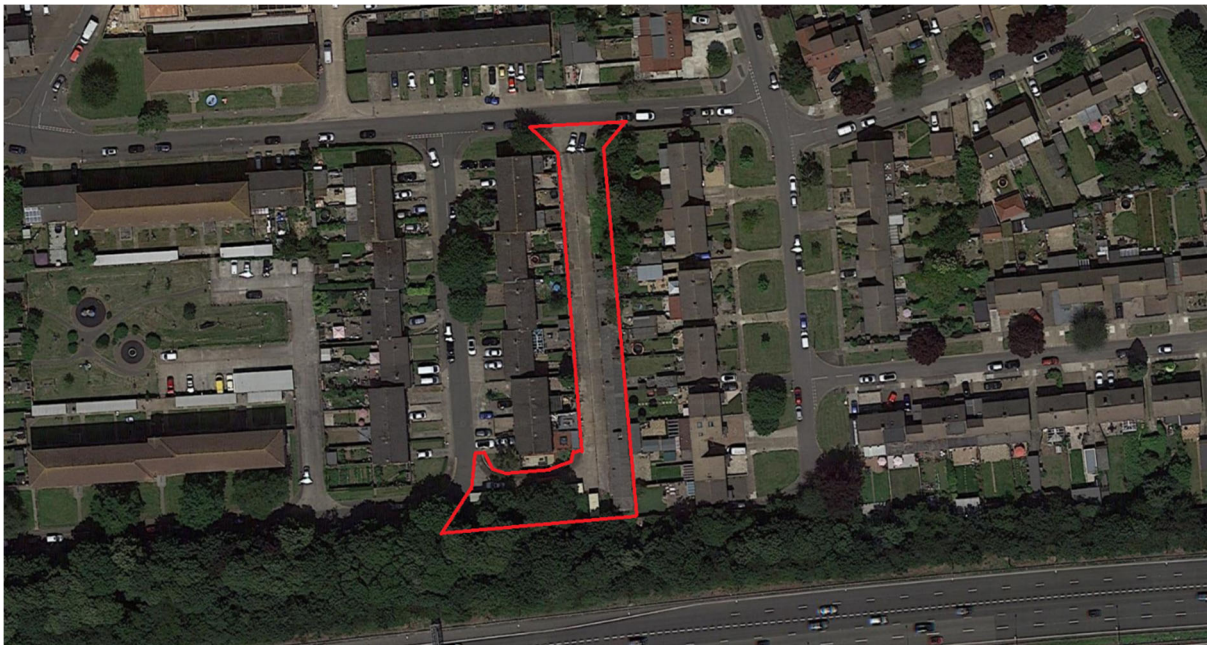


Figure 1 - Site Location

The site is currently used for private garages which are orientated in a North South direction parallel to Wordsworth Way. The garages are accessed via a private access off Wordsworth Way and Coleridge Way with a shared parking / turning facility running parallel to the garages. The access way is hard surfaced and positively drain.

2.3 Topography

A topographical survey of the existing site has been undertaken which confirms levels on site range from 49.870m AOD to 50.200m AOD with the lowest levels being located along the centreline of the existing access road where there is a line of gullies which pick up the surface water runoff from the hard surfaces.



Figure 2 – View from Wordsworth Way East along the Southern site entrance



Figure 3 – View from Coleridge Way South down the private shared surface

Copies of site topographical survey, drawing reference number 2018/D/255/P/02 can be found in Appendix A.

2.4 Geology and Groundwater

At the time of producing this report an intrusive ground investigation report had not been undertaken to confirm ground conditions on site. In the absence of an intrusive ground investigation British Geological Survey (BGS) 1:50,000 scale geology mapping was reviewed to confirm the geology on site. The details of the underlying geology can be found below and in Figure 2 below:

Bedrock Geology: London Clay Formation - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas. These sedimentary rocks are marine in origin. They are detrital and comprise coarse- to fine-grained slurries of debris from the continental shelf flowing into a deep-sea environment, forming distinctively graded beds.

Superficial Deposits: Langley Silt Member - Clay and Silt. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by wind blown deposits (U). These sedimentary deposits are aeolian in origin. They are detrital, comprising medium- to fine-grained materials, forming lenses, beds (and locally) dunes.

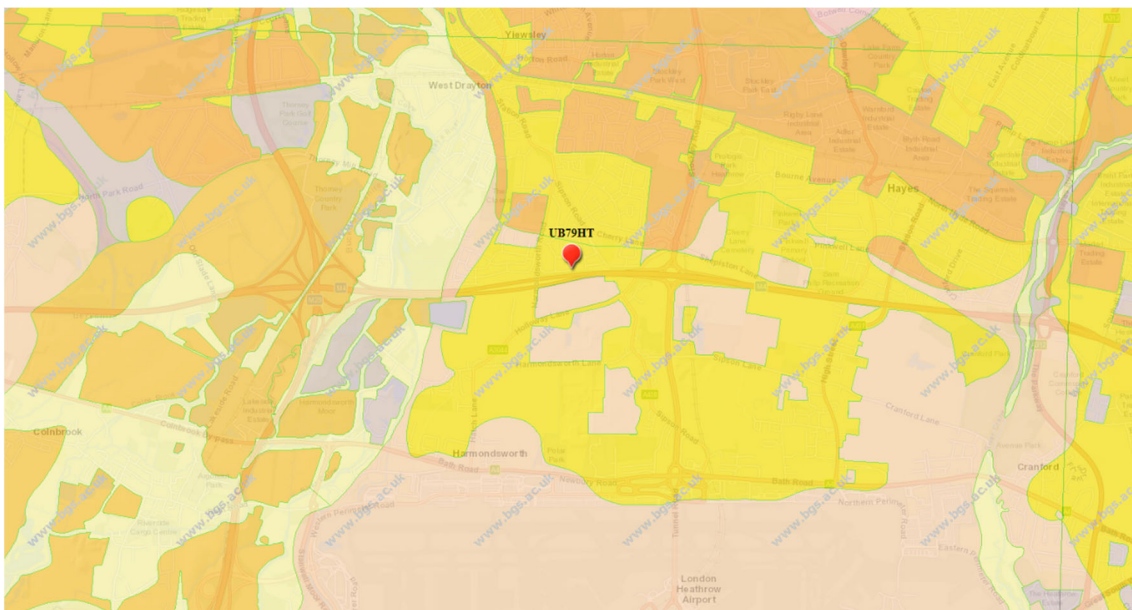


Figure 4 - Underlying Site Geology

In addition to British Geological Survey (BGS) 1:50,000 scale geology mapping historic borehole logs were reviewed. The borehole logs confirmed a topsoil layer beneath which Clay was encountered which continued till the boreholes were abandoned.

Copies of historic borehole logs from near to the site can be found in Appendix B.

2.5 Hydraulic Features

The nearest watercourse to the site is the River Colne which is located approximately 1.45km West of the site. Figure 5, below, shows the location of the River Colne relative to the site.



Figure 5 – River Colne located to the West of the site.

2.6 Current Site Drainage

Thames Water are responsible for adopted drainage in West Drayton. Thames Water sewer asset record plans have been obtained for the site and the surrounding roads to confirm what adopted assets are in close proximity to the site.

The sewer asset record plans show there are no adopted assets within the extents of the site.

There are two sewers in close proximity to the site, a 300mm dia. combined water sewer that flows in a West to East direction within Coleridge Way. The second is a surface water sewer that flows in a North to South direction within Wordsworth Way. The diameter of the surface water sewer is not clear from the sewer asset record plans.

A copy of Thames Water sewer asset record plans can be found in Appendix C.

3. PROPOSED DEVELOPMENT

The proposed development requires the demolition of the existing garages and the hard-surfaced access way. In place of the garages 6 no. residential properties are to be constructed comprising 2no. 4-bedroom 6 person houses and 4no. 2-bedroom 4 person bungalows. As part of the development a new private access road is to be constructed joining Wordsworth Way and Coleridge Way off which private parking spaces shall be provided for each of the properties.

Soft landscaping areas shall be incorporated around the private access road / parking spaces to the front of the development with grassed gardens to the rear of the properties.

A copy of the drawing 2018/D/255/P/03 – Proposed Site Plan by Hillingdon London Residents Services showing the proposed site arrangement can be found Appendix D.

4. SURFACE WATER DRAINAGE PROPOSAL

4.1 Requirements and Regulations

The means of draining surface water generated by a site is required to mirror the behaviour of the existing site run-off, so far as is practicable, to offset the off-site flood risk that might otherwise be created, or to bypass it entirely.

The following documents have been referred to as part of the development of the drainage strategy to ensure current standards and industry best practice are adhered to:

- Buildings Regulations Part H - Drainage and Waste Disposal
- Sewers for Adoption 6th Ed. - A Design and Construction Guide for Developers- March 2006
- Sewers for Adoption 7th Ed. - A Design and Construction Guide for Developers- August 2012
- CIRIA Report 753 - The SuDS Manual 2015
- BRE Digest 365 - Soakaway Design

In accordance with Building Regulations Part H- Drainage and Waste Disposal, surface water runoff generated by a site should look to discharge to one of the following listed in order of priority:

- An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
- A watercourse; or where that is not reasonably practicable,
- A surface water sewer; or where that is not reasonably practicable,
- A combined water sewer.

4.2 Surface Water Drainage Strategy

In accordance with the surface water hierarchy outlined in Building Regulations Part H, surface water runoff should look to discharge to soakaways or some other adequate infiltration system. At the time of producing this report on site infiltration testing in accordance with BRE 365 had not been undertaken to confirm percolation rates. British Geological Survey mapping and borehole logs confirmed a topsoil layer beneath which Clay was encountered which continued till the boreholes were abandoned.

Due to the cohesive nature of clay it is unlikely infiltration drainage techniques would be suitable within the development and as such has been discounted as the primary method of surface water disposal from the site.

The nearest watercourse to the site is River Colne which is located approximately 1.45km West of the site. To discharge surface water runoff to the watercourse it would be necessary to cross Third Party land, as such a discharge to the watercourse is not considered feasible.

The nearest sewers to the site is a surface water sewer that flows in a North to South direction within Wordsworth Way. The diameter of the surface water sewer is not clear from the sewer asset record plans.

A new surface water drainage system shall be constructed on site which will convey surface water runoff from the residential properties and the new private access road / parking spaces outfalling into the Thames Water surface water sewer.

Individual SuDS features for the site have been reviewed based on the site characteristics, such as the underlying soil type and geology. As well as the design considerations from the development that may limit the feasibility of certain SuDS features from being implemented. Details of the specific SuDS features selected for the site can be found in Section 4.3.

A private flow control device shall be installed to restricted surface water runoff from the site to pre development rates. Surface water discharge rates from the site shall be discussed further in Section 4.4.

Attenuation storage shall be provided in the form of cellular crates to attenuate surface water runoff for storms, up to and including 1 in 100 years plus 40% Climate Change with a 10080-minute duration. Onsite attenuation requirements shall be discussed further in Section 4.5.

Proposed foul and surface water drainage layout plan, drawing 08-0050-001 can be found in Appendix E.

4.3 Use of SuDS

To ensure the quality of runoff leaving the site is treated to a suitable level, SuDS features have been assessed for their suitability within the proposed development. In accordance with CIRIA Report C753 - The SuDS Manual 2015 features have been considered and their suitability evaluated in relation to the development. Table 1 below details all the SuDS features that have been considered for this site and providing supporting evidence to why each SuDS features type have or have not been deemed suitable.

Table 1 – SuDS Selector Table

SuDS Selector Table		
Feature	Suitable Y / N	Evidence
Rainwater Harvesting	Y	Rainwater harvesting in the form of rainwater butts could be used to provide rainwater reuse for irrigation purposes.
Green Roofs	N	Green roofs are ideally suited to flat roofs, a pitched roof has been proposed and as such is not suitable for the development.
Infiltration Systems	N	Due to the underlying ground conditions infiltration systems are not considered to be suitable.
Proprietary Treatment Systems	Y	Trapped gullies could be used at the bottom of the rainwater downpipes to assist with the removal of sediment.
Filter Strips	N	Due to the site layout filter strips are not considered to be suitable.
Filter Drains	N	Due to the site layout filter drains are not considered to be suitable.
Swales	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Bioretention Systems	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Trees / vegetation	Y	New planting will be incorporated into the development which will assist with the disposal of surface water runoff.
Pervious Pavements	Y	Pervious pavements with a tanked voided stone sub-base are to be utilised within the parking area. The pervious surface will offer treatment of surface water runoff from the paved areas and attenuation storage.
Attenuation Storage Tanks	N	Attenuation storage tanks could be utilised but have been rejected in favour of a tanked voided stone sub-base beneath the pervious pavement.
Detention Basins	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Ponds and Wetlands	N	Due to the land take requirements these features are not suitable with the current site layout plan.

4.4 Drainage Discharge and Outfalls

In accordance with Hillingdon Borough Council Sustainable Drainage Design & Evaluation Guide surface water runoff from a development should be restricted to Greenfield Runoff Rate. The HR Wallingford online Greenfield Runoff Rate estimation tool was used to calculate the discharge rate for the site of 0.3 l/s.

The runoff rate is too low for a control to restrict the surface water runoff to and as such would likely cause future maintenance issues, as such surface water runoff is to be restricted to a peak rate of **1.5 l/s** which is deemed to be the minimum rate a control can restrict runoff to.

Surface water runoff shall be restricted from the site to **1.5 l/s** for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

4.5 Storage

Surface water attenuation calculations using XP Solutions MicroDrainage have been undertaken for the surface water drainage system. FEH rainfall data for the site has been used within the design calculations and CV values have been set to 1.0 as outlined within the Hillingdon Borough Council Sustainable Drainage Design & Evaluation Guide.

Based on an impermeable area of 1020m² from the residential properties and the private access road / spaces discharging to the surface water Thames Water sewer approximately 80.2m³ of attenuation storage is required for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

Attenuation storage shall be provided in the form of a tanked voided stone sub-base beneath the pervious paving within the parking court. The pervious paving will offer treatment of surface water runoff from the parking court as well as attenuation storage.

Copies of XP Solutions MicroDrainage surface water pervious paving calculations can be found in Appendix F.

4.6 Ownership and Maintenance

The private surface water drainage system shall be the responsibility of individual property owners to manage and maintain.

The surface water discharge to the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

Future maintenance schedules for all the proposed SuDS features can be found in Appendix G.

5. FOUL WATER DRAINAGE PROPOSAL

5.1 Requirements and Regulations

The following documents have been referred as part of the development of the drainage strategy for the development to ensure current standards and industry best practices are adhered to:

- Buildings Regulations Part H - Drainage and Waste Disposal
- Sewers for Adoption 6th Ed. - A Design and Construction Guide for Developers- March 2006.
- Sewers for Adoption 7th Ed. - A Design and Construction Guide for Developers- August 2012.

In accordance with Building Regulations Part H - Drainage and Waste Disposal, foul effluent generated by a site should look to discharge to one of the following listed in order of priority:

- A public sewer; or, where that is not reasonably practicable,
- A private sewer communicating with a public sewer; or where that is not reasonably practicable,
- Either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system; or where that is not reasonably practicable,
- A cesspool

5.2 Foul Water Drainage Strategy

Thames Water are responsible for adopted drainage assets in West Drayton. Thames Water sewer asset record plans confirm the presence 300mm dia. combined water sewer which runs behind the back edge of footpath within Coleridge Way in an Easterly direction.

Foul water effluent is proposed to discharge to the adopted Thames Water combined water sewer. A new foul water drainage system is to be constructed on site to convey foul water effluent from the properties to the outfall.

Foul effluent is to discharge from the site to the combined water manhole on site at an unrestricted rate.

Proposed foul and surface water drainage layout plan, drawing 08-0050-001 can be found in Appendix E.

5.3 Operations and Management

The private foul water drainage system shall be the responsibility of individual property owners to manage and maintain.

The foul water discharge into the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Drainage Summary – Surface Water

The disposal of surface water runoff generated by the proposed development has been assessed in accordance with the guidance outlined within Building Regulations Part H – Drainage and Waste Disposal.

The nearest sewers to the site is a surface water sewer that flows in a North to South direction within Wordsworth Way. The diameter of the surface water sewer is not clear from the sewer asset record plans.

A new surface water drainage system shall be constructed on site which will convey surface water runoff from the residential properties and the new private access road / parking spaces outfalling into the Thames Water surface water sewer.

Surface water runoff shall be restricted from the site to **1.5 l/s** for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

Surface water attenuation calculations using XP Solutions MicroDrainage have been undertaken for the surface water drainage system. Based on an impermeable area of 1020m² from the residential properties and the private access road / spaces discharging to the surface water Thames Water sewer approximately 80.2m³ of attenuation storage is required for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

Attenuation storage shall be provided in the form of a tanked voided stone sub-base beneath the pervious paved access road. The pervious paving will offer treatment of surface water runoff as well as attenuation storage.

The private surface water drainage system shall be the responsibility of individual property owners to manage and maintain.

The surface water discharge to the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

6.2 Drainage Summary – Foul Water

The disposal of foul water effluent generated by the proposed development has been assessed in accordance with the guidance outlined within Building Regulations Part H – Drainage and Waste Disposal.

Foul water effluent is proposed to discharge to the adopted Thames Water combined water sewer. A new foul water drainage system is to be constructed on site to convey foul water effluent from the properties to the outfall.

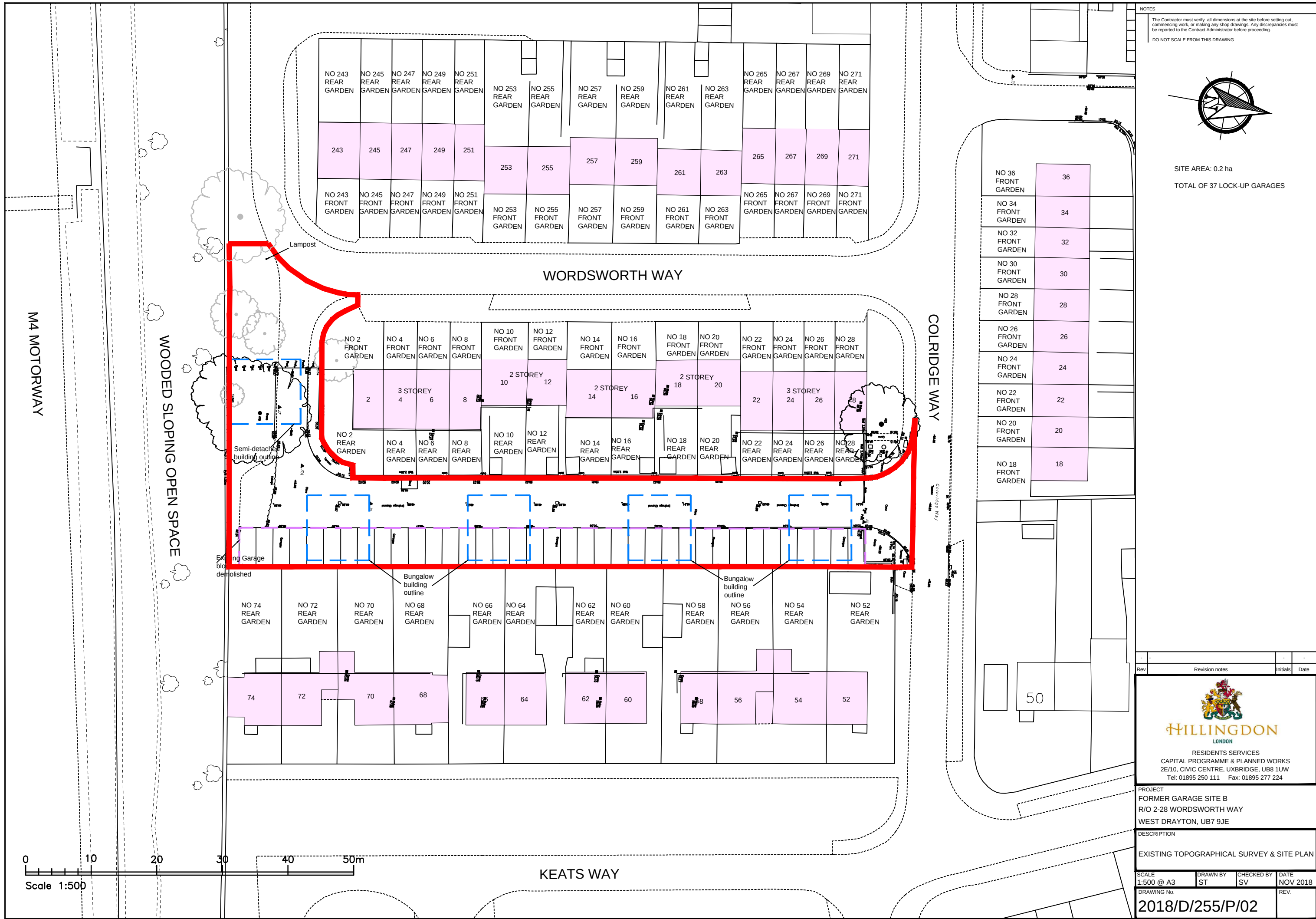
Foul effluent is to discharge from the site to the combined water manhole on site at an unrestricted rate.

The private foul water drainage system shall be the responsibility of individual property owners to manage and maintain.

The foul water discharge into the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

APPENDIX

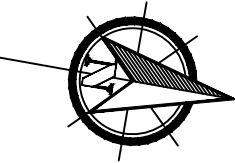
APPENDIX A – DRAWING 2018/D/255/P/02 – EXISTING TOPOGRAPHICAL SURVEY & SITE PLAN



NOTES

The Contractor must verify all dimensions at the site before setting out, commencing work, or making any shop drawings. Any discrepancies must be reported to the Contract Administrator before proceeding.

DO NOT SCALE FROM THIS DRAWING



SITE AREA: 0.2 ha

TOTAL OF 37 LOCK-UP GARAGES

Rev	Revision notes	Initials	Date



RESIDENTS SERVICES
CAPITAL PROGRAMME & PLANNED WORKS
2E/10, CIVIC CENTRE, UXBRIDGE, UB8 1UW
Tel: 01895 250 111 Fax: 01895 277 224

PROJECT
FORMER GARAGE SITE B
R/O 2-28 WORDSWORTH WAY
WEST DRAYTON, UB7 9JE

DESCRIPTION
EXISTING TOPOGRAPHICAL SURVEY & SITE PLAN

SCALE 1:500 @ A3	DRAWN BY ST	CHECKED BY SV	DATE NOV 2018
DRAWING No. 2018/D/255/P/02			REV.

APPENDIX B – BRITISH GEOLOGICAL SURVEY HISTORIC BOREHOLE LOGS

Norwest Holst Soil Engineering Ltd.

Borehole No.

235

Contract No. **P9047 (PART 2)**

BOREHOLE LOG

Location. **HEATHROW SURFACE ACCESS STUDIES**

Client. **HEATHROW AIRPORT LIMITED**

Method of Boring. **CABLE PERCUSSION**

Diameter of Borehole. **200mm**

Sheet. **1** of **2**

Co-ords. **ES06936 N178600**

Ground Level. **28.80** m.A.O.D.

Date. **14 - 15/3/91**

TQ 07 NE 202

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/R.O.D.%	Daily Progress
MADE GROUND: Brown very clayey sand with occasional tarmac fragments, fine to medium sub-angular to angular flint gravel, metal, brick and rootlets. (FILL)		0.70	28.10		0.50-1.00		
Firm friable brown clayey, slightly sandy SILT with occasional black root traces. (BRICEARTH)					1.00-1.50 1.00-1.45 1.50 1.50-2.00 2.00-2.45 2.50 2.50-3.00	(30)	
Soft to firm orange brown silty very sandy CLAY with much fine to coarse angular flint gravel. (ALLUVIUM)		3.00	25.80		3.00 3.00-3.45	"17"	
Dense brown very sandy fine to coarse angular to sub-angular flint GRAVEL, with occasional cobbles. (TERRACE GRAVEL)		3.50	25.30		3.50-4.00 4.00-4.45 4.50-5.00 5.00-5.45 5.50-6.00	"31"	
Medium dense brown clayey SAND and fine to coarse angular to rounded assorted GRAVEL, with pockets of soft brown silty clay. (TERRACE GRAVEL)		5.90	22.90		6.00-6.45	"18"	
Firm grey brown fissured indistinctly laminated silty CLAY. (LONDON CLAY)		6.35	22.45	6.30 14/3 6.75 15/3	7.00-7.45 7.50 8.50-8.95 9.00	(90)	
...8.50-9.00m Stiff						(84)	

Type of Sample

Is S.P.T. ☒ Undisturbed

Ic C.P.T. ☒ Vane

O Jar ☒ Water

● Bulk ☒ Piezometer

Remarks (Observations of Ground Water etc.) (-) U100 blows

Inspection Pit to 1.00m.

Groundwater: 14/3/91: Water added to assist drilling 3.00-6.50m.

pm W.L., 4.80m, casing to 6.30m

15/3/91: am W.L., 4.90m, casing to 6.30m

Sealed with casing at 6.75m

Borehole dry on completion

Piezometer installed at 5.40m, as shown (15/3/91)

Water level is subject to seasonal or tidal variations and should not be taken as constant

BOREHOLE LOG

Sheet 2 of 2

Co-ords. E506936 N178600

Ground Level.....28.80.....m.A.O.D.

Date 14 - 15/3/91

Borehole Complete at 15.00m.

Remarks (Observations of Ground Water etc.) (-) U100 blows

● Bulk  Piezometer

Water levels are subject to seasonal or tidal variations and should not be taken as constant.

Contract No. **P9047 (PART 2)**
 Location **HEATHROW SURFACE ACCESS STUDIES**
 Client **HEATHROW AIRPORT LIMITED**
 Method of Boring **CABLE PERCUSSION**
 Diameter of Borehole **200mm**

BOREHOLE LOG

Sheet **1** of **2**
 Co-ords **E505990 N178476**
 Ground Level **29.70** m.A.O.D.
 Date **12 - 14/3/91**

TQ07NE 193

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/R.O.D. %	Daily Progress
TOPSOIL.		0.10	29.60		0.00-1.00		
Firm light brown fine slightly sandy clayey SILT with occasional black root traces. (BRICEARTH)		1.00	28.70				12/3 13/3
Medium dense light brown silty fine SAND, locally clayey. (BRICEARTH)					1.50-1.95 2.00 2.00-3.00	(50)	
					3.00-4.00 3.00-3.45	"13"	
Light brown interbedded soft very sandy CLAY with some fine to medium angular flint gravel, slightly clayey fine to medium SAND and silty fine SAND. (BRICEARTH)		4.00	25.70		4.00-4.60 4.00-4.45	(61)	
		4.60	25.10		4.50		
		5.00	24.70		5.00-5.45	"20"	
Firm brown silty very sandy CLAY with much fine to coarse angular to sub-angular flint gravel. (ALLOVIUM)					5.50		
Medium dense brown SAND and fine to coarse angular to sub-angular flint GRAVEL, with occasional soft brown silty clay pockets. ... Locally becomes sandy GRAVEL. (TERRACE GRAVEL)					6.00-6.45 6.50	"20"	
					7.00 7.00-7.45	"20"	
				7.50 13/3	7.50		13/3 14/3
Very soft brown silty CLAY with much fine to coarse angular to rounded assorted gravel. (ALLOVIUM) L.C. (✓)		8.00	21.70		8.00 (14/3/91) 8.00		
Stiff grey brown fissured indistinctly laminated silty CLAY. (LONDON CLAY)		8.50	21.20	8.50 14/3	8.50 8.50-8.75	(100) NR	
Type of Sample		Remarks (Observations of Ground Water etc.) (-) U100 blows NR = No Recovery					
Is S.P.T. ■ Undisturbed		Groundwater: 11/3/91: Dry, no casing. 13/3/91: Dry, casing to 7.50m. 14/3/91: an WL, dry, casing at 7.50m. Strike at 8.00m, rising to 7.50m in 5 mins 7.00m in 10 mins 6.50m in 15 mins 6.00m in 20 mins, casing at 7.50m.					
Ic C.P.T. x Vane		Borehole back filled with arisings on completion.					
io Jar △ Water		Water levels are subject to seasonal or tidal variations and should not be taken as constant					
● Bulk ■ Piezometer							

Contract No. **P9047 (PART 2)****BOREHOLE LOG**Location **HEATHROW SURFACE ACCESS STUDIES**Sheet **2** of **2**Client **HEATHROW AIRPORT LIMITED**Co-ords. **E505990 N178476**Method of Boring **CABLE PERCUSSION**Ground Level **29.70** m.A.O.D.Diameter of Borehole **200mm**Date **12 - 14/3/91**

TQ 07 NE 193

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/R.O.D.%	Daily Progress
Stiff grey brown fissured indistinctly laminated silty CLAY. (LONDON CLAY)					10.00-10.45 s	"33"	
					11.50-11.95 s	"26"	
					13.00-13.45 s	"29"	
					14.50-14.95 s	"31"	
					16.00-16.45 s	"30"	
					17.50-17.95 s	"36"	
...19.00m 40mm band of light grey silty MUDSTONE, weak.					19.00-19.45 s	"36"	
Borehole Complete at 20.00m.		20.00	9.70		20.00		14/3

Type of Sample	Remarks (Observations of Ground Water etc.) (-) U100 blows
Is S.P.T. ■ Undisturbed	
Ic C.P.T. x Vane	
o Jar △ Water	
● Bulk [P] Piezometer	

Water levels are subject to seasonal or tidal variations and should not be taken as constant

APPENDIX C – THAMES WATER SEWER ASSET RECORD PLANS

Asset location search



Property Searches

GThirty Consulting Ltd
Neepsend Triangle Business Cen
1 Burton Road
SOUTH YORKSHIRE
S3 8BW

Search address supplied 2
Wordsworth Way
West Drayton
UB7 9HT

Your reference 08-0050

Our reference ALS/ALS Standard/2020_4139883

Search date 20 January 2020

Keeping you up-to-date

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



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



0845 070 9148



Search address supplied: 2, Wordsworth Way, West Drayton, UB7 9HT

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 search provides 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 0845 070 9148, 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

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

The map displays a residential neighborhood with several streets and property lots. Key streets include ERIDGE WAY at the top, WORDSWORTH WAY at the bottom, and a Gantry structure. A red dashed line with arrows indicates a route starting from the top left, moving right along ERIDGE WAY, then down a vertical street, and finally right along WORDSWORTH WAY. A purple dot labeled '61A' is located in the middle right section of the map. Various lot numbers are visible, such as 271, 259, 245, 28, 14, 2, 52, 62, 74, 55a, 55, 65, 76, 5, 17, 13, 57, 55, 53, 51, 33, 29, 23, 19, 205, 233, 211, 213, 217, 239, 241, 243, 6603, 6503, 6502, 7601, 7602, 7603, 7606, 7501, 300, 225, 150, and 300. A blue dashed line with arrows is also present, running horizontally across the top and then vertically down the left side of the map.

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.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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
7501	28.64	26.45
7606	28.33	25.31
761A	n/a	n/a
7605	28.48	24.45
861A	n/a	n/a
7603	28.59	24.51
7604	28.86	25.3
6503	28	n/a
6502	28.18	27.52
651A	n/a	n/a
661A	n/a	n/a
6603	28.42	27.52
6602	28.6	24.87
7602	28.5	26.38
7601	28.62	24.68
6601	28.3	27.15
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.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Trunk Surface Water
	Trunk Foul
	Storm Relief
	Trunk Combined
	Vent Pipe
	Bio-solids (Sludge)
	Proposed Thames Surface Water Sewer
	Proposed Thames Water Foul Sewer
	Gallery
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Sludge Rising Main
	Proposed Thames Water Rising Main
	Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate 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 level indicates that data is unavailable.

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
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

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

	Control Valve
	Drop Pipe
	Ancillary
	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.

	Outfall
	Undefined End
	Inlet

Other Symbols

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

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer
	Surface Water Sewer
	Combined Sewer
	Gully
	Culverted Watercourse
	Proposed
	Abandoned Sewer

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. 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 present on the plan, please contact a member of Property Insight on 0845 070 9148.

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 14 days from due 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. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. 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'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. 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 not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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 0121 345 1000 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	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS / OSS	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	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

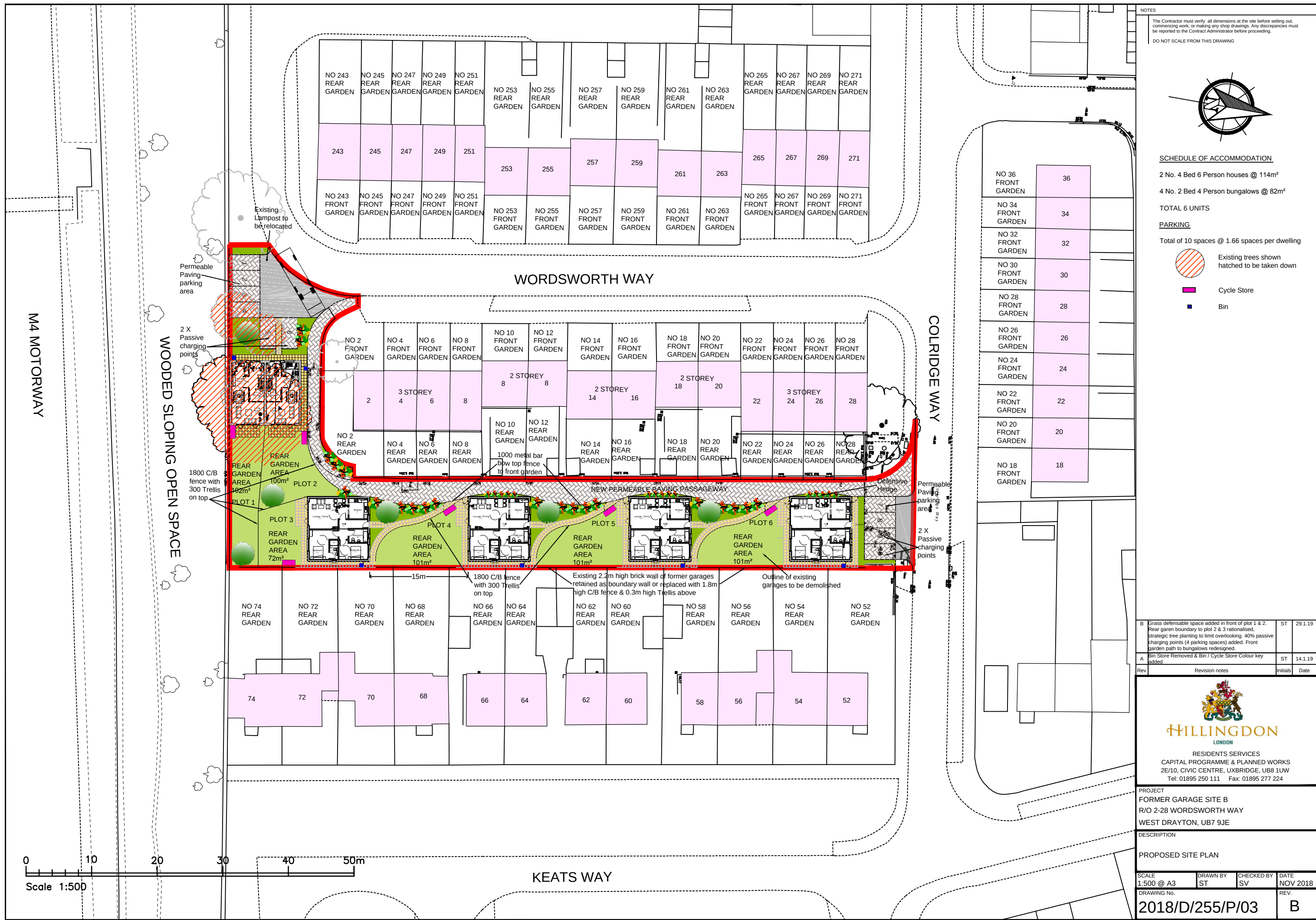
TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

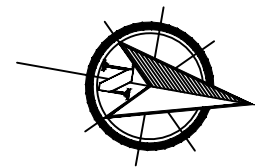
You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

APPENDIX D – DRAWING 2018/D/255/P/03 – PROPOSED SITE PLAN



NOTES
The Contractor must verify all dimensions at the site before setting out, commencing work, or making any shop drawings. Any discrepancies must be reported to the Contract Administrator before proceeding.
DO NOT SCALE FROM THIS DRAWING



SCHEDULE OF ACCOMMODATION

2 No. 4 Bed 6 Person houses @ 114m²

4 No. 2 Bed 4 Person bungalows @ 82m²

TOTAL 6 UNITS

PARKING

Total of 10 spaces @ 1.66 spaces per dwelling

- Existing trees shown hatched to be taken down
- Cycle Store
- Bin

NO 36 FRONT GARDEN	36
NO 34 FRONT GARDEN	34
NO 32 FRONT GARDEN	32
NO 30 FRONT GARDEN	30
NO 28 FRONT GARDEN	28
NO 26 FRONT GARDEN	26
NO 24 FRONT GARDEN	24
NO 22 FRONT GARDEN	22
NO 20 FRONT GARDEN	20
NO 18 FRONT GARDEN	18

B	Grass defensible space added in front of plot 1 & 2. Rear garden boundary to plot 2 & 3 rationalised, strategic tree planting to limit overlooking. 40% passive charging points (4 parking spaces) added. Front garden path to bungalows redesigned.	ST	29.1.19
A	Bin Store Removed & Bin / Cycle Store Colour key added	ST	14.1.19
Rev	Revision notes	Initials	Date

HILLINGDON
LONDON

RESIDENTS SERVICES
CAPITAL PROGRAMME & PLANNED WORKS
2E/10, CIVIC CENTRE, UXBRIDGE, UB8 1UW
Tel: 01895 250 111 Fax: 01895 277 224

PROJECT
FORMER GARAGE SITE B
R/O 2-28 WORDSWORTH WAY
WEST DRAYTON, UB7 9JE

DESCRIPTION
PROPOSED SITE PLAN

SCALE 1:500 @ A3	DRAWN BY ST	CHECKED BY SV	DATE NOV 2018
DRAWING No.			REV.

2018/D/255/P/03 B

M4 MOTORWAY

WOODED SLOPING OPEN SPACE

COLRIDGE WAY

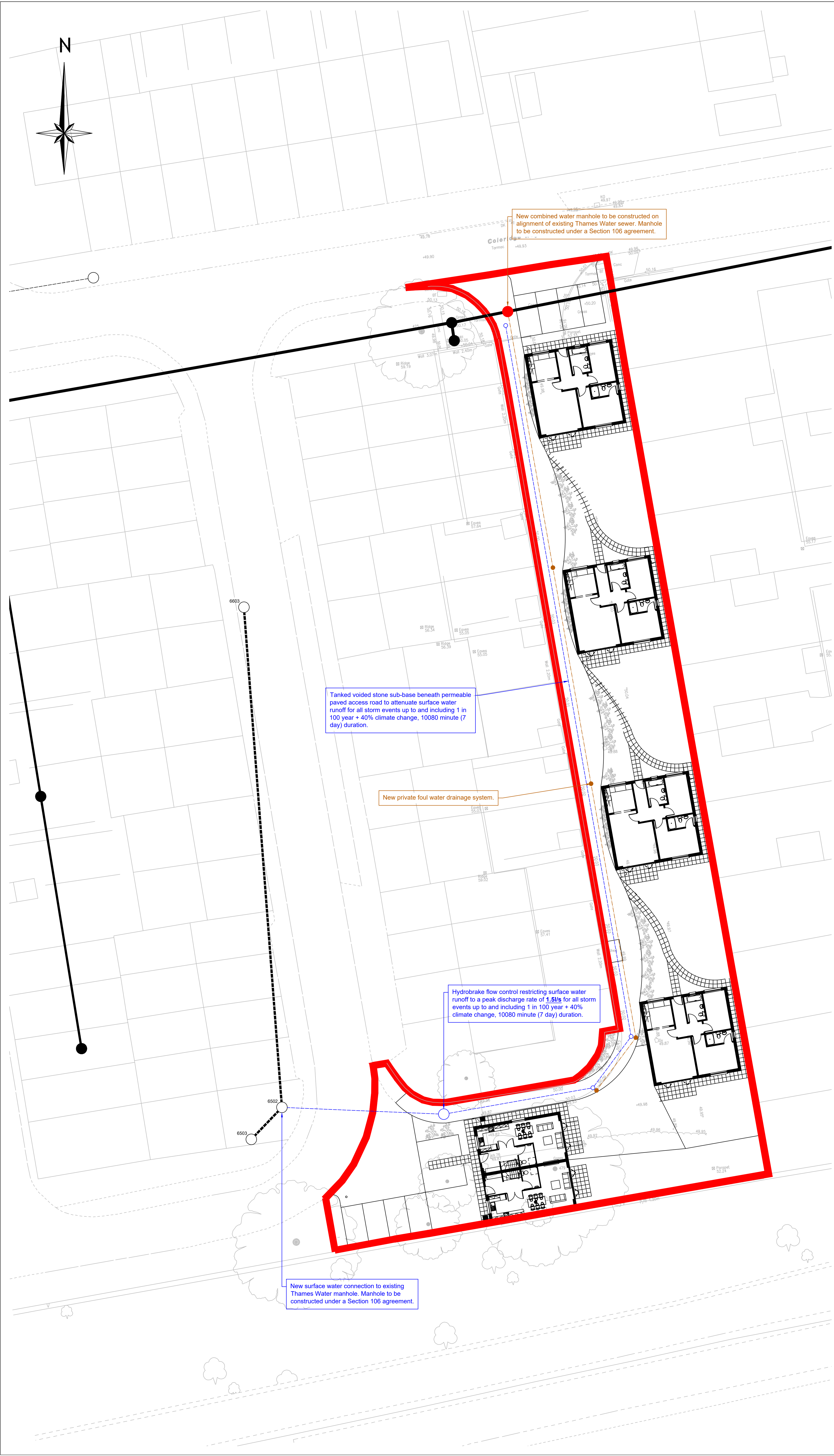
WORDSWORTH WAY

KEATS WAY



APPENDIX E – DRAWING 08-0050-001 – FOUL AND SURFACE WATER

DRAINAGE LAYOUT



G30 Consulting Ltd

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Copying of these plans in full or in part is not permitted unless the written consent of G30 Consulting Ltd is obtained.

General Notes

1. Do not scale this drawing.
2. All dimensions are in millimeters unless stated otherwise.
3. This drawing is to be read in conjunction with all other relevant drawings & specifications.
4. All proprietary items to be installed in strict compliance with manufacturers instructions and recommendations.
5. No works shall commence on site until approval has been obtained from all relevant Agencies / Authorities.
6. All dimensions referred to in this drawing must be verified.

Key

- Site boundary
- Surface water drainage - Existing manhole
- Surface water drainage - Existing drain
- Surface water drainage - Proposed manhole
- Surface water drainage - Proposed drain
- Combined water drainage - Existing manhole
- Combined water drainage - Existing drain
- Combined water drainage - Proposed manhole
- Foul water drainage - Proposed manhole
- Foul water drainage - Proposed drain

P2	Drainage revised in line with comments from Hillingdon Borough Council.	03.08.2020
P1	First Issue	31.01.2020
Revision	Description	Date

PRELIMINARY



G30
CONSULTING

59 Springfield Road, Sheffield, South Yorkshire, S7 2GG
W: www.g30consulting.com
E: enquiries@g30consulting.com
T: 0114 349 2720

Project
Inspired Design & Build Ltd
2 - 28 Wordsworth Way, West Drayton

Title
Foul and Surface Water Drainage Layout

Drawn by SG	Checked by SG	Paper Size A1
Drawing Number 08-0050-001		Revision P2
		Scale 1:200
		Date 31.01.2020

APPENDIX F – XP SOLUTIONS MICRODRAINAGE ATTENUATION

CALCULATIONS

G30 Consulting Ltd		Page 1
Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	2 - 28 Wordsworth Way, West Drayton - Permeable Paving Attenuation Calculation	
Date 03/08/2020 File PERMEABLE PAVING.SRCX	Designed by S. Griffiths Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

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

Half Drain Time : 481 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.335	0.335	0.0	1.5	1.5	37.0	O K
30 min Summer	9.406	0.406	0.0	1.5	1.5	48.6	O K
60 min Summer	9.471	0.471	0.0	1.5	1.5	59.1	O K
120 min Summer	9.547	0.547	0.0	1.5	1.5	71.6	O K
180 min Summer	9.581	0.581	0.0	1.5	1.5	77.1	O K
240 min Summer	9.595	0.595	0.0	1.5	1.5	79.4	O K
360 min Summer	9.594	0.594	0.0	1.5	1.5	79.3	O K
480 min Summer	9.577	0.577	0.0	1.5	1.5	76.5	O K
600 min Summer	9.558	0.558	0.0	1.5	1.5	73.5	O K
720 min Summer	9.540	0.540	0.0	1.5	1.5	70.4	O K
960 min Summer	9.506	0.506	0.0	1.5	1.5	64.9	O K
1440 min Summer	9.446	0.446	0.0	1.5	1.5	55.0	O K
2160 min Summer	9.359	0.359	0.0	1.5	1.5	40.8	O K
2880 min Summer	9.288	0.288	0.0	1.5	1.5	29.3	O K
4320 min Summer	9.193	0.193	0.0	1.5	1.5	14.0	O K
5760 min Summer	9.129	0.129	0.0	1.5	1.5	6.3	O K
7200 min Summer	9.092	0.092	0.0	1.4	1.4	3.2	O K
8640 min Summer	9.077	0.077	0.0	1.3	1.3	2.2	O K
10080 min Summer	9.068	0.068	0.0	1.1	1.1	1.7	O K
15 min Winter	9.335	0.335	0.0	1.5	1.5	37.0	O K
30 min Winter	9.406	0.406	0.0	1.5	1.5	48.6	O K
60 min Winter	9.471	0.471	0.0	1.5	1.5	59.2	O K
120 min Winter	9.549	0.549	0.0	1.5	1.5	71.9	O K
180 min Winter	9.583	0.583	0.0	1.5	1.5	77.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.759	0.0	38.5	24
30 min Summer	105.401	0.0	51.0	38
60 min Summer	65.136	0.0	63.6	66
120 min Summer	40.990	0.0	80.8	124
180 min Summer	30.666	0.0	90.9	184
240 min Summer	24.730	0.0	97.9	242
360 min Summer	18.003	0.0	107.0	360
480 min Summer	14.235	0.0	112.9	436
600 min Summer	11.808	0.0	117.0	494
720 min Summer	10.109	0.0	120.2	556
960 min Summer	7.875	0.0	124.7	684
1440 min Summer	5.496	0.0	130.2	958
2160 min Summer	3.814	0.0	134.9	1348
2880 min Summer	2.946	0.0	138.2	1704
4320 min Summer	2.058	0.0	143.5	2380
5760 min Summer	1.606	0.0	148.0	3048
7200 min Summer	1.338	0.0	152.8	3680
8640 min Summer	1.159	0.0	157.7	4408
10080 min Summer	1.032	0.0	162.7	5136
15 min Winter	161.759	0.0	38.5	23
30 min Winter	105.401	0.0	51.0	38
60 min Winter	65.136	0.0	63.6	66
120 min Winter	40.990	0.0	80.8	122
180 min Winter	30.666	0.0	90.9	180

G30 Consulting Ltd		Page 2
Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	2 - 28 Wordsworth Way, West Drayton - Permeable Paving Attenuation Calculation	
Date 03/08/2020 File PERMEABLE PAVING.SRCX	Designed by S. Griffiths Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	9.598	0.598	0.0	1.5	1.5	80.0	O K
360 min Winter	9.600	0.600	0.0	1.5	1.5	80.2	O K
480 min Winter	9.583	0.583	0.0	1.5	1.5	77.6	O K
600 min Winter	9.560	0.560	0.0	1.5	1.5	73.8	O K
720 min Winter	9.539	0.539	0.0	1.5	1.5	70.4	O K
960 min Winter	9.498	0.498	0.0	1.5	1.5	63.6	O K
1440 min Winter	9.417	0.417	0.0	1.5	1.5	50.3	O K
2160 min Winter	9.293	0.293	0.0	1.5	1.5	30.1	O K
2880 min Winter	9.207	0.207	0.0	1.5	1.5	16.0	O K
4320 min Winter	9.094	0.094	0.0	1.4	1.4	3.3	O K
5760 min Winter	9.068	0.068	0.0	1.1	1.1	1.7	O K
7200 min Winter	9.057	0.057	0.0	0.9	0.9	1.2	O K
8640 min Winter	9.051	0.051	0.0	0.8	0.8	1.0	O K
10080 min Winter	9.047	0.047	0.0	0.7	0.7	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	24.730	0.0	97.9	238
360 min Winter	18.003	0.0	107.0	350
480 min Winter	14.235	0.0	112.9	456
600 min Winter	11.808	0.0	117.0	546
720 min Winter	10.109	0.0	120.2	570
960 min Winter	7.875	0.0	124.7	724
1440 min Winter	5.496	0.0	130.2	1028
2160 min Winter	3.814	0.0	134.9	1408
2880 min Winter	2.946	0.0	138.2	1732
4320 min Winter	2.058	0.0	143.5	2292
5760 min Winter	1.606	0.0	148.0	2936
7200 min Winter	1.338	0.0	152.9	3648
8640 min Winter	1.159	0.0	157.8	4320
10080 min Winter	1.032	0.0	162.8	5080

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Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	2 - 28 Wordsworth Way, West Drayton - Permeable Paving Attenuation Calculation	
Date 03/08/2020	Designed by S. Griffiths	
File PERMEABLE PAVING.SRCX	Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

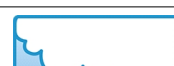
Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 506737 178628 TQ 06737 78628
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.102

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	5 0.068	5	10 0.034

G30 Consulting Ltd		Page 4
Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	2 - 28 Wordsworth Way, West Drayton - Permeable Paving Attenuation Calculation	
Date 03/08/2020	Designed by S. Griffiths	
File PERMEABLE PAVING.SRCX	Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 100.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	109.0
Max Percolation (l/s)	151.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	9.000	Membrane Depth (m)	0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0064-1500-0600-1500		
Design Head (m)	0.600		
Design Flow (l/s)	1.5		
Flush-Flo™	Calculated		
Objective	Minimise upstream storage		
Application	Surface		
Sump Available	Yes		
Diameter (mm)	64		
Invert Level (m)	9.000		
Minimum Outlet Pipe Diameter (mm)	100		
Suggested Manhole Diameter (mm)	1200		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	1.5	Kick-Flo®	0.391	1.2
Flush-Flo™	0.179	1.5	Mean Flow over Head Range	-	1.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	0.800	1.7	2.000	2.6	4.000	3.6	7.000	4.7
0.200	1.5	1.000	1.9	2.200	2.7	4.500	3.8	7.500	4.8
0.300	1.4	1.200	2.1	2.400	2.8	5.000	4.0	8.000	5.0
0.400	1.3	1.400	2.2	2.600	2.9	5.500	4.1	8.500	5.1
0.500	1.4	1.600	2.3	3.000	3.1	6.000	4.3	9.000	5.3
0.600	1.5	1.800	2.5	3.500	3.4	6.500	4.5	9.500	5.4

APPENDIX G – SUDS FEATURE FUTURE MAINTENANCE SCHEDULES

Operation and maintenance requirements for Rainwater Harvesting (Waterbutts)		
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters.	Annually (and following poor performance)
	Cleaning of tank inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris.	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters.	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 229.

Operation and maintenance requirements for Proprietary Treatment Systems		
Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary- indicated by system inspections or immediately following significant spill
Regular Maintenance	Replacement of any filters	Three monthly (or as required)
Remedial Actions	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 287.

Operation and maintenance requirements for Trees		
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris.	Monthly (or as required)
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check tree health and manage tree appropriately.	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary.	Annually, or as required.
	Water.	As required (in periods of drought).
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies.	Half yearly

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 382.

Operation and maintenance requirements for Pervious Pavements		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements.
Remedial Actions	Remediate and landscaping which through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required.
	Remedial works to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging).

Monitoring	Initial inspection	Monthly for the three months after installation.
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hours after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers.	Annually

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 430.