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FLOOD RISK ASSESSMENT and SUDS STRATEGY

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Quality Standards Control

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

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1 EXECUTIVE SUMMARY

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

The site is currently occupied by 2 dwellings and located at 13 and 13A The Drive, Ickenham

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

The proposed strategy presented in detail in this report proposed to drain the site via infiltration through permeable paving. The existing site drains via soakaways and so the ground conditions are proven to be effective for infiltration. Soakaway testing will be completed to confirm prior to construction. For the purposes of this report a conservative infiltration rate of 2×10^{-6} m/s has been assumed.

An additional 10% allowance for urban creep has been included in the sizing of attenuation. Maintenance/management of all onsite drainage infrastructure has been considered within a separate maintenance plan appended to this report. This will be updated through the development process.

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

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

Foul Drainage

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

2 INTRODUCTION

- 2.1.1 Jomas was commissioned to undertake a Drainage Assessment for the proposed development of the site located at 13 and 13A The Drive, Ickenham.
- 2.1.2 The proposed development comprises the construction of a new residential block and associated external works.
- 2.1.3 This Flooding and Drainage Assessment has been produced in support of a planning application and should be read in conjunction with the other planning documents.

3 SITE DESCRIPTION

- 3.1.1 The site is approximately 1550 square metres in size and is occupied by 2 dwellings.
- 3.1.2 Pre-development, the site is approximately 52% impermeable. Post development, the impermeable area will increase to approximately 59%.
- 3.1.3 The site location information is as follows:
- Nearest Postcode: UB10 8AF.

3.2 Topography

Site Topography

- 3.2.1 The site survey and existing plan is provided in appendix B. The site is relatively flat with a gentle fall towards the street.

4 DESIGN PRINCIPLES AND POLICY REQUIREMENTS

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

4.1.2 Report to be prepared in accordance with the National Planning Policy Framework (NPPF), the accompanying Planning Practice Guidance (PPG), and the London Borough of Hillingdon Strategic Flood Risk Assessment (SFRA) and SUDS policies as the Lead Local Flood Authority (LLFA).

4.2 General Principles for Flooding

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

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

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

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

4.3 General Principles for Surface Water Drainage

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

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

- discharge rainwater to the combined sewer.

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

5 FLOODING INFORMATION

5.1 Flood Risk from Rivers (Fluvial)

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

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

5.2 Coastal and Tidal Flood Risk

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

5.3 Geology and Hydrogeology (Groundwater)

5.3.1 The British Geological Survey (BGS) mapping available on line suggests that the area is underlain by London Clay Formation - Clay and Silt. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas.

5.3.2 The MAGIC Map indicates the area is not of any note regarding ground conditions.

5.3.3 The site is not located within a Source protection zone.

5.3.4 On site infiltration testing will be completed as part of the site investigation works, however it is likely that soakaways will work as the existing site drains via soakaways.

5.3.5 While groundwater may rise above ground level due to the likely permeable ground, it is unlikely to cause any flooding as the site falls away to the street and the building level is set 300mm above the existing ground level, hence the risk of flooding from ground water is considered very low.

5.4 Surface Water Flood Risk (Overland Flows)

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

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

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

Table 1: EA Surface Water Flood Risk Categories

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

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

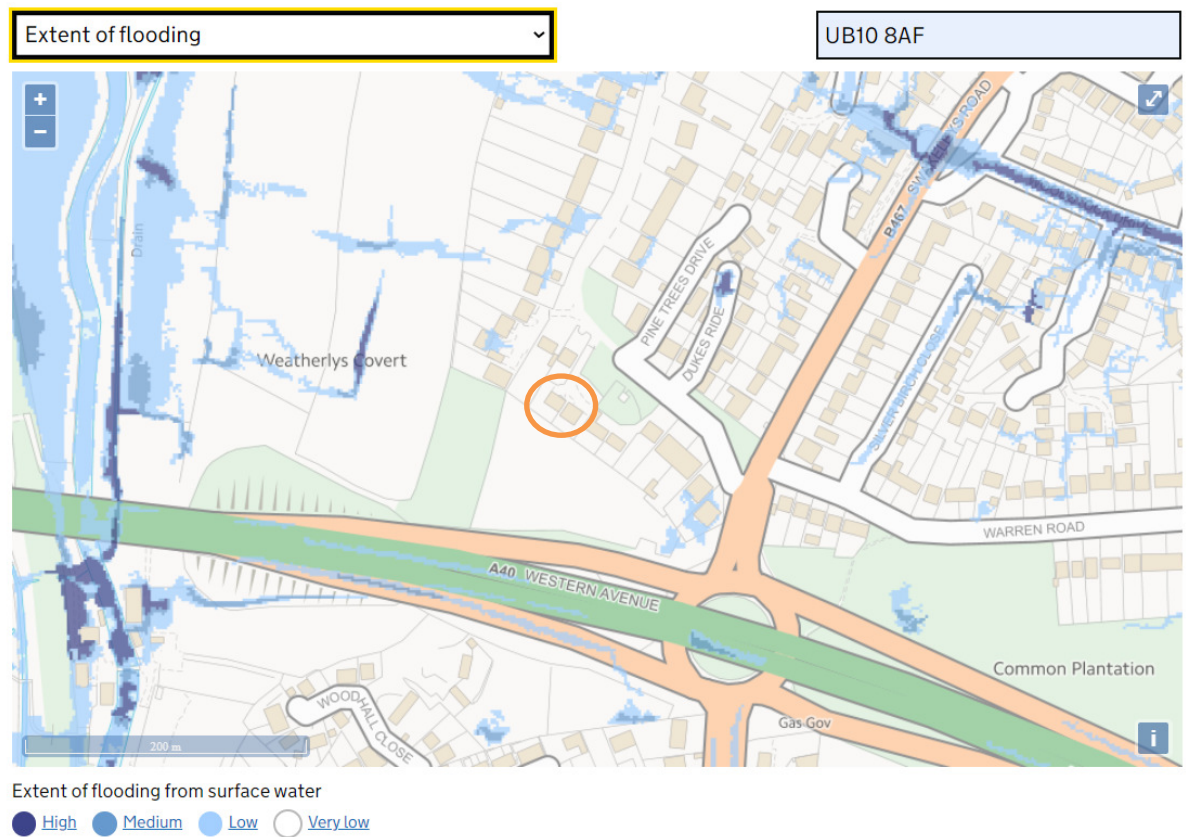


Figure 1: EA Flood Risk from Surface Water Map

- 5.4.5 The local Flood Risk Management Strategy does not show any risk of surface water flooding within this area.
- 5.4.6 Based on the EA's mapping, the local SFRA, historical data and local topography, the risk of surface water flooding to the site is considered to be very low.

5.5 Sewer/Drainage Flood Risk

- 5.5.1 Sewer flooding is often caused by excess surface water entering the drainage system when there is insufficient sewer capacity to cope with this excess water, but also due to 'one off' events such as blockages.
- 5.5.2 Thames Water is the statutory undertaker for the local public sewer network. The nearest Thames Water sewers to the site are located within the street.
- 5.5.3 As the natural topography of the site falls away towards the street, this indicates that the site is at very low risk of sewer flooding.
- 5.5.4 There are no records within any local flooding and drainage documents of sewer flooding in the area.
- 5.5.5 On the basis there is considered to be a very low risk of sewer flooding to the site.

5.6 Reservoir Flood Risk

- 5.6.1 The EA has produced a Reservoir Flood Map that shows that the site is at risk from reservoir flooding. This map indicates very low risk of reservoir flooding at this site.
- 5.6.2 It should be emphasised that the risk of flooding from reservoir breach is very small since the EA is the enforcement authority for the Reservoirs Act (1975) and all large raised reservoirs are inspected and supervised by reservoir panel engineers.
- 5.6.3 On the basis there is considered to be a negligible risk of reservoir flooding to the site.

5.7 Summary of risk levels

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

Table 2: Flood Risk Categories

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

6 SITE DRAINAGE INFORMATION

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

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

Discharge to Ground

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

6.1.3 The existing site drains via soakaway hence it is likely to be suitable for infiltration. Soakaway tests will be completed as part of the site investigation to confirm.

Discharge to Surface Water Body

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

Discharge to Surface Water Sewer/Combined Sewer

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

6.1.6 It is not proposed to connect the surface water to sewer.

6.2 Sustainable Drainage Systems (SuDS)

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

Table 3: SuDS Selection Based on the SuDS Hierarchy

Component	Recommendation
Green/Blue roofs	Whilst the use of green and blue roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and orientation must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority. If feasible, depending on the roof design, a green/blue roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green/blue roof/s will offer some attenuation for run-off, reducing volumes of run-off and in

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

7 SURFACE WATER DRAINAGE DESIGN

7.1 Site Areas

7.1.1 The development area currently comprises 2 dwellings and associated external works. The existing and proposed areas are summarised below.

Table 4: Site Areas

Parameter	Existing (m2)	Existing (%)	Proposed (m2)	Proposed (%)
Impermeable area	806	52	910	59
Permeable area	744	48	640	41
Total area	1550	100	1550	100

7.1.2 The existing surface water runoff from the site is currently drained to soakaways.

7.2 Design Considerations

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

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. To include an allowance for urban creep, the impermeable area used in the drainage calculations has been increased by 10% in accordance with the recommendation made in SC030219.

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

7.3 Greenfield Run-Off Rates

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

7.4 Existing Run-Off Rates

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

7.4.2 The total site area is 1550 square metres and is 52% impermeable, resulting in an impermeable area of 806 square metres. Taking conservative peak 1 year, 30 year and 100 year rainfall rates of 50mm/hr, 125mm/hr and 185mm/hr respectively, the maximum existing peak discharge rates have been calculated as follows.

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

$$806/1000 \times 50 \times 2.78 = \mathbf{11.2 \text{ l/s}}$$

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

$$806/1000 \times 125 \times 2.78 = \mathbf{28.0 \text{ l/s}}$$

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

$$806/1000 \times 185 \times 2.78 = \mathbf{41.5 \text{ l/s}}$$

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

Table 5: Existing Run-off Rates

Parameter	Existing Discharge (l/s)	Greenfield Discharge (l/s)	Proposed Discharge (l/s)
QBAR	NA	0.67	NA
1 year	11.2	0.57	0
30 year	28.0	1.55	0
100 year	41.5	2.15	0
100 year +40%	NA	NA	0

7.4.4 There is no proposed discharge from the site as the site is to drain via soakaway

7.4.5 Infiltration testing will be completed as part of the site investigation works and the soakway design revised to suit the infiltration rate.

7.5 Flood Risk Reduction

7.5.1 It is proposed to drain the site via infiltration through permeable paving. The existing site drains via soakaways and so the ground conditions are proven to be effective for infiltration. Soakaway testing will be completed to confirm prior to construction. For the purposes of this report a conservative infiltration rate of 2×10^{-6} m/s has been assumed.

7.5.2 Details of the drainage system and soakaway structures are presented in the design drawings and calculations in Appendix C.

7.5.3 Storage is provided in permeable paving in the front yard. A total volume of approximately 100 cubic metres is proposed to cater for the 100 year +40% storm event.

7.5.4 The calculations include an assessment of the attenuation for all storm events up to the 100-year storm +40% climate change.

7.5.5 All external areas will be constructed using permeable material to mimic natural drainage as far as possible.

7.6 Exceedance Flooding and Overland Flow

- 7.6.1 The area is not subject to overland flow routes or surface water flooding as discussed in the Flooding section above.
- 7.6.2 The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the overland flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site.
- 7.6.3 Due to the site levels falling gently to the permeable paved area, all overland flow will pond within the carpark area and should there be further overflow, it will be out to the street. See overland flow plan in Appendix C.

7.7 Basement Drainage

- 7.7.1 The proposed development includes a large basement area. This will include a foul pump station and a basement drainage system. See Appendix C for details of the basement drainage.

7.8 Consents, Offsite Works and Diversions

- 7.8.1 The proposed surface water drainage strategy is accommodated mostly on site with consent required from Thames Water for the foul sewer connection within the street should it be required.

7.9 Maintenance

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

8 WATER QUALITY

8.1 Post-Development Water Quality Treatment

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

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

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

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

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

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

8.1.4 The proposed drainage strategy utilises the following SuDS features:

- Permeable Paving

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

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

TABLE 26.3	Indicative SuDS mitigation indices for discharges to surface waters			
		Mitigation indices ¹		
	Type of SuDS component	TSS	Metals	Hydrocarbons
	Filter strip	0.4	0.4	0.5
	Filter drain	0.4 ²	0.4	0.4
	Swale	0.5	0.6	0.6
	Bioretention system	0.8	0.8	0.8
	Permeable pavement	0.7	0.6	0.7
	Detention basin	0.5	0.5	0.6
	Pond ⁴	0.7 ³	0.7	0.5
	Wetland	0.8 ³	0.8	0.8
	Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

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

Total SuDS mitigation index $\geq$ pollution hazard index

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

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

Table 8: Roof Space Water Quality Mitigation Summary

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

Table 9: External Areas Water Quality Mitigation Summary

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

- 8.1.8 Therefore, it can be concluded that the provision of permeable paving exceeds the required pollution mitigation indices and provides sufficient treatment as part of the surface water management train, in accordance with the 2015 SuDS Manual (CIRIA C753).
- 8.1.9 As the site is not located in a Source Protection Zone, there is nothing further required to ensure the risk of pollution to groundwater is minimised.

9 FOUL DRAINAGE

9.1 Discharge to Public Sewer Network

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

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

10 DRAINAGE DURING CONSTRUCTION

10.1 Construction Run-off Management

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

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

10.2 Management of Construction (Including Drainage)

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

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

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

10.3 Temporary Drainage During Construction

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

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

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

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

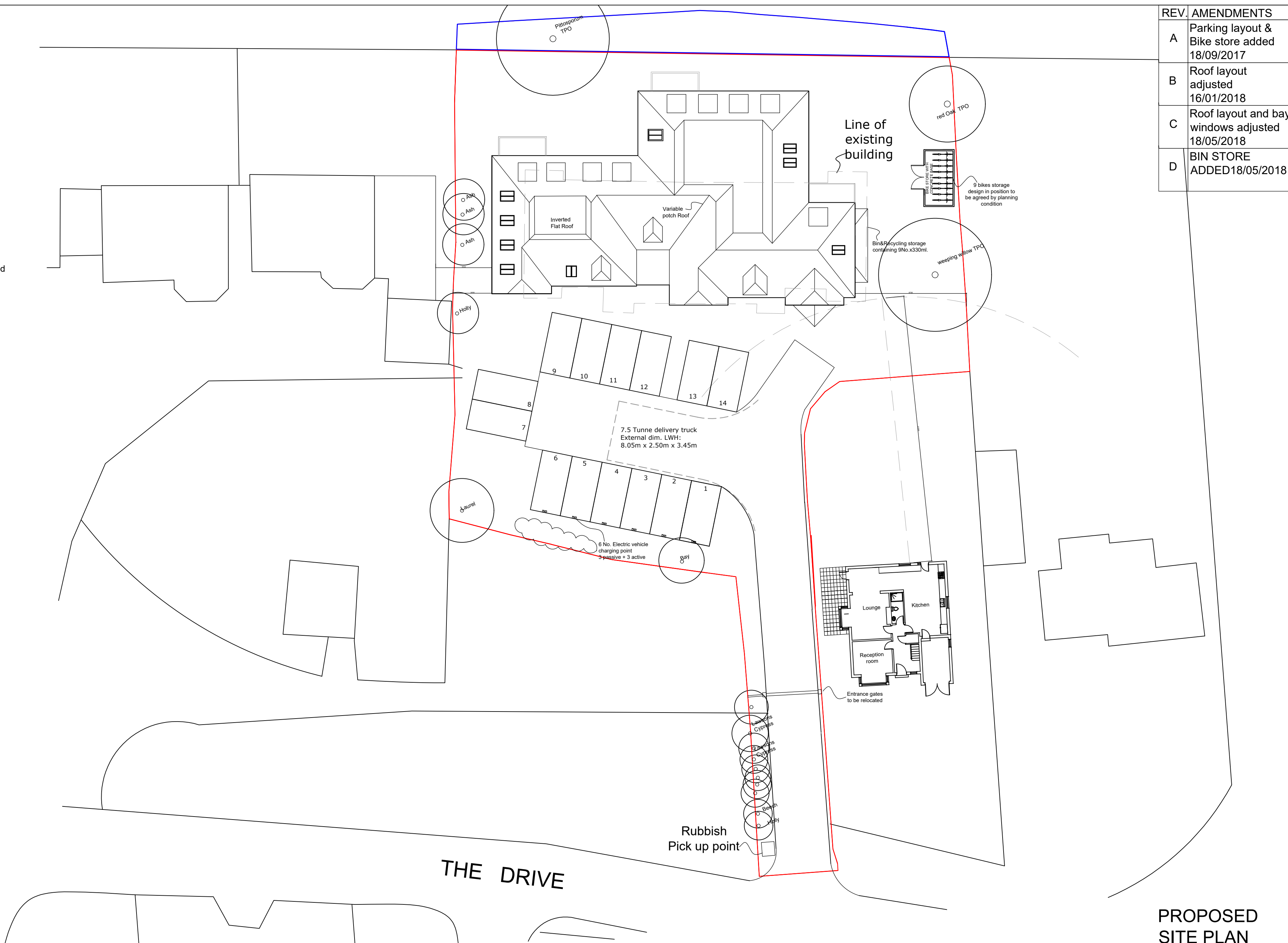
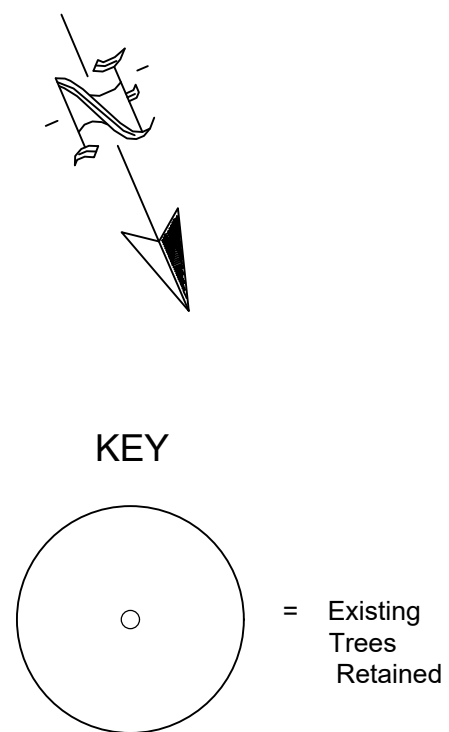
10.3.5 Run-off control measures will need to be implemented in order not overwhelm the temporary system and cause flooding issues. Run-off rates from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockage. Any additional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

- 10.3.6 Run-off control to include provision of perimeter ditches or appropriate levels grading to direct any water from the construction site to remain on site.
- 10.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 10.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

10.4 Protection of Drainage Infrastructure during Construction

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

Appendix A: Proposed Development Details



REV.	AMENDMENTS
A	Parking layout & Bike store added 18/09/2017
B	Roof layout adjusted 16/01/2018
C	Roof layout and bay windows adjusted 18/05/2018
D	BIN STORE ADDED 18/05/2018

13 & 13A THE DRIVE , ICKENHAM, UB10 8AF

Scale Bar
0 1 2 3 4 5 6 7 8 9 10 Metres

1:200 @ A2



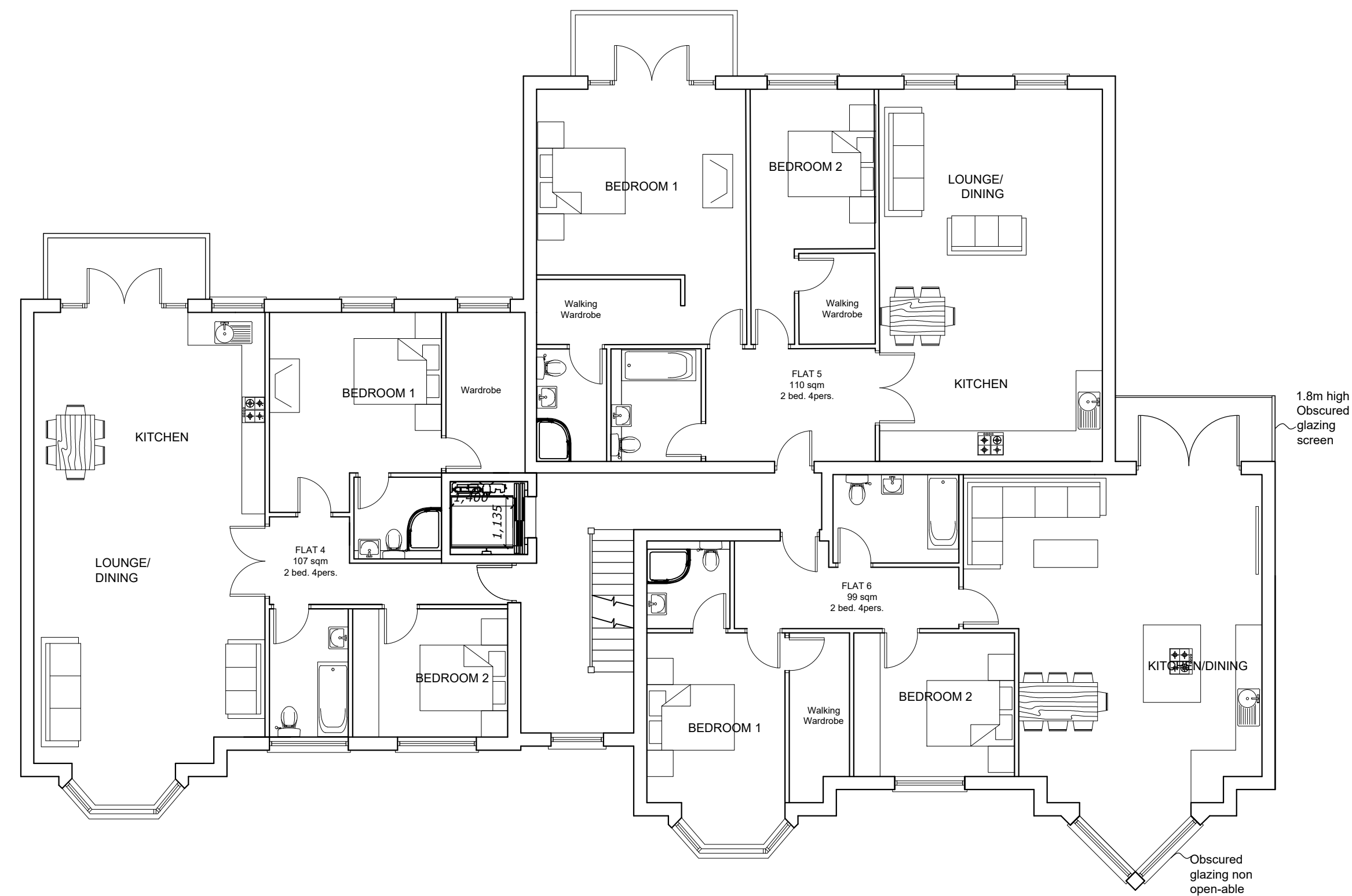
THE GILLETT MACLEOD PARTNERSHIP
Chartered Architects & Town Planning Consultants
1 High Road Old Eastcote Pinner Middlesex HA5 2EW tel. 0208 868 1333

Drg. No. 17/3101/2^D
Scale 1:200
Date 16/05/17
Drawn by AK

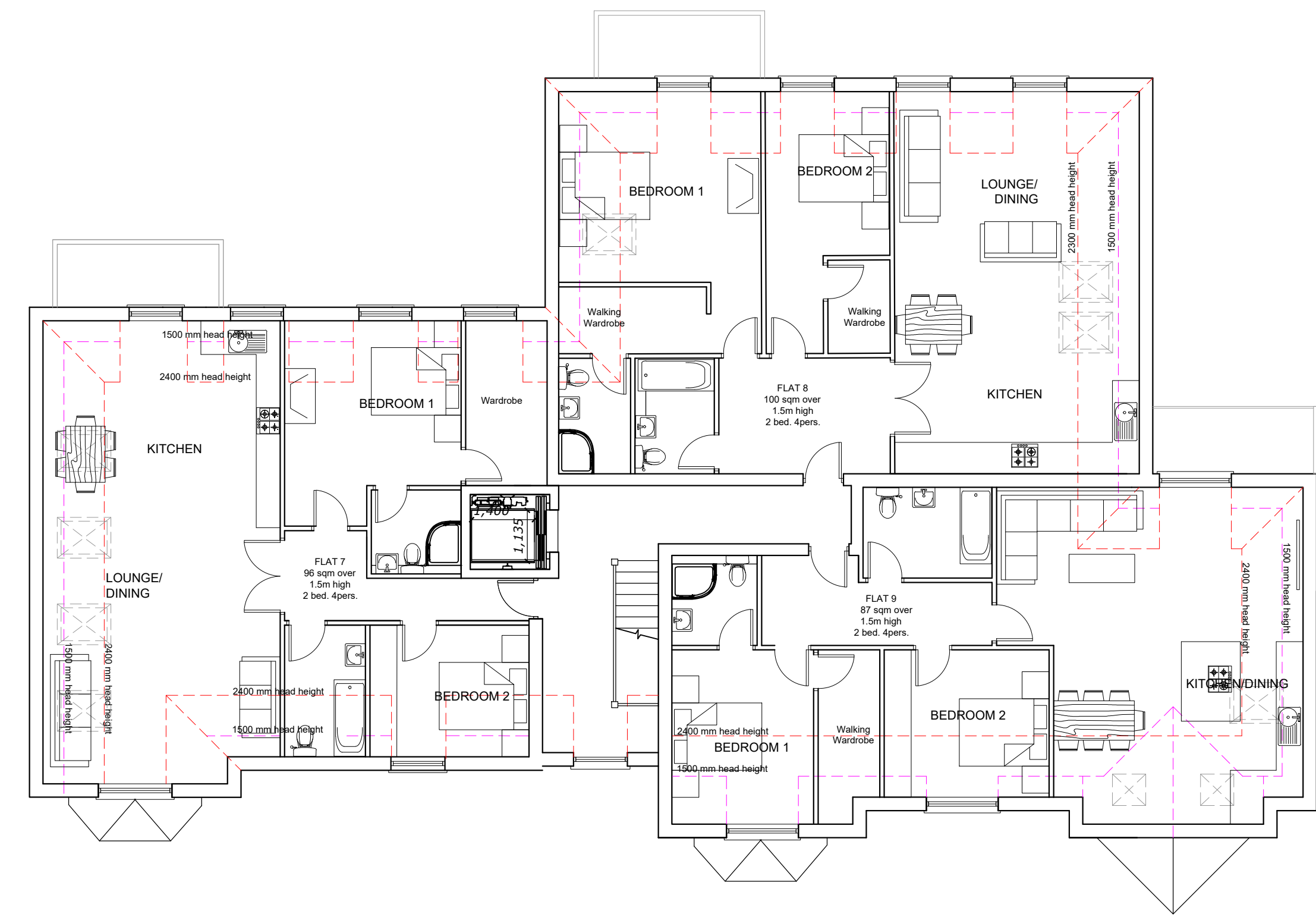
PROPOSED
SITE PLAN

REVISION
D
drawn

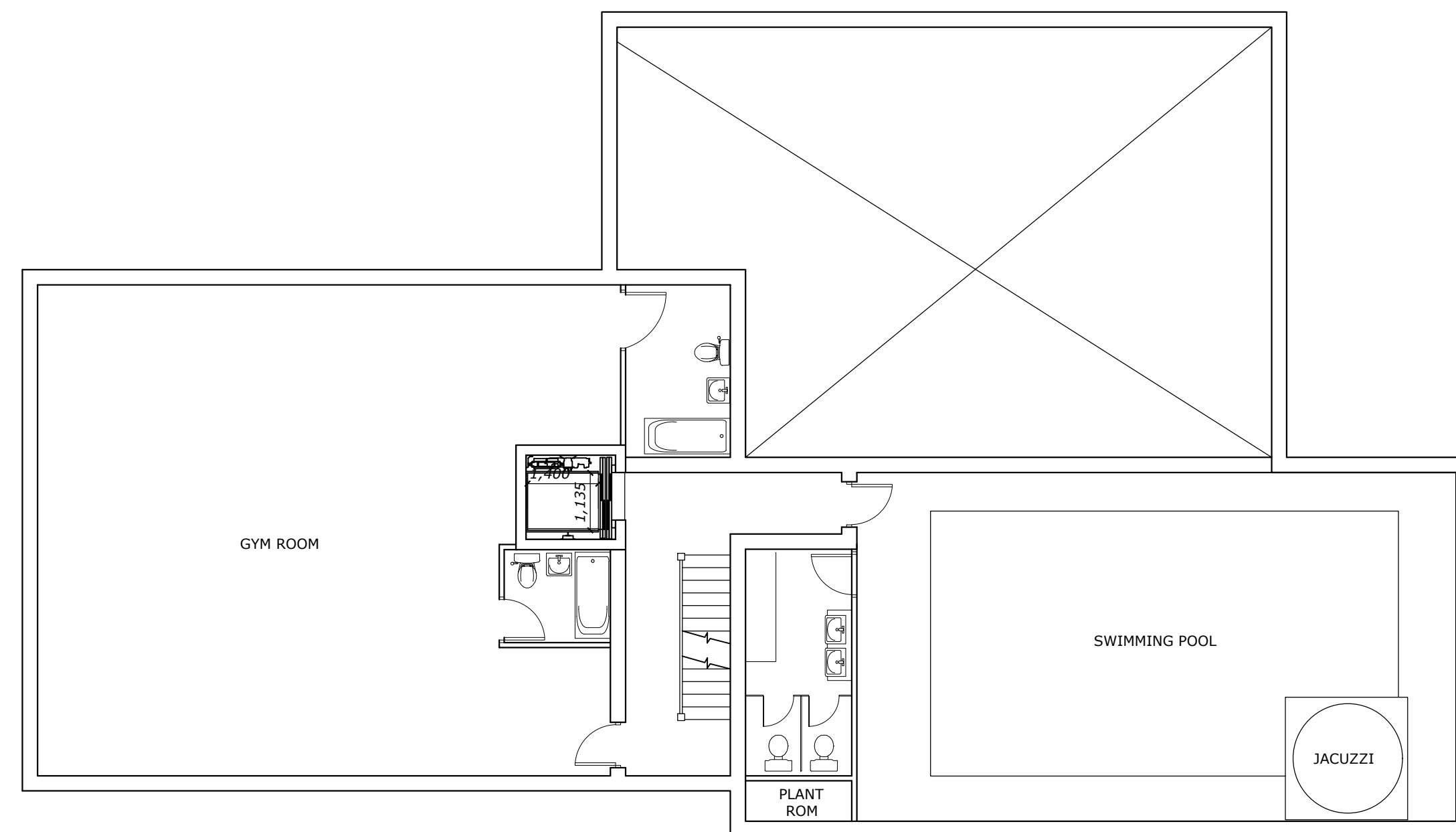
REV.	AMENDMENTS
A	Layout, scale adjusted 16/01/2018
C	Dormers, rooflight adjusted 12/03/2018
D	Roof layout and bay windows adjusted 18/05/2018
E	Layout adjusted 07/01/2019



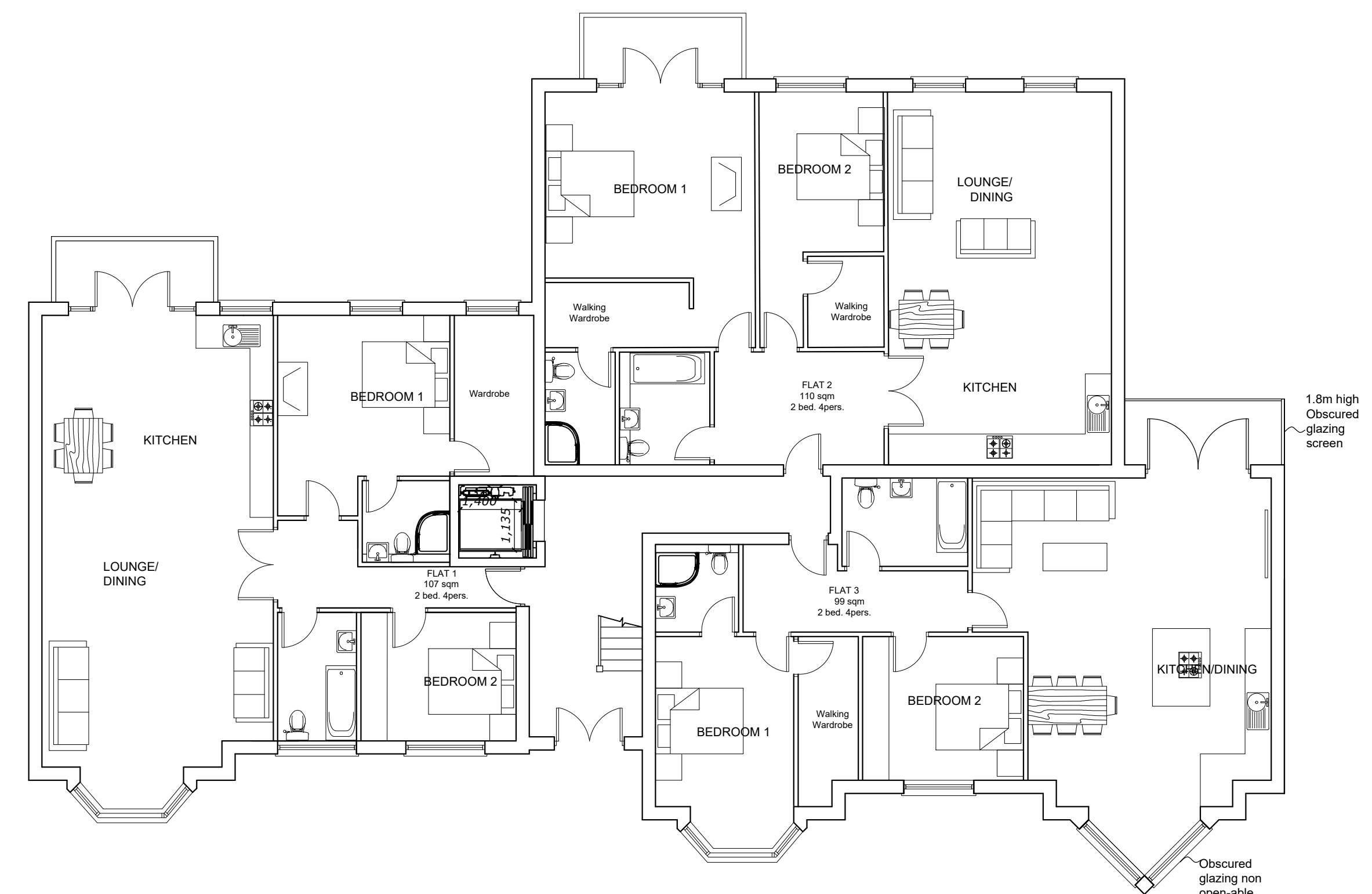
FIRST FLOOR



SECOND FLOOR



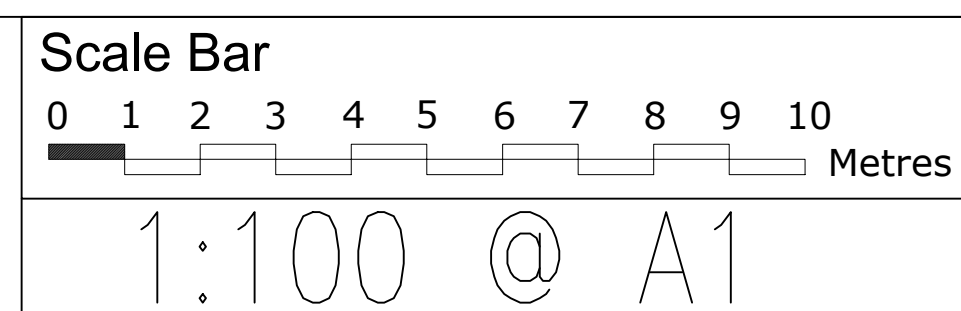
LOWER GROUND FLOOR



GROUND FLOOR

PROPOSED FLOOR PLANS

13 & 13A THE DRIVE , ICKENHAM, UB10 8AF



THE GILLET MACLEOD PARTNERSHIP
Chartered Architects & Town Planning Consultants
1 High Road Old Eastcote Pinner Middlesex HA5 2EW tel. 0208 868 1333

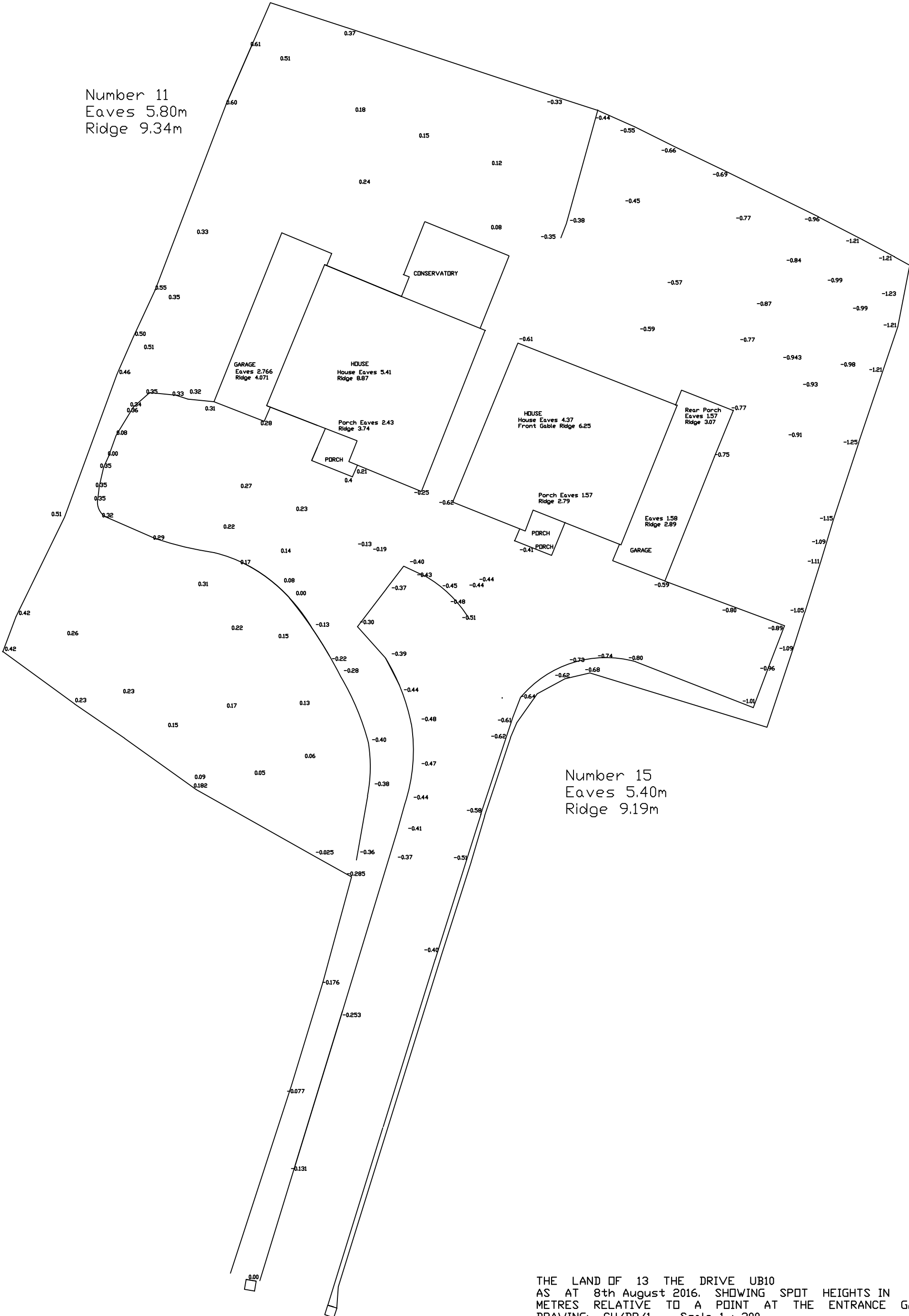
Drg. No.	17/3101/3 ^E
Scale	1:100
Date	16/05/17
Drawn by	AK

REVISION
E
C drawer

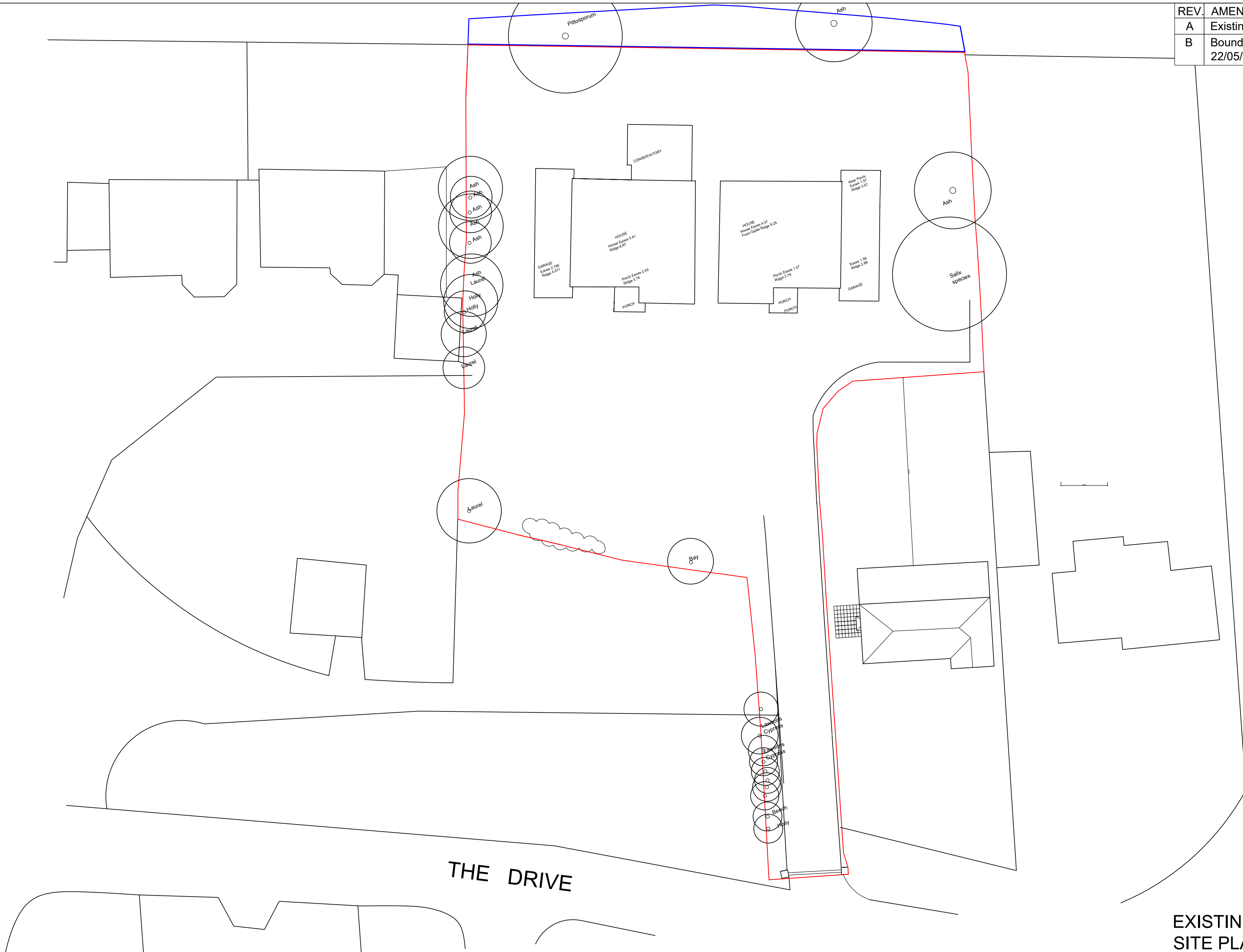


Appendix B: Existing Site

Number 11
Eaves 5.80m
Ridge 9.34m



Number 15
Eaves 5.40m
Ridge 9.19m



REV.	AMENDMENTS
A	Existing Trees
B	Boundary adjusted 22/05/18

13 & 13A THE DRIVE , ICKENHAM, UB10 8AF

Scale Bar
0 1 2 3 4 5 6 7 8 9 10 Metres
1:200 @ A2



THE GILLETT MACLEOD PARTNERSHIP
Chartered Architects & Town Planning Consultants
1 High Road Old Eastcote Pinner Middlesex HA5 2EW tel. 0208 868 1333

Drg. No. 17/3101/1^B
Scale 1:200
Date 16/05/16
Drawn by A.Razick

REVISION
B
(C) drawer



Appendix C: Drainage Drawings and Calculations

Asset location search



Property Searches

andrew wallace
22Park Rise
HARPENDEN
AL5 3AL

Search address supplied 13
The Drive
Ickenham
Uxbridge
UB10 8AF

Your reference drive

Our reference ALS/ALS Standard/2020_4324863

Search date 16 December 2020

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: 13, The Drive, Ickenham, Uxbridge, UB10 8AF

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

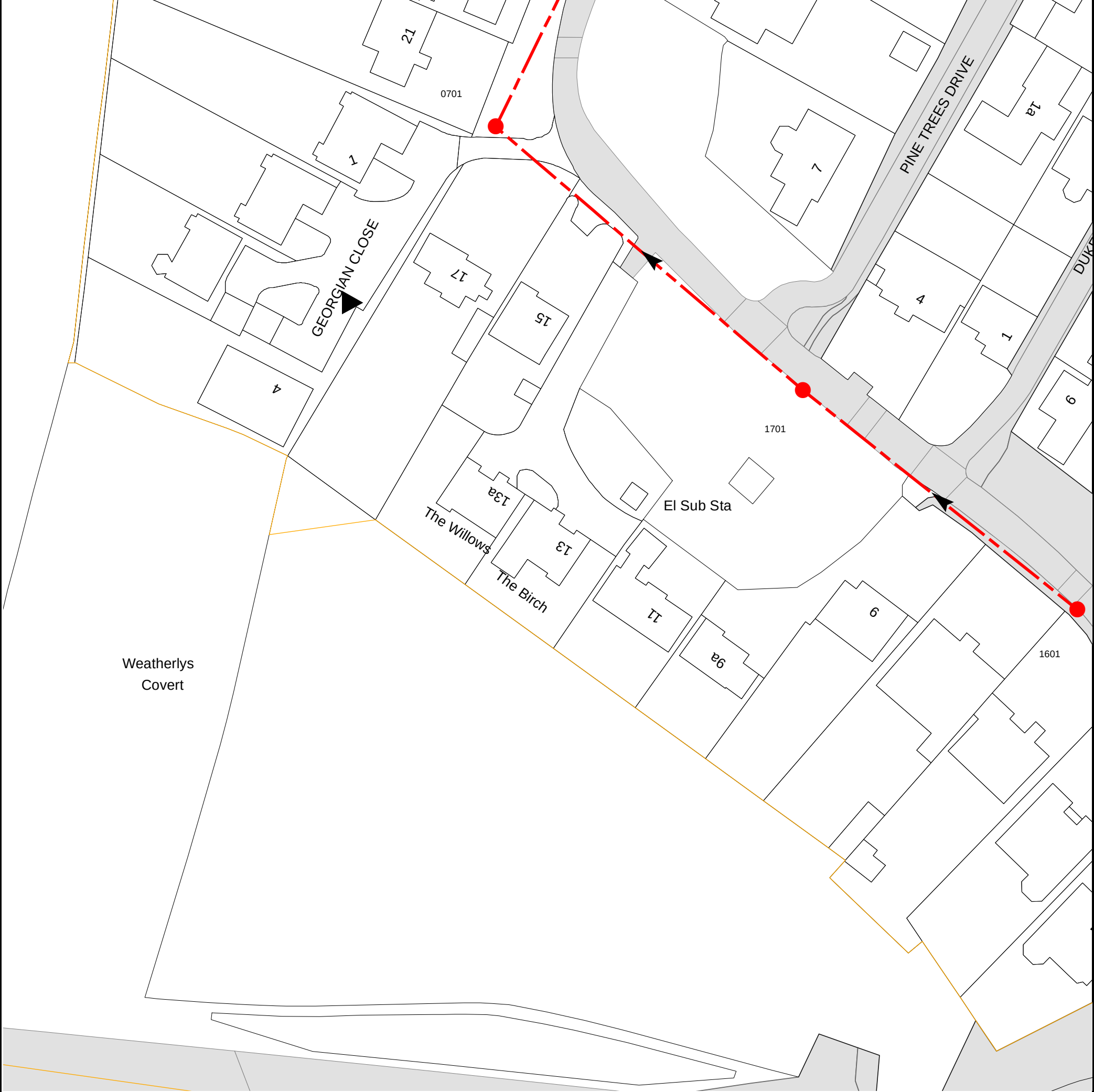
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

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 width of the displayed area is 200 m and the centre of the map is located at OS coordinates 506085,185695
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
1601 1701 0701	60.6 60.19 58.52	59.56 58.75 56.54
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.

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	andrew wallace
Site name:	the drive
Site location:	ickenham

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

Site Details

Latitude:	51.56034° N
Longitude:	0.47072° W
Reference:	1957443353
Date:	Dec 16 2020 10:57

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.155
-----------------------	-------

Methodology

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

Soil characteristics

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

Hydrological characteristics

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

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.67	0.67
1 in 1 year (l/s):	0.57	0.57
1 in 30 years (l/s):	1.55	1.55
1 in 100 year (l/s):	2.15	2.15
1 in 200 years (l/s):	2.52	2.52

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR
NOTE: CONTRACTOR TO NOTE THE LIKELY PRESENCE OF MULTIPLE EXISTING SERVICES.
ALL SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND DIVERTED AS NECESSARY

DRAINAGE CONCEPT LEGEND

Ø100@1:100>

Surface Water Pipe - Diameter and fall

Ø100@1:100>

Perforated Surface Water Pipe - Diameter and fall



SMH
CL 80.90
IL 80.00

Manhole type - SMH Surface Water
Cover Level
Invert Level



Polypropylene Inspection Chamber (PPIC)



Rain Water Pipe

Ø150@1:100>

Foul Pipe - Diameter and fall



FMH
Ø1200
CL 80.90
IL 80.00

Manhole type - FMH Foul Water
Diameter
Cover Level
Invert Level



Polypropylene Inspection Chamber (PPIC)



Sewer Vent Pipe/Sub Stack/Outlet

18.30+

Proposed Level

FFL 80.90

Finished floor level

Ø150@1:100>

Existing Foul sewer

Ø100@1:100>

Existing Surface Water sewer



Permeable Paving

Job. No. P3226J2132 Rev.

DRAINAGE NOTES

- THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
- CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
- ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
- ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
- ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
- THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1: SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
- ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.
- NODE NUMBERS REFER TO DRAINAGE MODEL OUTPUT IN REPORT
- UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING Ø100@1:40,
FOUL PIPES EXTERNAL Ø100@1:80,
SURFACE WATER PIPES Ø150@1:100

Notes.

Copyright of this plan is held by Jomas Associates Ltd.
No responsibility is taken for amendments by others.
Do not scale from copies or PDF's.

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

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

Amendments

Rev	Date		By	Chkd
A	19.05.21	REVISED TO LLFA COMMENTS	AW	AW



Client

Matthew Singh

Project

13 & 13A The Drive,
Ickenham

Drawing

Proposed Drainage Plan

Dwg no	Checked	Surveyor
C01	AW	NA

Date	18.12.20	Scale	1:100 @ A1
Job No.	P3226J2132		

Rev. A

Grid	Contours	Level Datum
------	----------	-------------

See Continuation Adjacent

See Continuation Adjacent

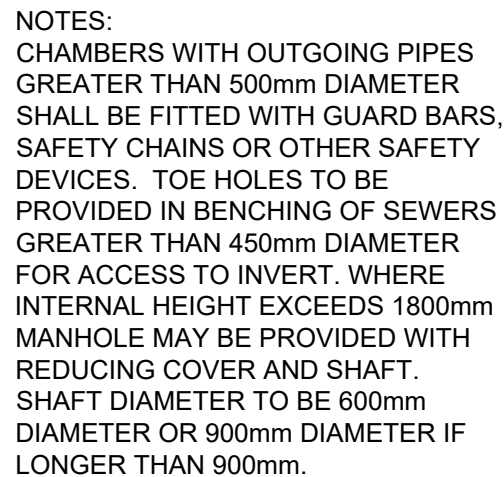
SADDLE
CONNECTION TO
EXISTING SEWER IF
EXISTING
CONNECTION

<EXISTING TW
FOUL SEWER

NOTE: Details for private drainage only.



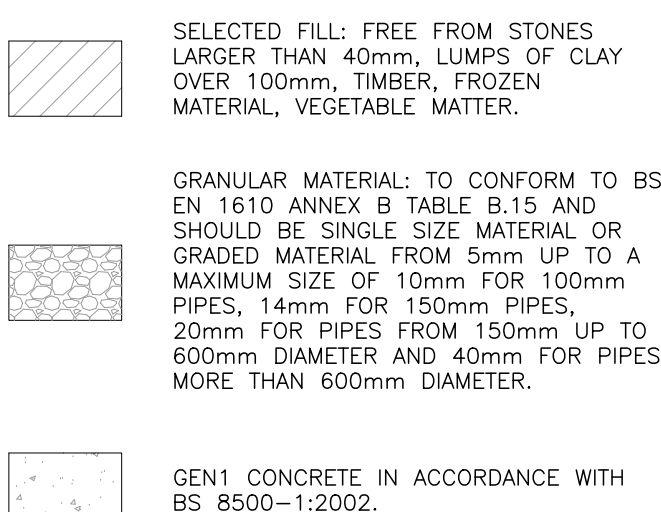
SCALE 1:20



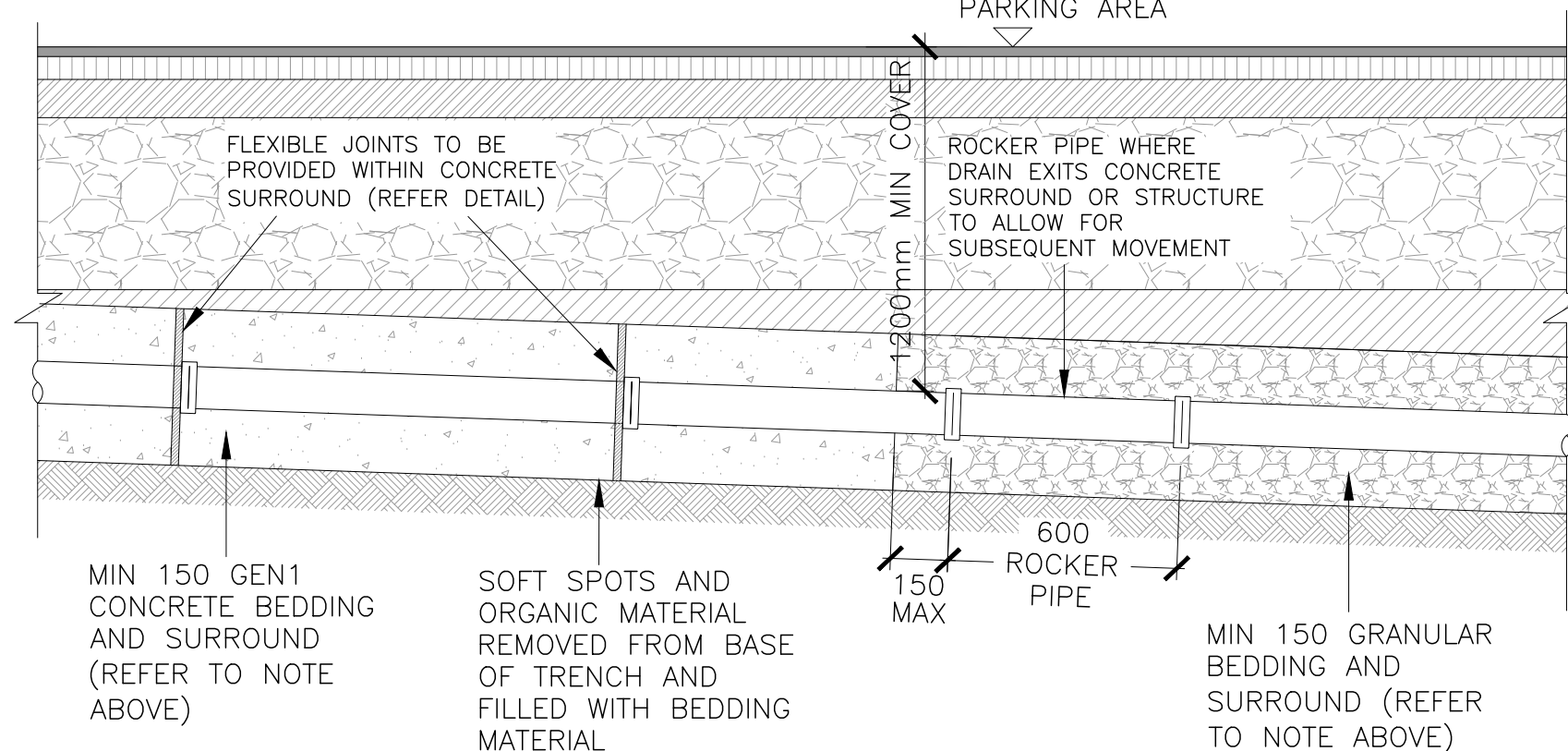
PIPE DIAMETER	ROCKER PIPE * LENGTH
150mm-450mm	500mm-750mm
475mm-750mm	750mm-1000mm
OVER 750mm	1200mm

* OR LINTEL AND COMPRESSIBLE SEALANT IN ACCORDANCE WITH CLAUSE 689 OF THE SPECIFICATION.

TYPICAL PCC MANHOLE DETAIL
DEPTH TO PIPE SOFFIT LESS THAN 1.5m



NOTE:
PIPES LESS THAN 1200mm BELOW ROADS
AND LESS THAN 600mm BELOW OTHER
EXTERNAL AREAS SHALL HAVE A 150mm
GEN1 CONCRETE SURROUND. OTHER THAN
PIPES CAST WITHIN PILECAPS ALL PIPES
BELOW SUSPENDED SLAB SHALL HAVE
GRANULAR SURROUND AS SHOWN.



SCALE 1:20

Amendments

Rev	Date		By	Chkd
A	19.05.21	REVISED TO LLFA COMMENTS	AW	AW



Jomas Associates Ltd.
6-9 The Square
Stockley Park
UB11 1FW
Tel. 0843 2892187

Client

Matthew Singh

Project

13 & 13A The Drive,
Ickenham

Drawing

Proposed Drainage Details

Dwg no	Checked	Surveyor
C03	AW	NA
Date 18.12.20	Scale	As shown
Job No.	P3226J2132	
		Rev. A
Grid	Contours	Level Datum



Job. No.

P3226J2132

Rev.

DRAINAGE NOTES

1. THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.

2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.

3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.

4. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.

5. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.

6. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1, SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.

7. ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.

8. UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING #100Ø1:40,
FOUL PIPES EXTERNAL #100Ø1:80,
SURFACE WATER PIPES #150Ø1:100

STORMWATER CONCEPT LEGEND

18.30x

Proposed Level

FFL 80.90

Finished floor level

←

Overland flow

Notes.

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

1. This survey has been computed and drawn about O S National Grid.

2. All levels are in metres and relate to O S National Datum by GPS instruments.

3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd
A	19.05.21	REVISED TO LLFA COMMENTS	AW	AW

JOMAS

Jomas Associates Ltd.
6-9 The Square
Stockley Park
UB11 1FW
Tel. 0843 2892187

Client

Matthew Singh

Project

13 & 13A The Drive,
Ickenham

Drawing

Proposed Overland Flow

Dwg no	Checked	Surveyor	
C03	AW	NA	
Date	18.12.20	Scale	1:100 @ A1
Job No.	P3226J2132	Rev.	A

Grid	Contours	Level Datum

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
OVERFLOW			10.300	1200	55.000	5.000	0.200
1	0.020	2.00	10.300	1200	55.000	10.000	1.300
2	0.020	2.00	10.300	1200	50.000	55.000	1.050
3	0.010	2.00	10.300	1200	30.000	60.000	1.000
4	0.020	2.00	10.300	450	27.000	70.000	0.900
5	0.020	2.00	10.300	450	52.000	60.000	1.000
6	0.010	2.00	10.300	450	47.000	60.000	0.700
7	0.010	2.00	10.300	450	60.000	70.000	0.900

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.002	2	1	45.277	0.600	9.250	9.000	0.250	181.1	150	3.90	50.0
1.001	3	2	20.616	0.600	9.300	9.250	0.050	412.3	150	2.88	50.0
1.000	4	3	10.440	0.600	9.400	9.300	0.100	104.4	150	2.18	50.0
2.001	5	2	5.385	0.600	9.300	9.250	0.050	107.7	150	2.33	50.0
3.000	6	5	5.000	0.600	9.600	9.300	0.300	16.7	150	2.03	50.0
2.000	7	5	12.806	0.600	9.400	9.300	0.100	128.1	150	2.24	50.0
1.003	1	OVERFLOW	5.000	0.600	10.100	10.100	0.000	0.0	150	3.98	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.002	0.743	13.1	12.2	0.900	1.150	0.090	0.0	115	0.842
1.001	0.489	8.6	4.1	0.850	0.900	0.030	0.0	72	0.481
1.000	0.983	17.4	2.7	0.750	0.850	0.020	0.0	40	0.718
2.001	0.968	17.1	5.4	0.850	0.900	0.040	0.0	58	0.858
3.000	2.479	43.8	1.4	0.550	0.850	0.010	0.0	18	1.111
2.000	0.886	15.7	1.4	0.750	0.850	0.010	0.0	30	0.541
1.003	1.000	17.7	14.9	0.050	0.050	0.110	0.0	0	∞

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00700	Safety Factor	1.0	Invert Level (m)	9.400
Side Inf Coefficient (m/hr)	0.00700	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	200.0	200.0	0.800	200.0	200.0	0.801	1.0	200.0

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00700	Safety Factor	1.0	Invert Level (m)	9.400
Side Inf Coefficient (m/hr)	0.00700	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	150.0	150.0	0.800	150.0	150.0	0.801	1.0	150.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00700	Safety Factor	1.0	Invert Level (m)	9.400
Side Inf Coefficient (m/hr)	0.00700	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	150.0	150.0	0.800	150.0	150.0	0.801	1.0	150.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 94.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	OVERFLOW	1	10.100	0.000	0.0	0.0000	0.0000	OK
240 minute winter	1	180	9.466	0.466	1.3	4.6434	0.0000	OK
240 minute winter	2	180	9.466	0.216	1.7	3.3089	0.0000	SURCHARGED
240 minute winter	3	180	9.466	0.166	1.0	3.2042	0.0000	SURCHARGED
240 minute winter	4	180	9.466	0.066	0.6	0.0397	0.0000	OK
240 minute winter	5	180	9.466	0.166	1.2	0.0927	0.0000	SURCHARGED
15 minute summer	6	9	9.620	0.020	1.7	0.0090	0.0000	OK
240 minute winter	7	180	9.466	0.066	0.3	0.0251	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.003	OVERFLOW	0.0	0.000	0.000	0.0000	0.0
240 minute winter	1	Infiltration		0.4				
240 minute winter	2	1.002	1	0.7	0.170	0.051	0.7971	
240 minute winter	2	Infiltration		0.3				
240 minute winter	3	1.001	2	-0.2	0.165	-0.024	0.3629	
240 minute winter	3	Infiltration		0.3				
240 minute winter	4	1.000	3	0.6	0.364	0.033	0.1307	
240 minute winter	5	2.001	2	1.1	0.264	0.067	0.0948	
15 minute summer	6	3.000	5	1.7	0.388	0.039	0.0426	
240 minute winter	7	2.000	5	0.3	0.168	0.018	0.1603	

Results for 10 year Critical Storm Duration. Lowest mass balance: 94.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	OVERFLOW	1	10.100	0.000	0.0	0.0000	0.0000	OK
240 minute winter	1	228	9.536	0.536	2.1	8.9804	0.0000	OK
240 minute winter	2	228	9.536	0.286	2.9	6.5935	0.0000	SURCHARGED
240 minute winter	3	228	9.536	0.236	1.6	6.4751	0.0000	SURCHARGED
240 minute winter	4	228	9.536	0.136	1.0	0.0823	0.0000	OK
240 minute winter	5	228	9.536	0.236	1.9	0.1322	0.0000	SURCHARGED
15 minute summer	6	9	9.628	0.028	3.4	0.0126	0.0000	OK
240 minute winter	7	228	9.536	0.136	0.5	0.0520	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.003	OVERFLOW	0.0	0.000	0.000	0.0000	0.0
240 minute winter	1	Infiltration		0.4				
240 minute winter	2	1.002	1	1.1	0.195	0.086	0.7971	
240 minute winter	2	Infiltration		0.3				
240 minute winter	3	1.001	2	-0.3	0.179	-0.037	0.3629	
240 minute winter	3	Infiltration		0.3				
240 minute winter	4	1.000	3	1.0	0.364	0.055	0.1797	
240 minute winter	5	2.001	2	1.9	0.291	0.111	0.0948	
15 minute summer	6	3.000	5	3.4	0.367	0.078	0.0498	
240 minute winter	7	2.000	5	0.5	0.150	0.029	0.2204	

Results for 30 year Critical Storm Duration. Lowest mass balance: 94.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	OVERFLOW	1	10.100	0.000	0.0	0.0000	0.0000	OK
240 minute winter	1	232	9.580	0.580	2.8	11.6551	0.0000	OK
240 minute winter	2	232	9.580	0.330	3.9	8.6183	0.0000	SURCHARGED
240 minute winter	3	232	9.580	0.280	2.2	8.4920	0.0000	SURCHARGED
240 minute winter	4	232	9.580	0.180	1.3	0.1085	0.0000	SURCHARGED
240 minute winter	5	232	9.580	0.280	2.6	0.1565	0.0000	SURCHARGED
15 minute summer	6	9	9.632	0.032	4.3	0.0141	0.0000	OK
240 minute winter	7	232	9.580	0.180	0.7	0.0686	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.003	OVERFLOW	0.0	0.000	0.000	0.0000	0.0
240 minute winter	1	Infiltration		0.4				
240 minute winter	2	1.002	1	1.5	0.258	0.115	0.7971	
240 minute winter	2	Infiltration		0.3				
240 minute winter	3	1.001	2	0.3	0.179	0.035	0.3629	
240 minute winter	3	Infiltration		0.3				
240 minute winter	4	1.000	3	1.2	0.230	0.072	0.1838	
240 minute winter	5	2.001	2	2.6	0.346	0.150	0.0948	
15 minute summer	6	3.000	5	4.3	0.385	0.098	0.0508	
240 minute winter	7	2.000	5	0.6	0.150	0.040	0.2254	

Results for 100 year Critical Storm Duration. Lowest mass balance: 94.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	OVERFLOW	1	10.100	0.000	0.0	0.0000	0.0000	OK
240 minute winter	1	232	9.650	0.650	3.6	15.9568	0.0000	OK
240 minute winter	2	232	9.650	0.400	4.9	11.8727	0.0000	SURCHARGED
240 minute winter	3	232	9.650	0.350	2.7	11.7341	0.0000	SURCHARGED
240 minute winter	4	232	9.650	0.250	1.7	0.1507	0.0000	SURCHARGED
240 minute winter	5	232	9.650	0.350	3.2	0.1956	0.0000	SURCHARGED
240 minute winter	6	232	9.650	0.050	0.8	0.0222	0.0000	OK
240 minute winter	7	232	9.650	0.250	0.8	0.0952	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.003	OVERFLOW	0.0	0.000	0.000	0.0000	0.0
240 minute winter	1	Infiltration		0.4				
240 minute winter	2	1.002	1	1.9	0.258	0.142	0.7971	
240 minute winter	2	Infiltration		0.3				
240 minute winter	3	1.001	2	-0.4	0.195	-0.049	0.3629	
240 minute winter	3	Infiltration		0.3				
240 minute winter	4	1.000	3	1.6	0.262	0.094	0.1838	
240 minute winter	5	2.001	2	3.2	0.346	0.185	0.0948	
240 minute winter	6	3.000	5	0.8	0.255	0.018	0.0568	
240 minute winter	7	2.000	5	0.8	0.150	0.048	0.2254	

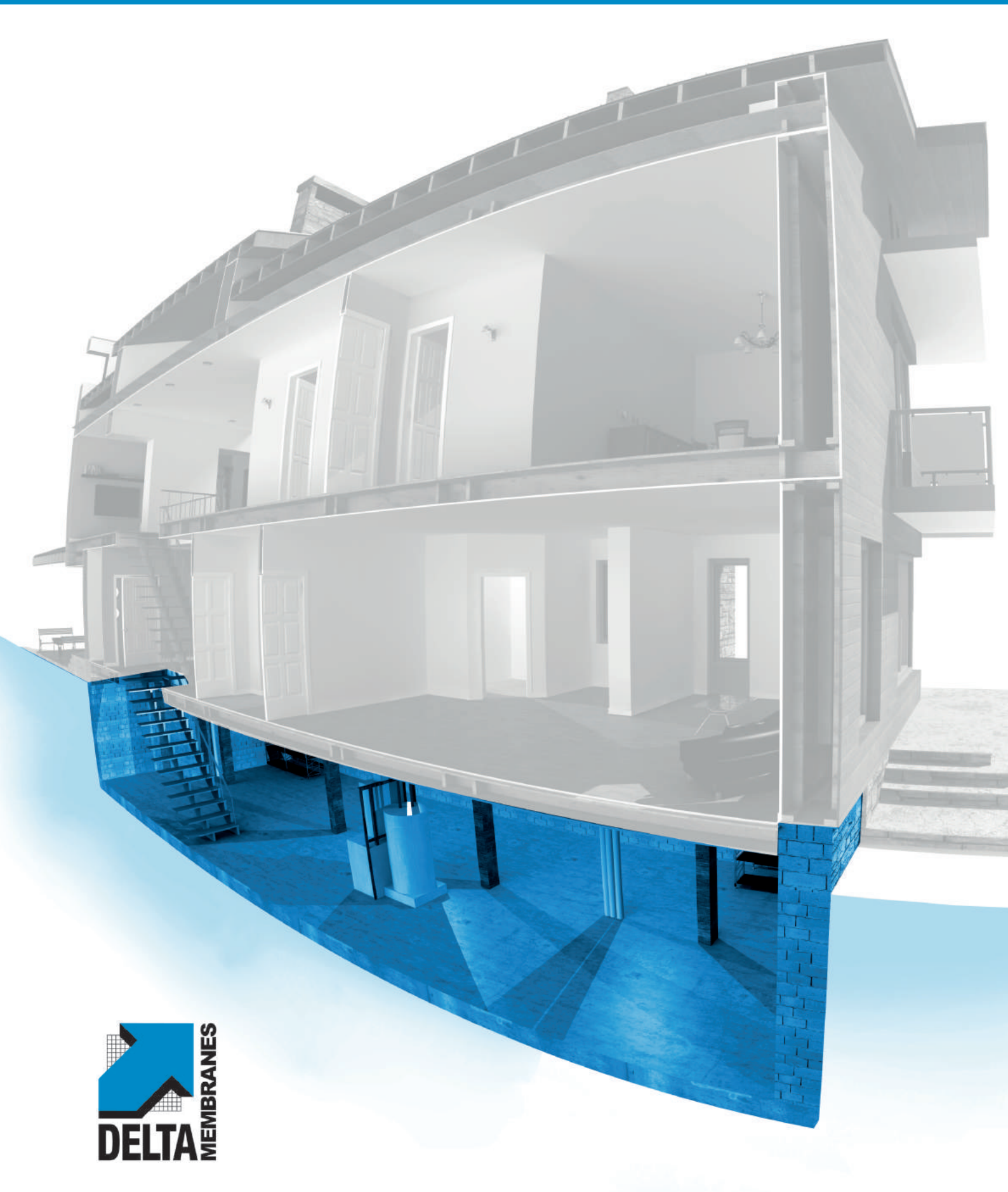
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 94.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	OVERFLOW	1	10.100	0.000	0.0	0.0000	0.0000	OK
360 minute winter	1	352	9.790	0.790	3.7	24.5715	0.0000	OK
360 minute winter	2	352	9.790	0.540	5.1	18.3976	0.0000	SURCHARGED
360 minute winter	3	352	9.790	0.490	2.8	18.2319	0.0000	SURCHARGED
360 minute winter	4	352	9.790	0.390	1.7	0.2353	0.0000	SURCHARGED
360 minute winter	5	352	9.790	0.490	3.4	0.2740	0.0000	SURCHARGED
360 minute winter	6	352	9.790	0.190	0.9	0.0847	0.0000	SURCHARGED
360 minute winter	7	352	9.790	0.390	0.9	0.1487	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.003	OVERFLOW	0.0	0.000	0.000	0.0000	0.0
360 minute winter	1	Infiltration		0.4				
360 minute winter	2	1.002	1	2.0	0.197	0.149	0.7971	
360 minute winter	2	Infiltration		0.3				
360 minute winter	3	1.001	2	0.4	0.179	0.044	0.3629	
360 minute winter	3	Infiltration		0.3				
360 minute winter	4	1.000	3	1.6	0.258	0.095	0.1838	
360 minute winter	5	2.001	2	3.4	0.282	0.197	0.0948	
360 minute winter	6	3.000	5	0.9	0.186	0.020	0.0880	
360 minute winter	7	2.000	5	0.8	0.148	0.054	0.2254	

DELTA MEMBRANE SYSTEMS LTD

BASEMENT PUMP & DRAINAGE

July 2019



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DELTA MEMBRANES



Delta Membrane Systems Limited is the leading Type C Cavity Drain Membrane Manufacturer in the United Kingdom. Our extensive range of waterproofing and damp proofing products are suitable for basement drainage and structural waterproofing (both for new build and existing structures) and in flood resilience projects.

Installing a Delta Membrane System offers complete protection to structures from ground water ingress and contaminants. Our products comply with British Standard BS 8102:2009 and are BBA Certified. Our dedicated Technical Team offer knowledge and experience in waterproofing design solutions and can provide on-site assistance and advice throughout a project.

BS 8102:2009 (Code of Practice for Protection of Below Ground Structures Against Water from the Ground) recommends that every Design Team should incorporate a Waterproofing Design Specialist.

Delta Membrane Systems Limited has a dedicated team of Waterproofing Design Specialists. Our trusted Technical Team offer knowledge and experience and are able to provide expertise in structural waterproofing. As a Waterproofing Specialist Manufacturer, we work with architects, surveyors, contractors and engineers alike to provide a design service which complies with BS 8102:2009 and offers the highest level of technical expertise and assurance.



SERVICES

Delta Membrane Systems Limited provides a full range of waterproofing solutions suitable for all new, retrofit and refurbishment construction. With over 125 years of manufacturing experience, Delta is an impeccable partner on every project. Our skills have been mastered through experience in the waterproofing industry. Delta's trusted Technical Team will offer assistance from concept to completion. Our hands on approach and knowledge is what sets us apart.



DESIGN SUPPORT

- Architecture knowledge
- Concept and waterproofing solutions
- Advice on design and best practice
- Custom solutions, as each project is unique in requirements
- Qualified CSSW staff (named on the Waterproofing Design Register)



SPECIFICATION SUPPORT

- Detailed drawings including CAD
- Watertight and locking down structure concepts
- Specifications
- BIM
- NBS Plus
- RIBA Product Selector



SITE SUPPORT

- Training and guidance offered at every step
- Technical Team attendance at site meetings
- Knowledge and experience
- Troubleshooting solutions



BASEMENT PROTECTION



One of the main design considerations when designing a Cavity Drain System is to consider managing the collection and discharge of ground and/or foul water.

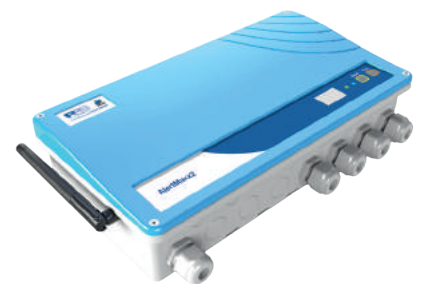
The majority of projects will require a collection sump + pump to automatically manage the evacuation of water ingress. A sump + pump solution will require mains power to operate.

Peace of mind is offered with the MaxxFamily product range. The AlertMaxx2 is a high level water alarm and monitoring system which will predictively alert a homeowner when there is a potential fault or service required to the sump pump. Our extensive range of battery back-ups offer unrivalled technology and will keep the sump pump working in the event of power failure.

The number of pump systems required for each project will (in part) depend on the overall basement size, perimeter and also the method of drainage – Delta Channel, Modular or a combination of both.

External surface water from light-wells, courtyards and terraces may be drained into the ground water sump, providing the area of external surface water collection does not exceed 12m² to each sump – if the external area is greater, advice should be sought from the Delta Technical Team.

For each sump system, the recommendation is for two pumps in case of failure of the duty pump. In the event of failure of the duty pump, the secondary back up pump will take over, therefore significantly reducing the risk of potential flooding. In addition, a minimum industry standard would be to include a high level alarm such as the Delta AlertMaxx2 and power back up system such as Delta PowerMaxx in case of mains power failure. Again reducing the risk of potential flooding to the basement.



GROUND & SURFACE WATER

GROUND & SURFACE WATER

A range of pump stations designed to collect ground and/or surface water from the smallest domestic basement through to large commercial projects.

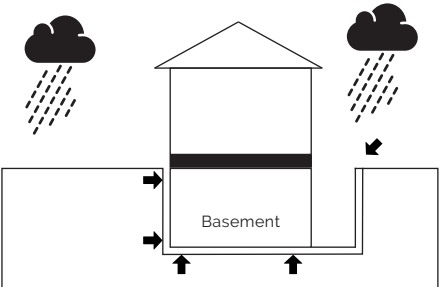
Our range of products have been designed specifically for the application and brings the technology of waterproofing and discharging water from properties under one responsibility, fully integrated and co-ordinated.

CALCULATING FLOW RATES (GROUND WATER)

- It is virtually impossible to calculate water ingress through a structure, however, we need to make some assumptions and based on our experience we allow 0.001l/s/m2 of basement slab and walls and then allow a safety factor of 5. However, if the basement pumps are monitored by AlertMaxx2 & SideWinder we can build up a dataset for water ingress and make recommendations if and when necessary.

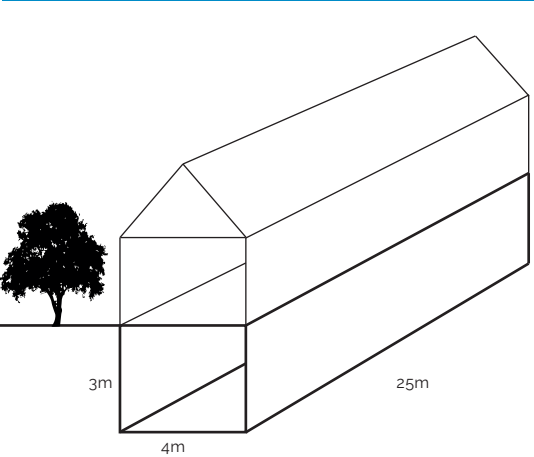
CALCULATING GROUND WATER INGRESS

- It is very difficult to obtain data for water ingress, we need to assume...
- For basements above the water table, assume 0.1l/s per 100m3 basement wall and floor area (or 0.001l/s/m2). Multiply by a factor of safety of 5.
- For basements below the water table assume 0.2l/s per 100m3 basement wall and floor area (or 0.002l/s/m2). Multiply by a factor of safety of 5.



GROUND WATER

- Ground water collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment and rocks, originating from rain, melting snow and ice and is the source of water for aquifers, springs and wells.
- The basement structure should offer the primary resistance to passage of water.



Slab = 25m x 4m = 100m2

Wall 1 = 25m x 3m x 2no = 150m2

Wall 2 = 3m x 4m x 2no = 24m2

Total area = 274m2

Multiply total area by flow rate and factor of safety

=274m2 x 0.001l/s/m2 x 5 = 1.37l/s

PLEASE NOTE

For any calculation, detailed reference should be made to the relevant British/European Standard.

CALCULATING FLOW RATES (SURFACE WATER)

- When selecting a pump station for collecting & discharging surface water we take into account a 5 minute storm event and the storage required for 24 hours, we always use a 500 year return period for basement applications and 24 hour storage as they are considered critical. *Battery backups can be used instead of physical storage.*

Example : 25m2 surface water application i.e. patio or small rear roof elevation

Flow rate: Area x l/s/m2 = 1.6l/s

5 minute storage: Area x l/s/m2 x 5 minutes

24 hour storage: Area x 0.11

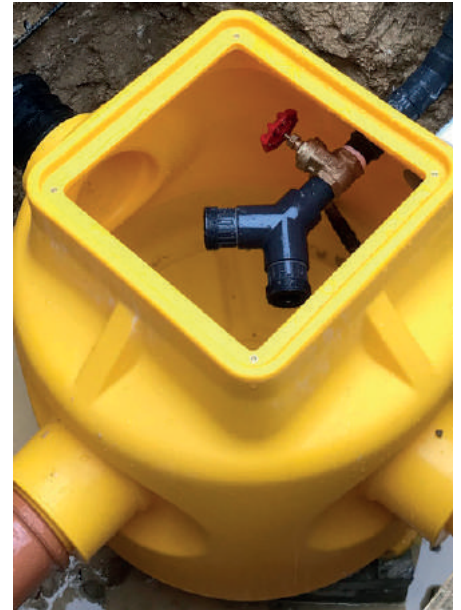
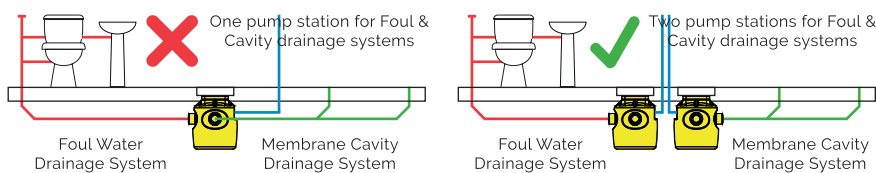
CALCULATING SURFACE WATER FLOW RATES & STORAGE

Design intensity for London based on BS EN 752 (2008)

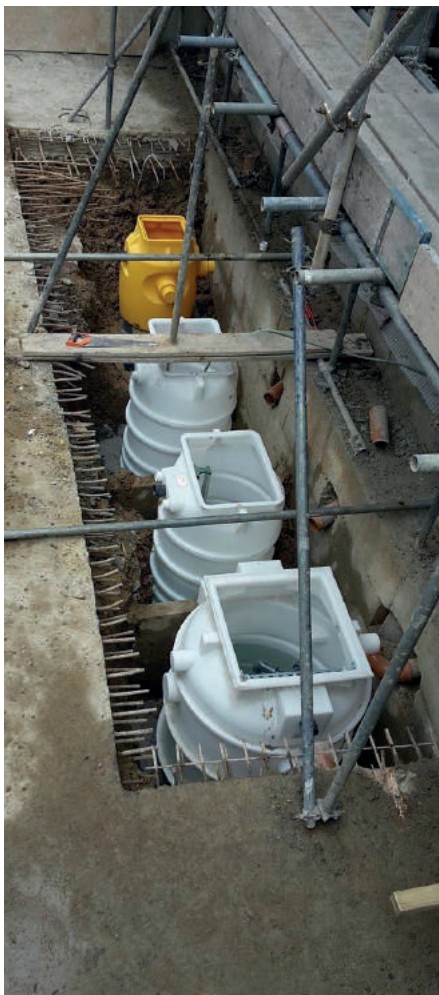
Return period	l/s/m2	mm/hour
1 year	0.016	576
5 years	0.024	86.4
50 years	0.040	144.0
500 years	0.064	230.4

WHY FOUL & GROUND WATER SHOULD NEVER BE MIXED

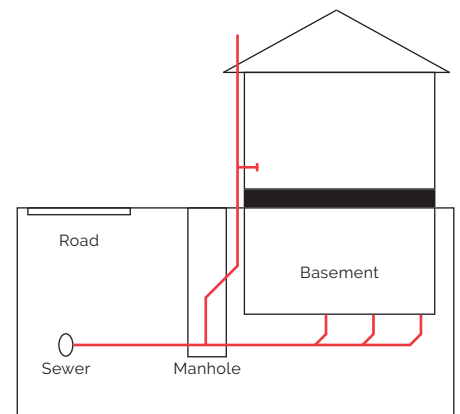
1. Foul gas will be able to migrate into the cavity spaces behind the membrane and will be able to escape into the building at the top edges of the membrane sheet, which must be left unsealed.
2. In the event of a pump station becoming inoperative, continual use of the sanitary appliances may result in the foul level rising above the normal operating level to the extent that effluent would back-fill the cavity drainage system and eventually escape into the cavities, resulting in contamination of floor construction.



BASEMENT WITHOUT FLOOD PROTECTION

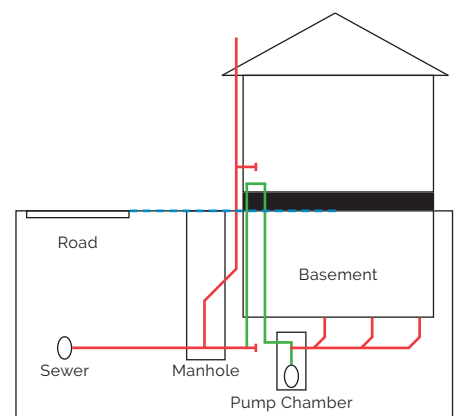


- If the sewer becomes surcharged and if the road surface floods, water will back-up in the house drain and flood the basement.
- If the sewer causes the surface of the road to flood, then the level of the flood water in the basement will reach the same level.



FLOOD PROTECTION MEASURES

- A pump station with an anti-flooding loop in the discharge pipe is the best method in accordance with BS12056-4.
- If the sewer becomes surcharged and if the road surface floods, the basement will remain safe.
- Flood water cannot pass over the top of the anti-flooding loop.
- Benefits:
- Flood protection is not reliant on valves which may leak and won't prevent odours travelling back into the property.
- The pumped drainage system will remain operational during flooding.

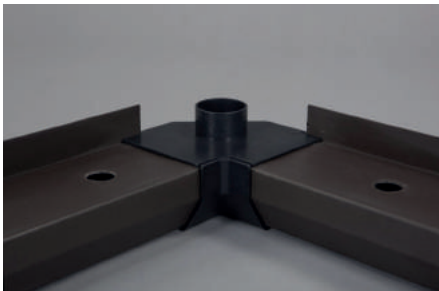


GROUND & SURFACE WATER - DRAINAGE



PERIMETER DRAINAGE CHANNEL

Channel typically laid level in a rebate in the structural slab. As the name suggests it is run around the perimeter of the basement, but can also be installed across the basement to improve drainage. The maximum distance from the end of channel to the sump is 25 linear meters, therefore one sump can be used for a 50m linear run where the sump is installed centrally.

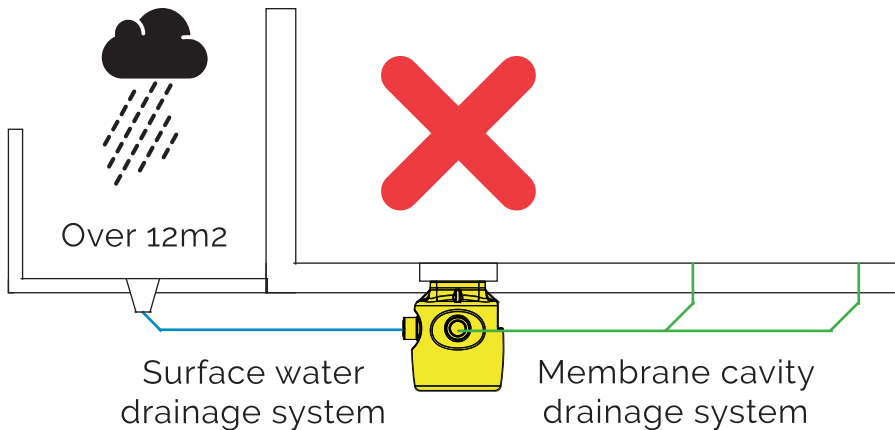


MODULAR DRAINAGE

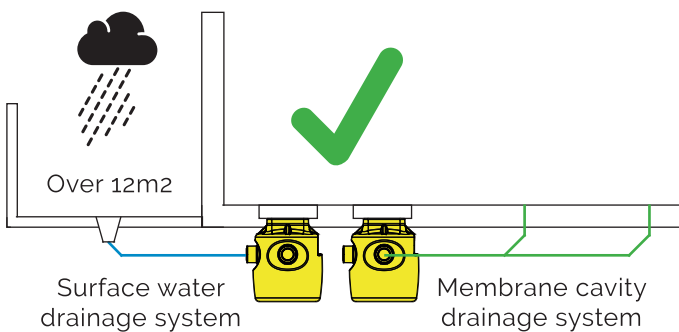
110mm drainage pipe laid below or in the slab to a fall of 1:100. One pump station can serve areas over 200m². Typically one drainage point is required every 12m² of basement slab area.

SURFACE WATER LIMITS FOR GROUND WATER SUMPS

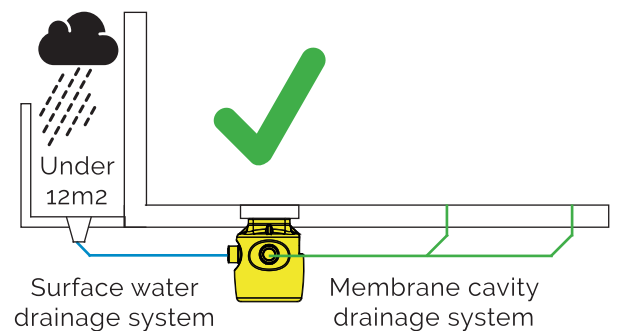
- Where rainwater from a total surface area exceeding 12m² is to be pumped it is recommended this water is drained to a dedicated pump station.



Pump station for a cavity system & external area MORE THAN 12m²



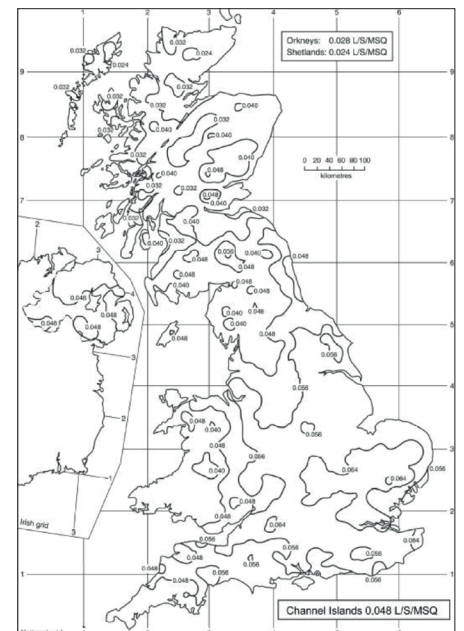
Pump stations for a cavity system & external area MORE THAN 12m²



Pump station for a cavity system & external area NOT MORE THAN 12m²

CONSTANT RAINFALL

- Constant rate rainfall intensity for an event of 5 minutes duration with a probability of exceedance of 0.002 in 1 year (a return period of 500 years).
- We use this figure as basement design is considered to be critical.
- Figures and map available from BS EN 752:2008.



DUAL V3

A packaged pump station designed to collect ground water via perimeter channel or 110mm pipes (129 detail) and/or clear opening to the top of the chamber. This chamber cannot collect grey water from showers and wash hand basins, or foul from a WC (See 'Delta Foul V3 Sump'). A typical application would be collecting ground water from a basement up to 150m² and surface water from a 12m² lightwell.

The Dual V3 pump station has been specifically designed for below ground applications. The chamber is manufactured from HDPE and able to withstand hydrostatic forces encountered in applications with high water tables.

The pump station is delivered as a complete package including, chamber, all internal pipework and two powerful V3 pumps. It is designed to be installed by contractors with competent building, plumbing and electrical skills.

PUMP STATION TECHNICAL DATA	
DMS Code	DMS-164
Chamber Material	High Density Polyethylene
Volume Below Inlets	87L
Total Volume	217L
Fixed Inlets	3 x 110 / 160mm
Cable Duct Size	50mm
Discharge Connection	1.25" / 32mm BSP Class C
Discharge Pipework	1.25" / 32mm BSP Class C
Internal Pipework	1.25" / 32mm BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe

The Dual V3 is simple to install, the chamber sits on a concrete base, inlets in the form of perimeter channel or modular 110mm system are connected into the chamber, a 32mm discharge pipe connects to the gravity drain and a 50mm cable duct to bring electrics and control cabling from the chamber into a dry environment. The chamber is filled with water to prevent buoyancy and is surrounded with concrete. A simple rule of thumb is the top of the chamber should be level with the structural slab or no deeper than 500mm from the final finishes.

The installation is to be topped off with a double sealed cover supplied by the contractor to tie in with the general floor finish. Remember this product need to be accessed for service so care should be taken with its location.

For full installation instructions see 'Delta Dual V3 Installation Instructions' on our website.



RECOMMENDATIONS

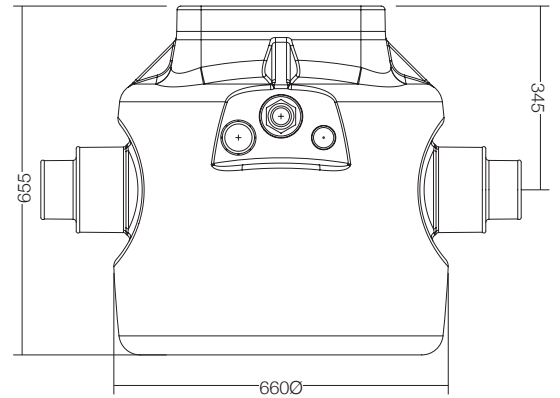
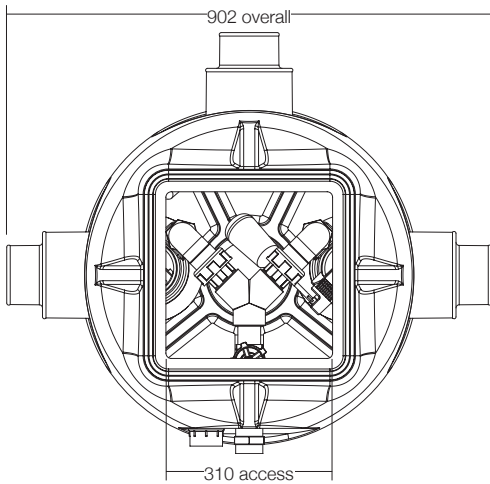
- AlertMaxx2 (DMS-298)
- PowerMaxx (DMS-280)

SPECIFICATION

- NBS specification R18 (clause 310) Pumping Stations & Pressure Pipelines.

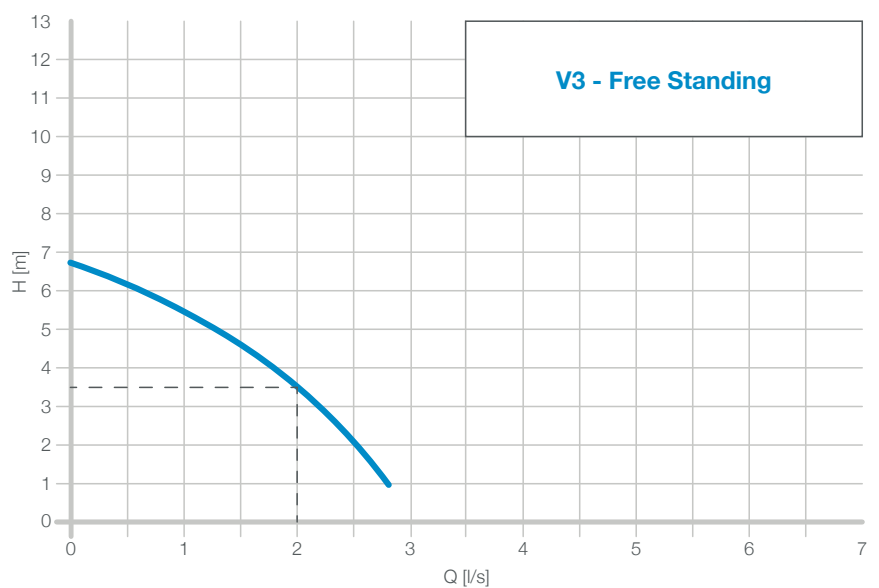


DUAL V3 - DMS-164



PUMP DATA

Pump Model	V3
Voltage	230V
KW Rating P1 / P2	0.43 / 0.18kW
Full Load Current	1.9A
Fuse Spur Rating	13A Non-switched
Typical Duty	2.0l/s @ 3.5m
Power Phase	Single
Weight	5.64kg



DUAL V3.1

A packaged pump station designed to collect ground water via perimeter channel or 110mm pipes (129 detail) and/or clear opening to the top of the chamber. This chamber cannot collect grey water from showers and wash hand basins, or foul from a WC (See 'Delta Foul V3 Sump'). The Dual V3.1 is ideal for jobs where one or less inlet is required and space is limited. A typical application would be collecting ground water from a basement up to 150m² and surface water from a 12m² lightwell.

The Dual V3.1 pump station has been specifically designed for below ground applications. The chamber is manufactured from HDPE and able to withstand hydrostatic forces encountered in applications with high water tables.

The pump station is delivered as a complete package including, chamber, all internal pipework and two powerful V3 pumps. It is designed to be installed by contractors with competent building, plumbing and electrical skills.

RECOMMENDATIONS

- AlertMaxx2 (DMS-298)
- PowerMaxx (DMS-280)

SPECIFICATION

- NBS specification R18 (clause 310) Pumping Stations & Pressure Pipelines.

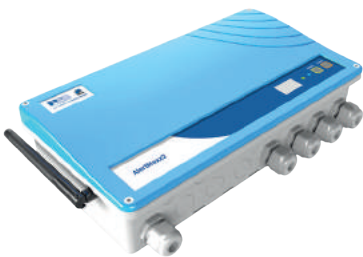
PUMP STATION TECHNICAL DATA

DMS Code	DMS-166
Chamber Material	High Density Polyethylene
Volume Below Inlets	87L
Total Volume	217L
Fixed Inlets	1 x 110 / 160mm
Cable Duct Size	50mm
Discharge Connection	1.25" / 32mm BSP Class C
Discharge Pipework	1.25" / 32mm BSP Class C
Internal Pipework	1.25" / 32mm BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe

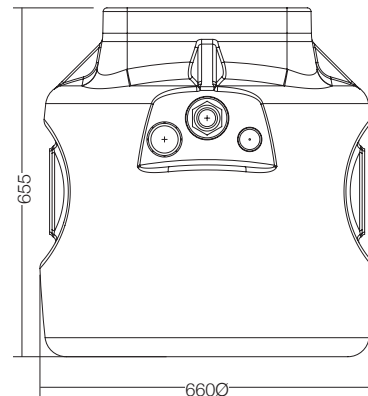
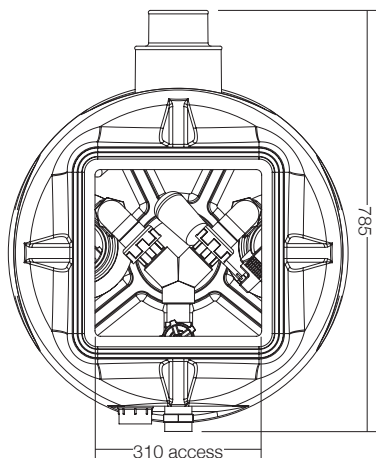
The Dual V3.1 is simple to install, the chamber sits on a concrete base, inlets in the form of perimeter channel or modular 110mm system are connected into the chamber, a 32mm discharge pipe connects to the gravity drain and a 50mm cable duct to bring electrics and control cabling from the chamber into a dry environment. The chamber is filled with water to prevent buoyancy and is surrounded with concrete. A simple rule of thumb is the top of the chamber should be level with the structural slab or no deeper than 500mm from the final finishes.

The installation is to be topped off with a double sealed cover supplied by the contractor to tie in with the general floor finish. Remember this product need to be accessed for service so care should be taken with its location.

For full installation instructions see 'Delta Dual V3 Installation Instructions' on our website.

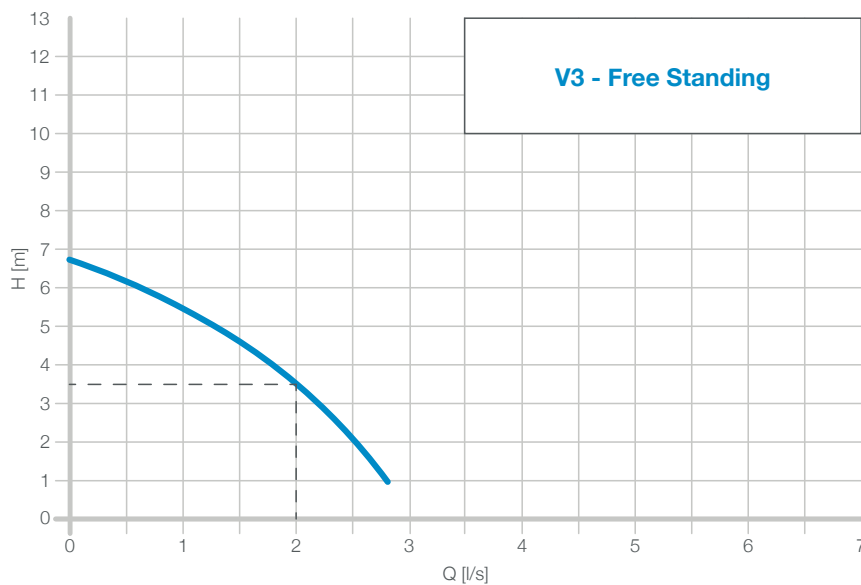


DUAL V3.1 - DMS-166



PUMP DATA

Pump Model	V3
Voltage	230V
KW Rating P1 / P2	0.43 / 0.18kW
Full Load Current	1.9A
Fuse Spur Rating	13A Non-switched
Typical Duty	2.0l/s @ 3.5m
Power Phase	Single
Weight	5.64kg



DUAL V4

The Dual V4 is an upgrade to the standard Dual V3 where higher discharge heads are required. Typically, for double and triple depth basements or where long discharge runs are required resulting in higher than normal pipe work losses. The Dual V4 is suitable for basements that require a head height greater than the V3. The Dual V4 can pump 12m² of surface area in addition to ground water.

The Dual V4 has been specifically designed for below ground applications. The chamber is manufactured from HDPE and is able to withstand hydrostatic forces encountered in applications with high water tables.

The pump station is delivered as a complete package including chamber, all internal pipework and two powerful V4 pumps. It is designed to be installed by contractors with competent building, plumbing and electrical skills.

RECOMMENDATIONS

- AlertMaxx2 (DMS-298)
- Hi-PowerMaxx (DMS-364)

SPECIFICATION

- NBS specification R18 (clause 310) Pumping Stations & Pressure Pipelines.

PUMP STATION TECHNICAL DATA

DMS Code	DMS-217
Chamber Material	High Density Polyethylene
Volume Below Inlets	137L
Total Volume	273L
Fixed Inlets	3 x 110 / 160mm
Cable Duct Size	50mm
Discharge Connection	2" / 50mm BSP Class C
Discharge Pipework	2" / 50mm BSP Class C
Internal Pipework	1.25" / 32mm BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe

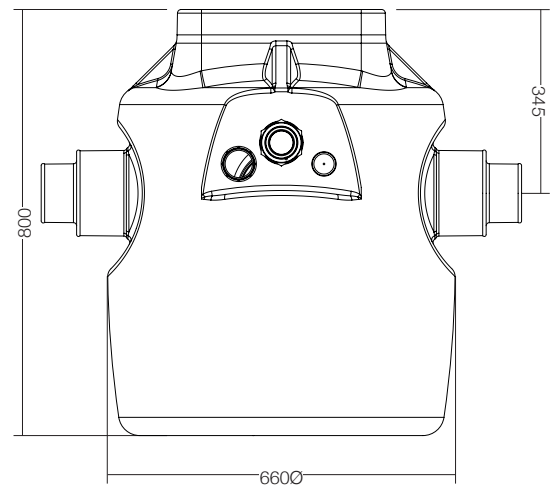
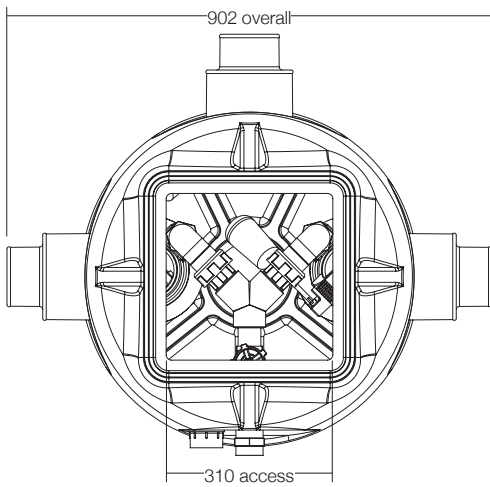
The Dual V4 is simple to install, the chamber sits on a concrete base, inlets in the form of perimeter channel or modular 110mm system are connected into the chamber, a 32mm discharge pipe connects to the gravity drain and a 50mm cable duct to bring electrics and control cabling from the chamber into a dry environment. The chamber is filled with water to prevent buoyancy and is surrounded with concrete. A simple rule of thumb is the top of the chamber should be level with the structural slab or no deeper than 500mm from the final finishes.

The installation is to be topped off with a double sealed cover supplied by the contractor to tie in with the general floor finish. Remember this product need to be accessed for service so care should be taken with its location.

For full installation instructions, see 'Delta Dual V4/V6 Installation Instructions' on our website.

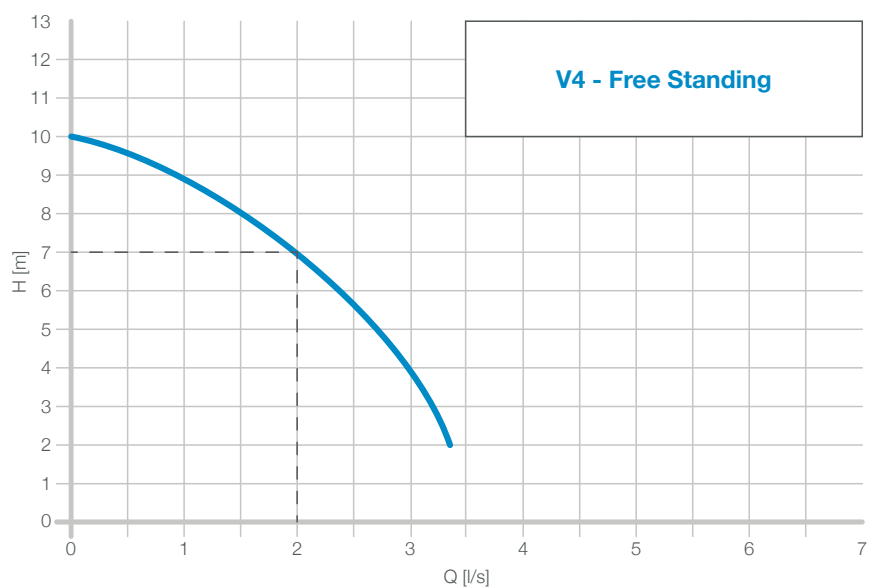


DUAL V4 - DMS-217



PUMP DATA

Pump Model	V4
Voltage	230V
KW Rating P1 / P2	0.75 / 0.36kW
Full Load Current	4.0A
Fuse Spur Rating	13A Non-switched
Typical Duty	2.0l/s @ 7m
Power Phase	Single
Weight	6.7kg



DUAL V6

The Dual V6 is an upgrade to the standard Dual V3 where higher discharge heads are required. Typically, for double and triple depth basements or where long discharge runs are required resulting in higher than normal pipe work losses. The Dual V6 is suitable for basements that require a head height greater than the V4. The Dual V6 can pump 12m² of surface area in addition to ground water.

The Dual V6 has been specifically designed for below ground applications. The chamber is manufactured from HDPE and is able to withstand hydrostatic forces encountered in applications with high water tables.

The pump station is delivered as a complete package including chamber, all internal pipework and two powerful V6 pumps. It is designed to be installed by contractors with competent building, plumbing and electrical skills.

RECOMMENDATIONS

- AlertMaxx2 (DMS-298)
- Hi-PowerMaxx (DMS-364)

SPECIFICATION

- NBS specification R18 (clause 310) Pumping Stations & Pressure Pipelines.

PUMP STATION TECHNICAL DATA

DMS Code	DMS-079
Chamber Material	High Density Polyethylene
Volume Below Inlets	137L
Total Volume	273L
Fixed Inlets	3 x 110 / 160mm
Cable Duct Size	50mm
Discharge Connection	2" / 50mm BSP Class C
Discharge Pipework	2" / 50mm BSP Class C
Internal Pipework	1.25" / 32mm BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe

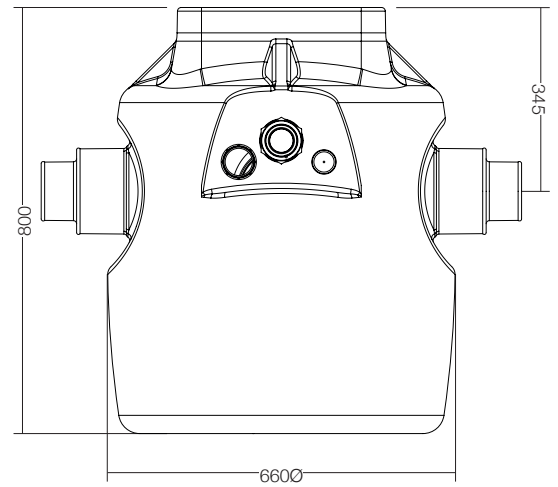
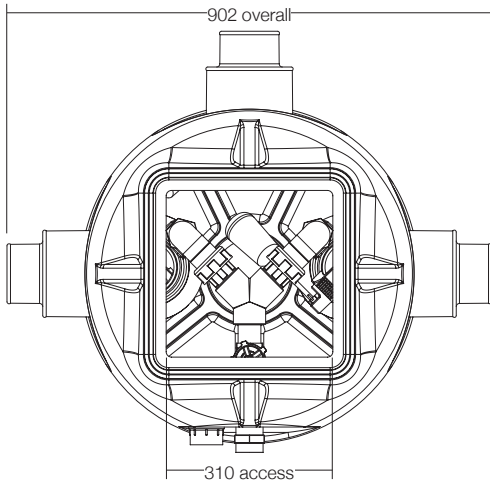
The Dual V6 is simple to install, the chamber sits on a concrete base, inlets in the form of perimeter channel or modular 110mm system are connected into the chamber, a 32mm pipe discharge connects to the gravity drain and a 50mm cable duct to bring electrics and control cabling from the chamber into a dry environment. The chamber is filled with water to prevent buoyancy and is surrounded with concrete. A simple rule of thumb is the top of the chamber should be level with the structural slab or no deeper than 500mm from the final finishes.

The installation is to be topped off with a double sealed cover supplied by the contractor to tie in with the general floor finish. Remember this product need to be accessed for service so care should be taken with its location.

For full installation instructions, see 'Delta Dual V4/V6 Installation Instructions' on our website.

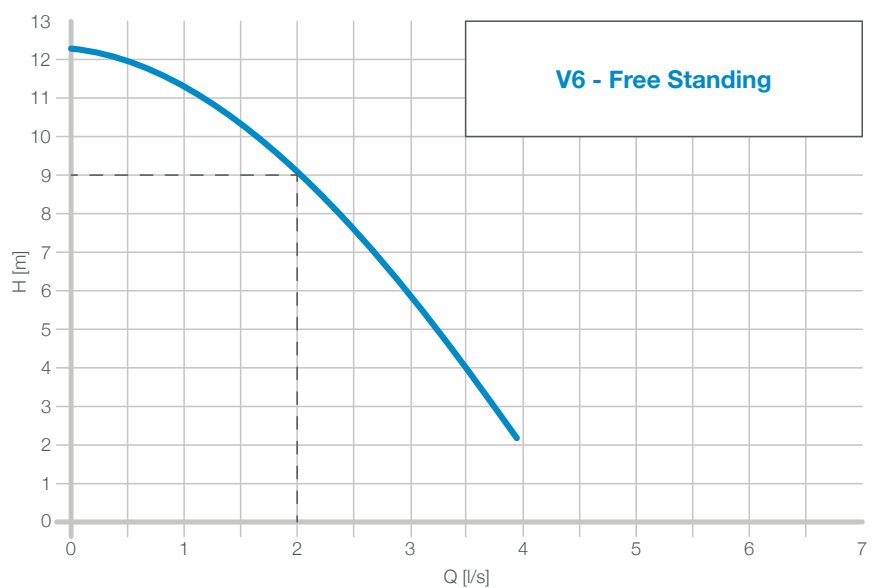


DUAL V4 / V6 - DMS-217 / 079



PUMP DATA

Pump Model	V6
Voltage	230V
KW Rating P1 / P2	1.05 / 0.50kW
Full Load Current	4.9A
Fuse Spur Rating	13A Non-switched
Typical Duty	2.0l/s @ 9m
Power Phase	Single
Weight	6.9kg



800 SERIES GROUND & SURFACE WATER STATIONS

The 800 series ground & surface water pump stations are available in depths from 800mm – 2000mm. Applications include collecting ground water from a Type C cavity membrane system or surface water from roofs and patios subject to selection criteria.

This product is specifically designed for below ground applications where hydrostatic water pressure may be present. However, they should be surrounded with concrete to prevent movement. A manhole cover is not supplied as these are generally site specific and installed in the final finish. However, if required the chamber will accept a standard 450mm x 600mm cover and frame. A kit is provided so inlets can be easily drilled and sealed on site in the positions highlighted in blue, making this product very simple to install.

The 800 series pump chambers are compatible with a range of free standing and guide rail mounted pumps.

TYPICAL APPLICATION

- Ground Water
- Surface Water



PUMP STATION TECHNICAL DATA

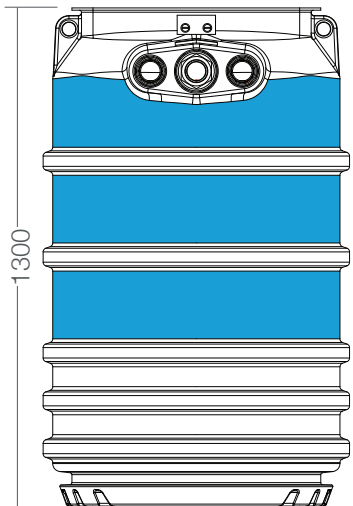
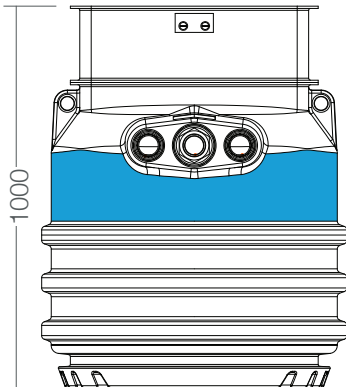
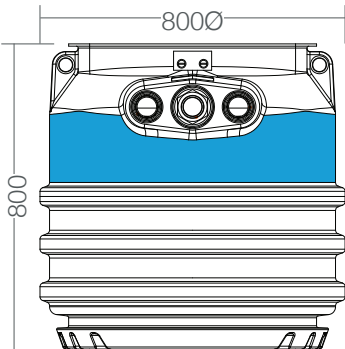
Chamber Model	800 Series
Chamber Material	High Density Polyethylene
Available Depths	800mm, 1000mm, 1300mm, 1500mm, 1800mm, 2000mm
Available Pumps	V3, V4, V6
Inlets	5 x 110mm grommets (supplied loose)
Cable Duct & Vent Size	50mm
Discharge Connection	BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe
Vent Pipework	2" / 50mm White Waste Pipe

INLETS

Inlets can be cut on site using the inlet kit provided with the chamber. The sections highlighted in blue on the drawings below show the areas suitable for drilling inlets.

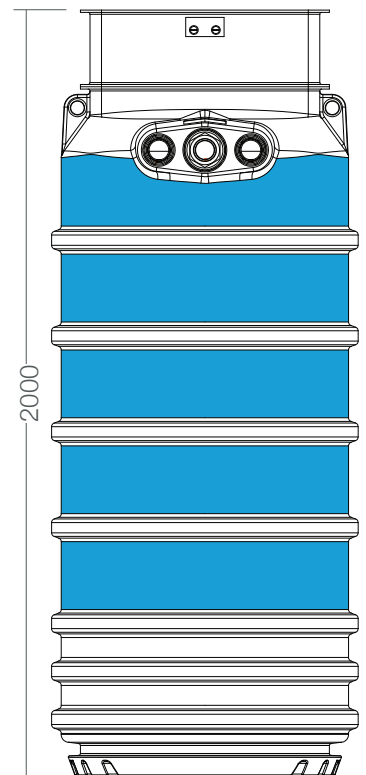
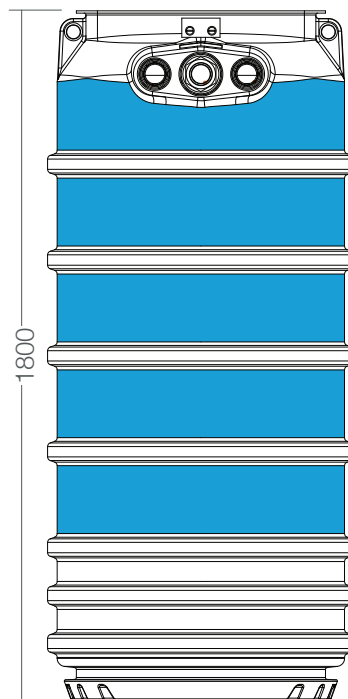
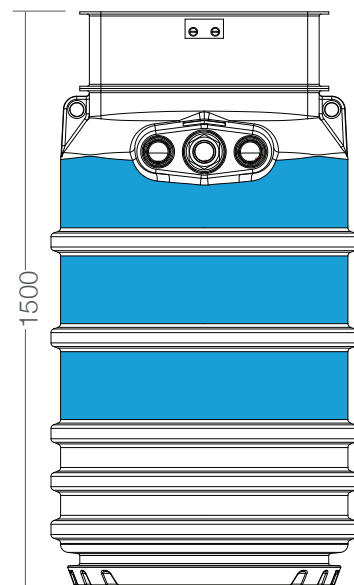
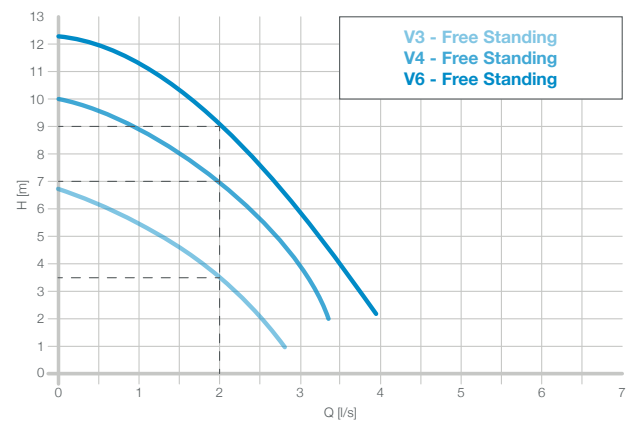
SPECIFICATION

NBS specification R18 (clause 310)
Pumping Stations & Pressure Pipelines.



V3, V4, V6

50Hz - 1 - 230V Discharge 1.25" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
V3	0.43	0.18	1.9	116	5.64
V4	0.75	0.36	4.0	216	7.17
V6	1.05	0.50	4.9	084	7.40



1000 SERIES GROUND & SURFACE WATER STATIONS

The 1000 series ground & surface water pump stations are available in depths from 1250mm - 3000mm. Applications include collecting ground water from a Type C cavity membrane system and larger surface water applications from roofs and patios subject to selection criteria.

This product is specifically designed for below ground applications where hydrostatic water pressure may be present. However, they should be surrounded with concrete to prevent movement. The chamber will accept a standard 750mm x 600mm cover and frame to suit floor build. A kit is provided so inlets can be easily drilled and sealed on site in the positions highlighted in blue, making this product very simple to install.

The 1000 series pump chambers are compatible with a range guide rail mounted pumps.

TYPICAL APPLICATION

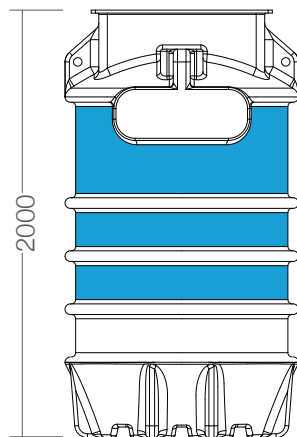
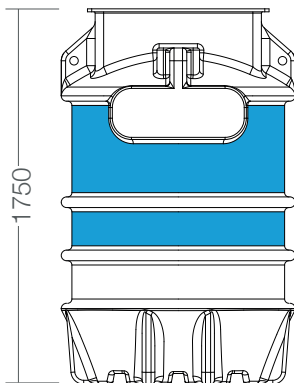
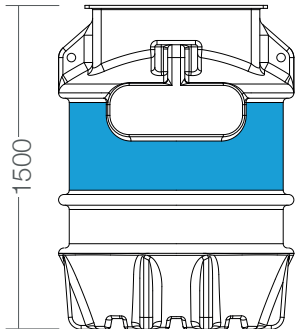
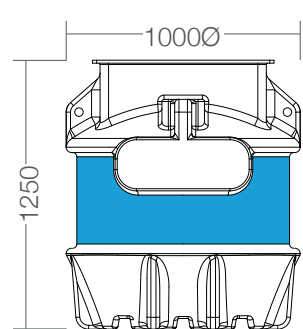
- Ground Water
- Surface Water

INLETS

Inlets can be cut on site using the inlet kit provided with the chamber. The sections highlighted in blue on the drawings below show the areas suitable for drilling inlets.

PUMP STATION TECHNICAL DATA

Chamber Model	1000 Series
Chamber Material	High Density Polyethylene
Available Depths	1250mm, 1500mm, 1750mm, 2000mm, 2250mm, 2500mm, 2750mm, 3000mm
Available Pumps	2500 Series, D10 Series
Inlets	5 x 110mm grommets (supplied loose)
Cable Duct & Vent Size	50mm
Discharge Connection	BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe
Vent Pipework	2" / 50mm White Waste Pipe

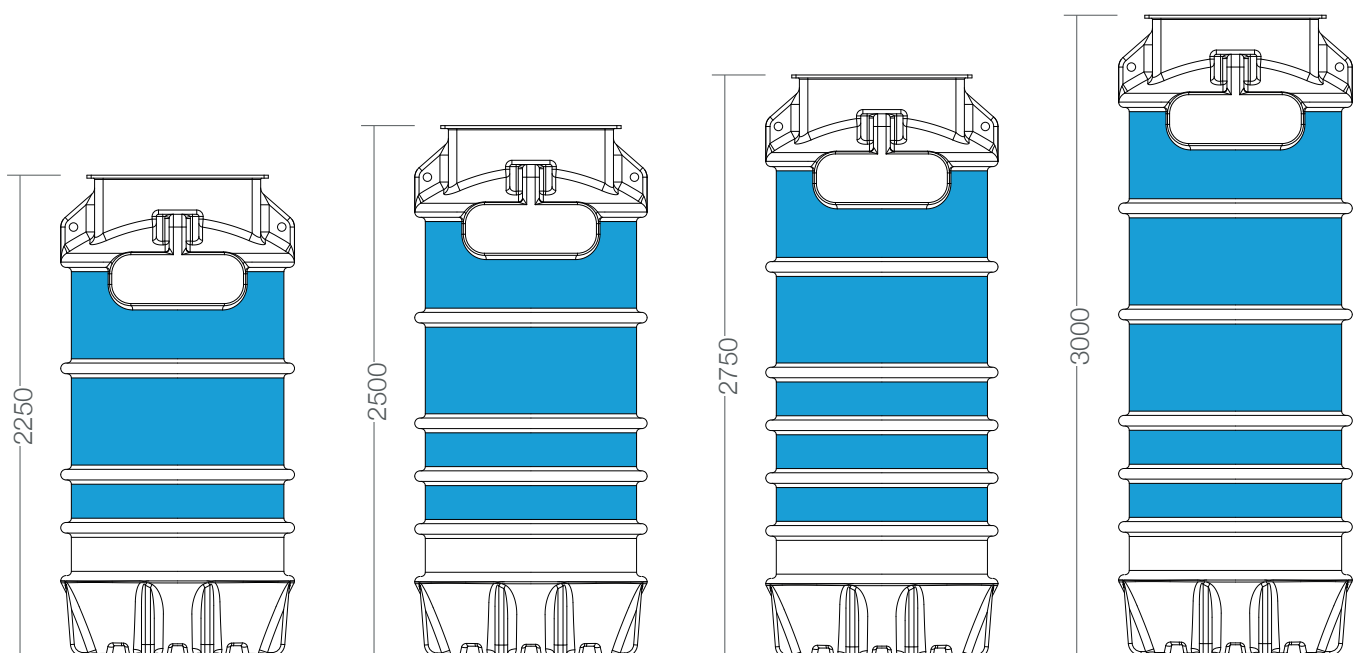
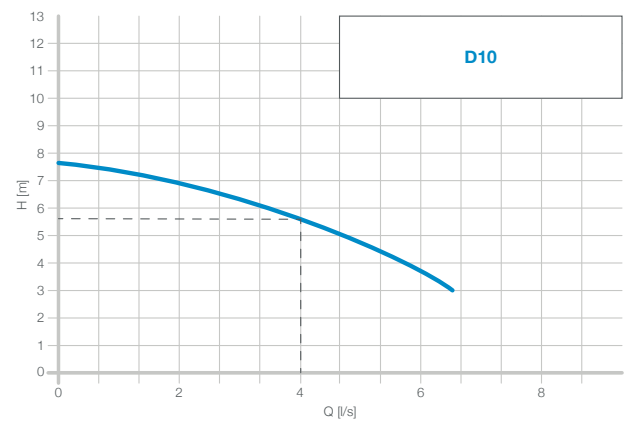
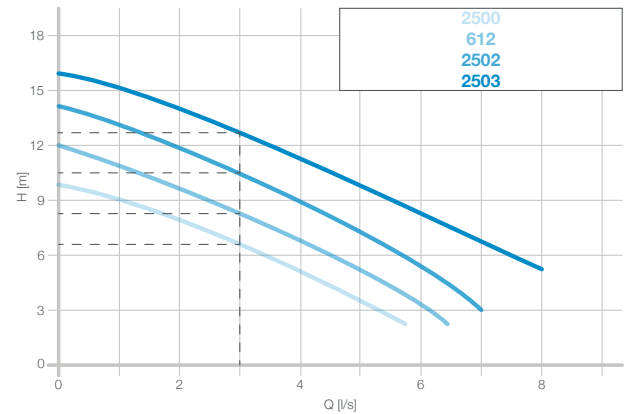


2500 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
2500SA	1.00	0.55	5.0	Call	22
612SA	0.75	0.36	6.0	114	22
2502SA	1.05	0.50	8.2	PU-006	22
2503SA	1.90	1.10	8.2	PU-008	22
2500SM	1.00	0.55	5.0	Call	22
612SM	1.25	0.75	6.0	PU-005	22
2502SM	1.80	1.10	8.2	PU-007	22
2503SM	1.80	1.10	8.2	PU-009	22
50Hz - 3 - 400V Discharge 2" BSP Female					
2500TM	0.90	0.55	2.3	Call	22
612TM	1.10	0.75	2.8	Call	22
2502TM	1.50	1.10	3.0	Call	22
2503TM	2.05	1.50	3.5	Call	22

D10 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
D10SA	1.14	0.75	5.84	120	13.4
D10SM	1.14	0.75	5.84	PU-101	13.4



FOUL WATER PUMP STATIONS

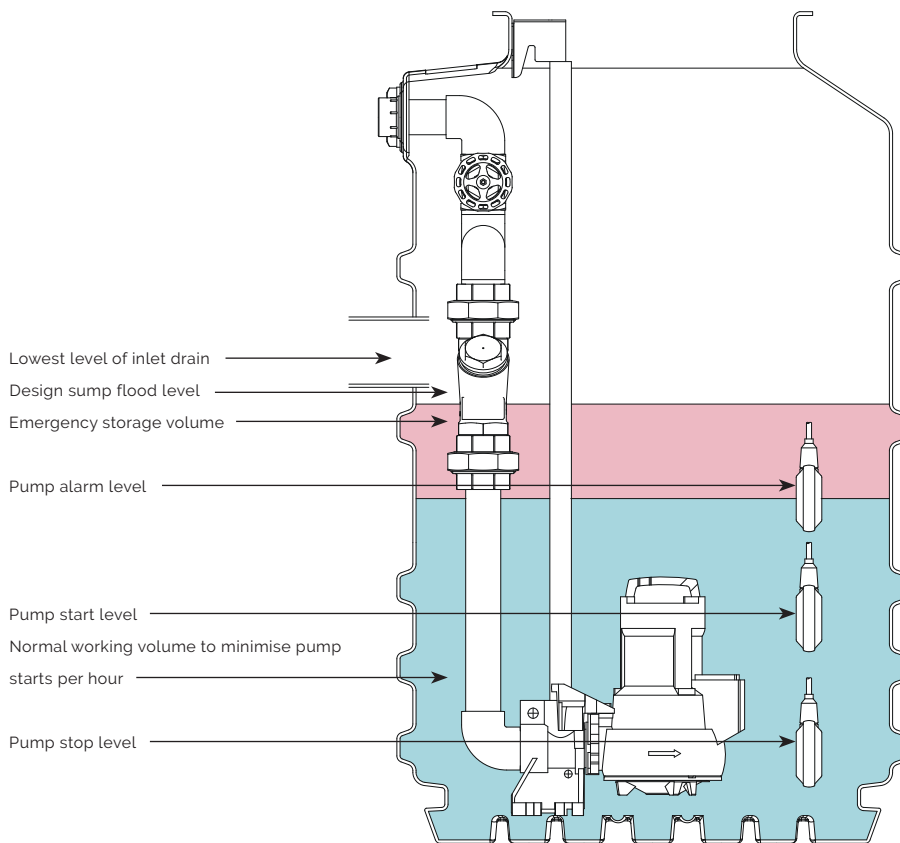
FOUL WATER

A range of pump stations designed to collect foul water from a small utility room to large commercial projects, such as theatres, blocks of flats and major building upgrades where gravity discharge is not possible.

Our range of products have been designed specifically for these application and brings the technology of waterproofing and discharging water from properties under one responsibility, fully integrated and co-ordinated.



CALCULATING FOUL WATER STORAGE VOLUMES



NOTE

- The inlet drain should not be submerged otherwise there is a risk that the solid waste would cause a blockage.

EMERGENCY STORAGE

- Where foul water drainage from a building is to be pumped, the effluent receiving chamber should be sized to contain 24 hour inflow to allow for disruption in service. The minimum daily discharge of foul drainage should be taken as 150 litres per head per day for domestic use. For other types of building, the capacity of the receiving chamber should be based on the calculated daily demand of the water intake for the building. Where only a proportion of the foul sewage is to be pumped, then the capacity should be based pro-rata. In all pump systems the controls should be so arranged to optimise pump operation.

Example : 6 bedroom house to be 'pumped' = 2 people in the master bedroom, 1 in each of the remaining = 7 x 150L = 1050L

It is considered bad practice to pump facilities from ground level and above if they can be designed to be discharged by gravity.

It may not be necessary to allow for storage capacity on a pro-rata basis for basement application where alternative gravity facilities are available in accordance with BS6465.

FLOW RATES FROM DWELLINGS

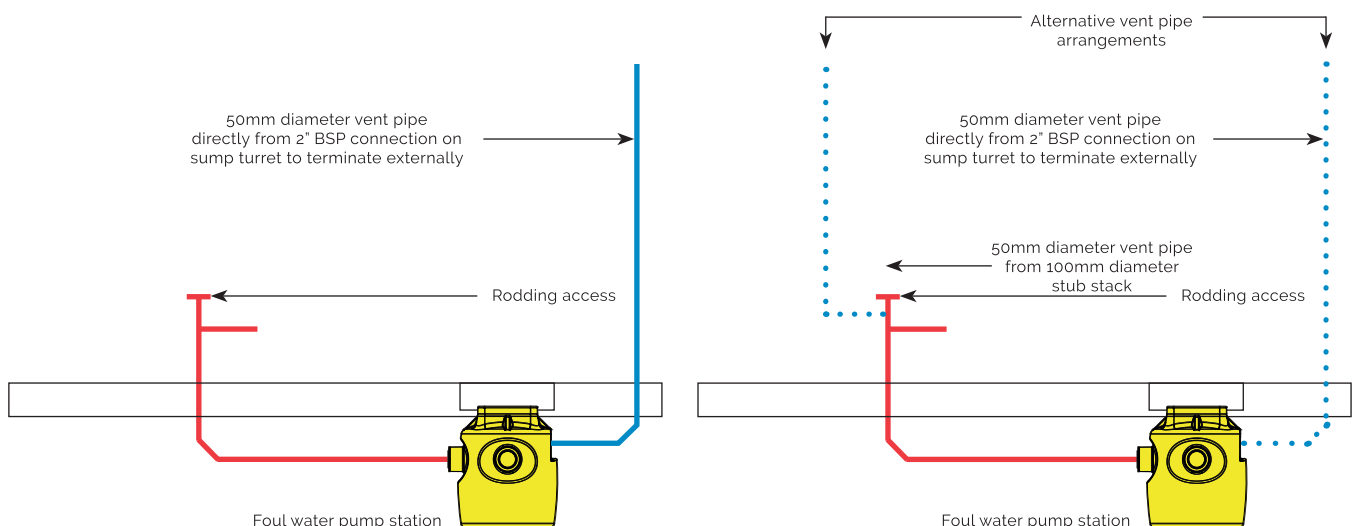
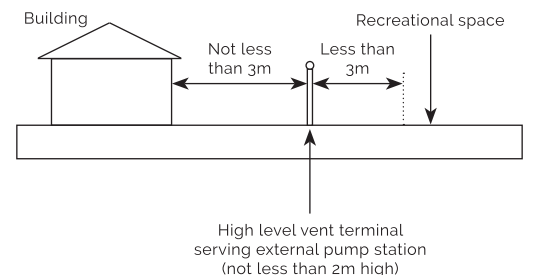
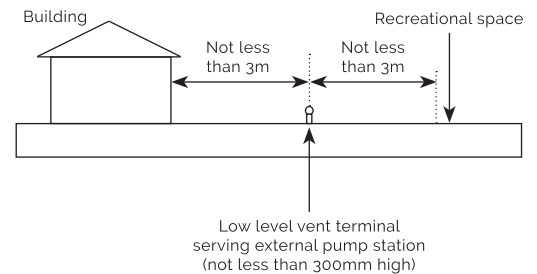
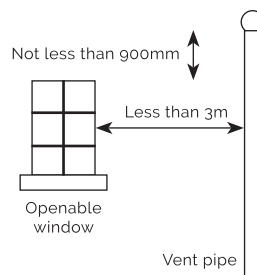
Number of dwellings	Flow rate (litres/sec)
1	2.5
5	3.5
10	4.1
15	4.6
20	5.1
25	5.4
30	5.8

ASSESSING FOUL SUMP FLOW RATE

- The flow rate of a foul pump should equal or exceed the design inflow of the drainage system.
- For typical dwellings, where there is no information about the sanitary appliances, it is acceptable to use the information from the table opposite.
- For non-typical dwellings or where the sanitary appliances are known, the Delta Wastewater Design Flow Calculator can be used.
- For buildings other than dwellings, assistance from a Delta Consultant should be sought.

VENTILATION OF FOUL SUMPS

- The purpose of sump ventilation is to:
 - a) allow foul gas to escape safely.
 - b) prevent the pump from overheating.
 - c) allow the sump to fill higher than normal in an emergency situation.
- The best situation is to provide a 50mm vent pipe connected directly to the sump at high level using the connection provided by the manufacturer.
- In some situations it is acceptable to ventilate the sump via the drainage system.
- The use of an air admittance valve is not acceptable.



FOUL V3

A packaged pump station designed to collect foul water from basements and ground floor extensions where other facilities in the property discharge via gravity. A typical application would be the collection and discharge of foul water from a basement fitted with a bathroom and a utility room. This pump station is not designed to collect ground water from a cavity membrane system (see Dual V3 Sump). For kitchen applications, we recommend fitting a grease trap prior to the pump station and do not recommend sinks fitted with macerator type waste disposal units are connected to pump stations.

The Foul V3 pump station has been specifically designed for below ground applications. The chamber is manufactured from virgin tank grade HDPE and is able to withstand hydrostatic forces encountered in applications with high water tables.

The pump station is delivered as a complete package with all internal pipework and a D10SA foul vortex pump. It is designed to be installed by contractors with competent building, plumbing and electrical skills.

RECOMMENDATIONS

- AlertMaxx2 (DMS-299)
- Hi-PowerMaxx-XL (DMS-236)

SPECIFICATION

- NBS specification R18 (clause 310) Pumping Stations & Pressure Pipelines.

PUMP STATION TECHNICAL DATA

DMS Code	DMS-165-1
Chamber Material	High Density Polyethylene
Volume Below Inlets	137L
Total Volume	273L
Fixed Inlets	3 x 110 / 160mm
Cable Duct & Vent Size	50mm
Discharge Connection	2" / 50mm BSP Class C
Discharge Pipework	2" / 50mm BSP Class C
Internal Pipework	2" / 50mm BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe
Vent Pipework	2" / 50mm White Waste Pipe

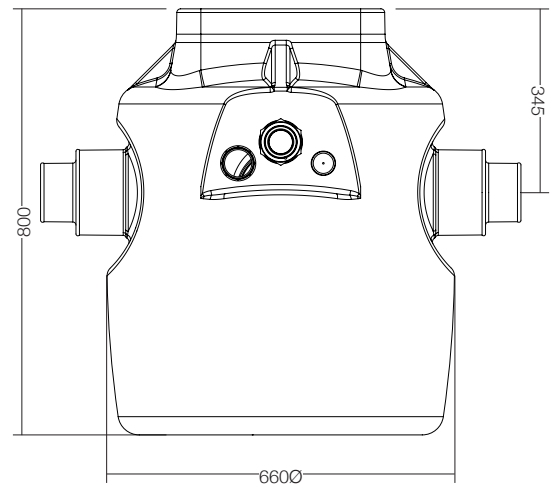
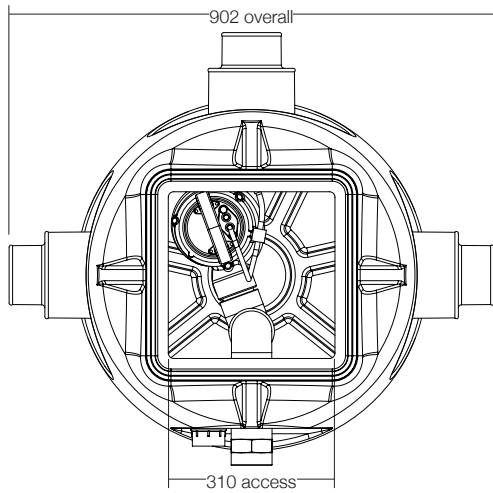
The Foul V3 is simple to install, the chamber is sited on a concrete base, inlets in the form of 110mm pipework are connected into the chamber, a 50mm discharge pipe connects to the gravity drain and a 50mm cable duct to bring electrics and control cabling from the chamber into a dry environment. The chamber is vented via a 50mm duct to the same standard as a traditional SVP. An air admittance or 'durgo' type valve should not be used. The chamber is filled with water to prevent buoyancy and is surrounded with concrete. A simple rule of thumb is the top of the chamber should be level with the structural slab or no deeper than 500mm from the final finishes.

The whole lot is topped off with a double sealed cover supplied by the contractor to tie in with the general floor finish. Remember this product need to be accessed for service so care should be taken with its location.

For full installation instructions see 'Delta Foul V3 Installation Instructions' on our website.

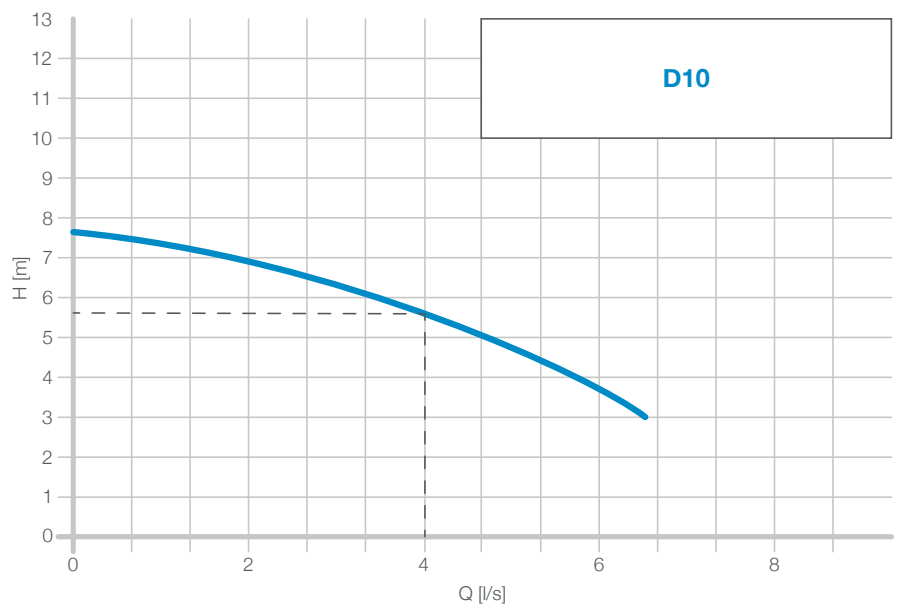


FOUL V3 - DMS-165-1



PUMP DATA

Pump Model	D10SA
Voltage	230V
KW Rating P1 / P2	1.14 / 0.75kW
Full Load Current	5.84A
Fuse Spur Rating	13A Non-switched
Typical Duty	4.0l/s @ 6.5m
Power Phase	Single
Weight	13.4kg



800 SERIES FOUL WATER STATIONS

The 800 series foul water pump stations are available in depths from 800mm - 2000mm. Applications include collecting foul and grey water from WC's, wash hand basins, showers, sinks and dishwashers subject to selection criteria, typically for larger self contained basements or where inverts are low due to site conditions. When the 800 series is collecting grey water from a kitchen, we recommend fitting a grease trap prior to the chamber to optimize the reliability of the pump station.

This product is specifically designed for below ground applications where hydrostatic water pressure may be present. However, they should be surrounded with concrete to prevent movement. A manhole cover is not supplied as these are generally site specific and installed in the final finish. However, if required the chamber will accept a standard 450mm x 600mm cover and frame.

The 800 series pump chambers are compatible with a range of free standing and guide rail mounted pumps.

TYPICAL APPLICATION

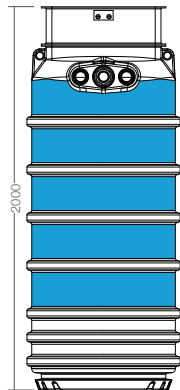
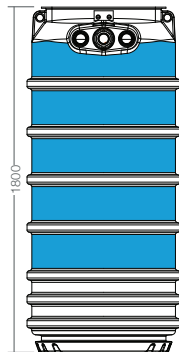
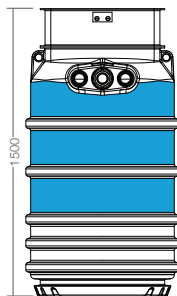
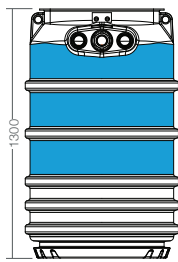
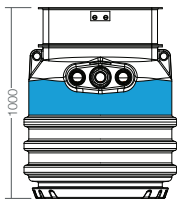
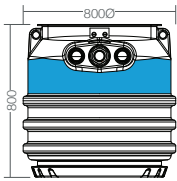
- Foul Water

INLETS

Inlets can be cut on site using the inlet kit provided with the chamber. The sections highlighted in blue on the drawings below show the areas suitable for drilling inlets.

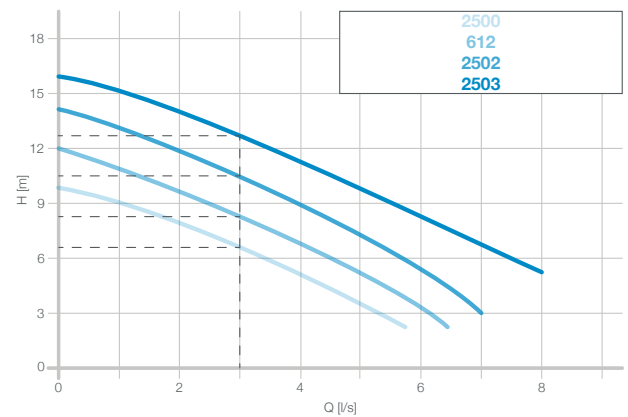
PUMP STATION TECHNICAL DATA

Chamber Model	800 Series
Chamber Material	High Density Polyethylene
Available Depths	800mm, 1000mm, 1300mm, 1500mm, 1800mm, 2000mm
Available Pumps	2500 Series, 2600 Series, D10 Series
Inlets	5 x 110mm grommets (supplied loose)
Cable Duct & Vent Size	50mm
Discharge Connection	BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe
Vent Pipework	2" / 50mm White Waste Pipe



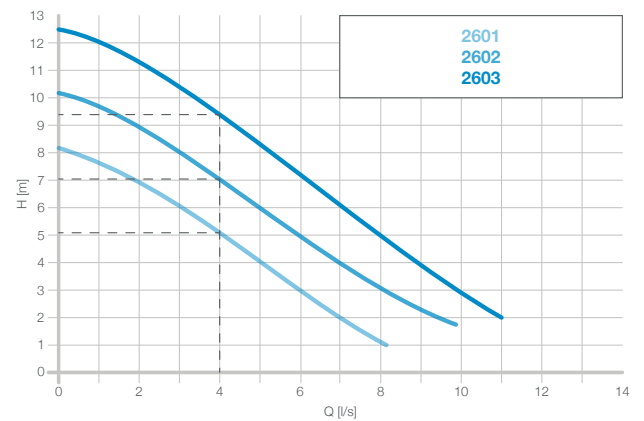
2500 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
2500SA	1.00	0.55	5.0	Call	22
612SA	0.75	0.36	6.0	DMS-114	22
2502SA	1.05	0.50	8.2	PU-006	22
2503SA	1.90	1.10	8.2	PU-008	22
2500SM	1.00	0.55	5.0	Call	22
612SM	1.25	0.75	6.0	PU-005	22
2502SM	1.80	1.10	8.2	PU-007	22
2503SM	1.80	1.10	8.2	PU-009	22
50Hz - 3 - 400V Discharge 2" BSP Female					
2500TM	0.90	0.55	2.3	Call	22
612TM	1.10	0.75	2.8	Call	22
2502TM	1.50	1.10	3.0	Call	22
2503TM	2.05	1.50	3.5	Call	22



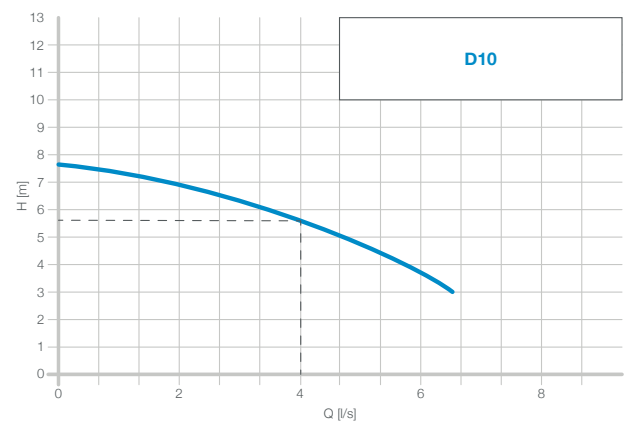
2600 SERIES

50Hz - 1 - 230V Discharge 2.50" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
2601SA	1.25	0.75	6.0	PU-010	25
2602SA	1.80	1.10	8.2	PU-012	25
2603SA	1.80	1.10	8.2	PU-014	25
2601SM	1.25	0.75	6.0	PU-011	25
2602SM	1.80	1.10	8.2	PU-013	25
2603SM	1.80	1.10	8.2	PU-015	25
50Hz - 3 - 400V Discharge 2.50" BSP Female					
2601TM	1.10	0.75	2.8	Call	25
2602TM	1.50	1.10	3.0	Call	25
2603TM	2.05	1.50	3.5	Call	25



D10 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
D10SA	1.14	0.75	5.84	DMS-120	13.4
D10SM	1.14	0.75	5.84	PU-101	13.4



1000 SERIES FOUL WATER STATIONS

The 1000 series foul water pump stations are available in depths from 1250mm - 3000mm. Applications include collecting foul and grey water from WC's, wash hand basins, showers, sinks and dishwashers subject to selection criteria, typically for larger basements or where inverts are low due to site conditions. When the 1000 series is collecting grey water from a kitchen, we recommend fitting a grease trap prior to the chamber to optimize the reliability of the pump station.

This product is specifically designed for below ground applications where hydrostatic water pressure may be present. However, they should be surrounded with concrete to prevent movement. A manhole cover is not supplied as these are generally site specific and installed in the final finish. However, if required the chamber will accept a standard 450mm x 600mm cover and frame.

The 1000 series pump chambers are compatible with a range of free standing and guide rail mounted pumps.

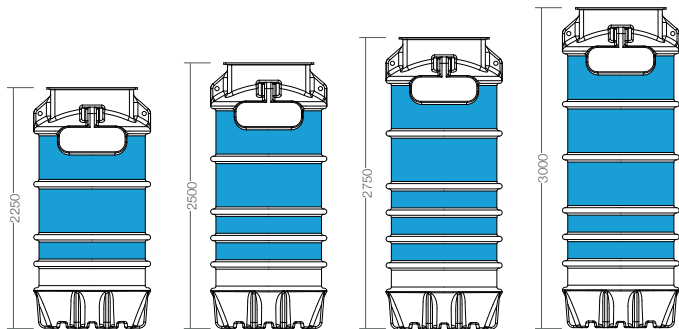
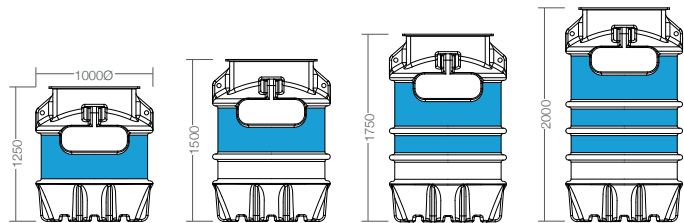
TYPICAL APPLICATION

- Foul Water

INLETS

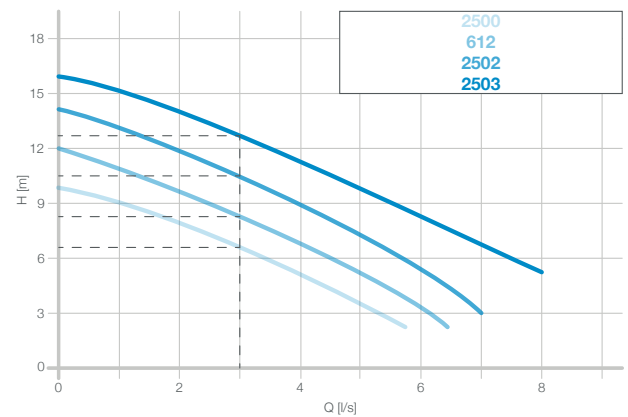
Inlets can be cut on site using the inlet kit provided with the chamber. The sections highlighted in blue on the drawings below show the areas suitable for drilling inlets.

PUMP STATION TECHNICAL DATA	
Chamber Model	1000 Series
Chamber Material	High Density Polyethylene
Available Depths	1250mm, 1500mm, 1750mm, 2000mm, 2250mm, 2500mm, 2750mm, 3000mm
Available Pumps	2500 Series, 2600 Series, D10 Series
Inlets	5 x 110mm grommets (supplied loose)
Cable Duct & Vent Size	50mm
Discharge Connection	BSP Class C
Cable Duct Pipework	2" / 50mm White Waste Pipe
Vent Pipework	2" / 50mm White Waste Pipe



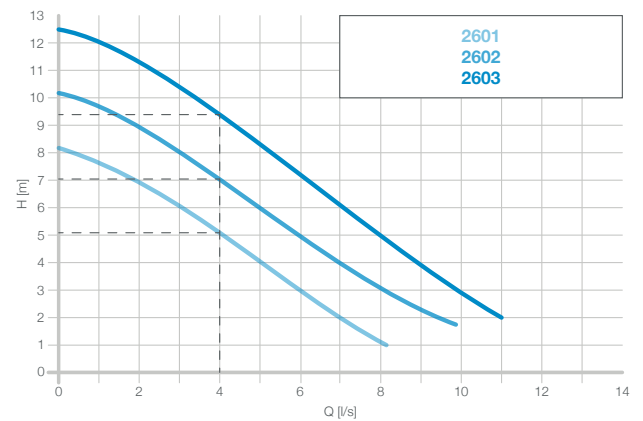
2500 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
2500SA	1.00	0.55	5.0	Call	22
612SA	0.75	0.36	6.0	DMS-114	22
2502SA	1.05	0.50	8.2	PU-006	22
2503SA	1.90	1.10	8.2	PU-008	22
2500SM	1.00	0.55	5.0	Call	22
612SM	1.25	0.75	6.0	PU-005	22
2502SM	1.80	1.10	8.2	PU-007	22
2503SM	1.80	1.10	8.2	PU-009	22
50Hz - 3 - 400V Discharge 2" BSP Female					
2500TM	0.90	0.55	2.3	Call	22
612TM	1.10	0.75	2.8	Call	22
2502TM	1.50	1.10	3.0	Call	22
2503TM	2.05	1.50	3.5	Call	22



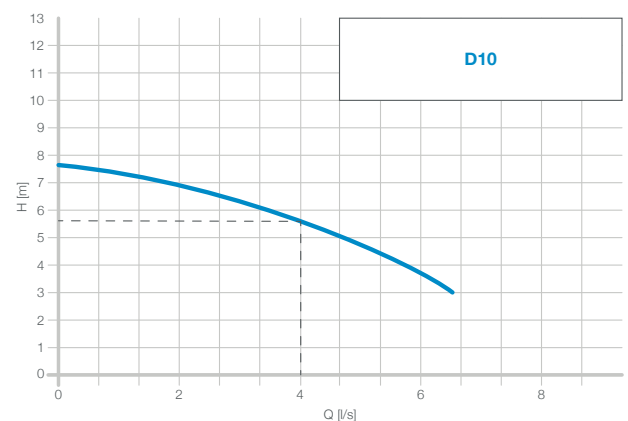
2600 SERIES

50Hz - 1 - 230V Discharge 2.50" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
2601SA	1.25	0.75	6.0	PU-010	25
2602SA	1.80	1.10	8.2	PU-012	25
2603SA	1.80	1.10	8.2	PU-014	25
2601SM	1.25	0.75	6.0	PU-011	25
2602SM	1.80	1.10	8.2	PU-013	25
2603SM	1.80	1.10	8.2	PU-015	25
50Hz - 3 - 400V Discharge 2.50" BSP Female					
2601TM	1.10	0.75	2.8	Call	25
2602TM	1.50	1.10	3.0	Call	25
2603TM	2.05	1.50	3.5	Call	25



D10 SERIES

50Hz - 1 - 230V Discharge 2" BSP Female					
Model	P1 kW	P2 kW	In A	Part No.	Weight Kg
D10SA	1.14	0.75	5.84	DMS-120	13.4
D10SM	1.14	0.75	5.84	PU-101	13.4



ALERTMAXX2

The AlertMaxx2 is an intelligent high level alarm, designed to alert homeowners when the water level in their pump station becomes too high. AlertMaxx2 can be a stand alone high level alarm offering internal data logging, energy monitoring and a service reminder or it can be connected via Wi-Fi to the SideWinder Technology monitoring system (www.sidewindertech.co.uk). To enable the Wi-Fi, the AlertMaxx2 will have to be connected by one of the Certified SideWinder installers.

The AlertMaxx2 can be connected to a PowerMaxx or Hi-PowerMaxx. When connected, the AlertMaxx2 receives important data about the battery backups status and condition. The battery backup will also extend the operating time of the AlertMaxx2 during a power outage. All this data is transmitted via Wi-Fi (if connected) to the SideWinder operations centre where it is available 24/7 for intelligent analysis.

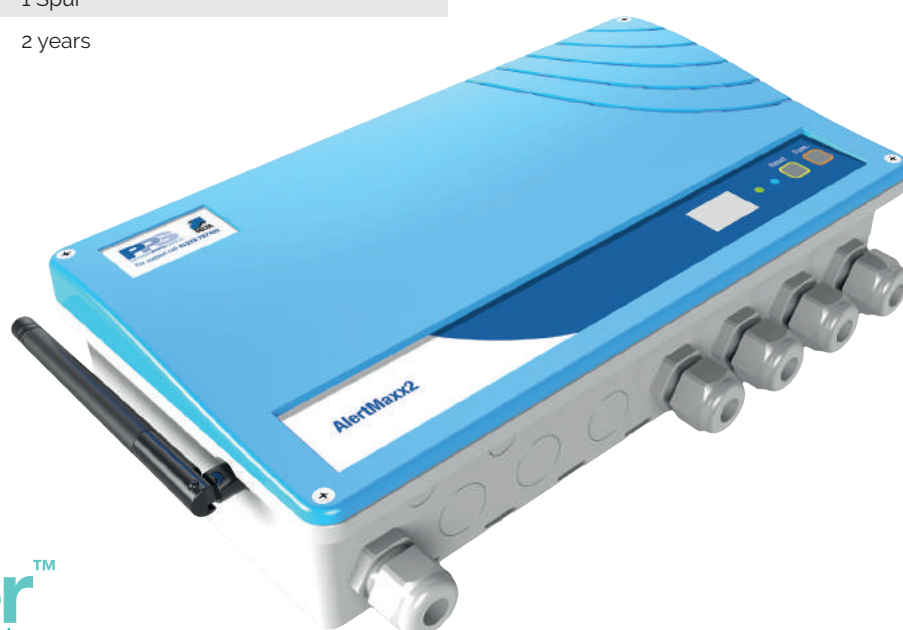
Offering a volt free contact, the AlertMaxx2 allows connection of external devices such as an alarm or beacon with a maximum load of 0.5A and voltage up to 30V. The VFR can also be connected to any BMS system if required for high level alarm only, sending a continuous signal.

KEY FEATURES

- 6V battery backup.
- Intelligent logging.
- 100db sounder.
- Digital display.
- Software controlled.
- Local energy monitoring.
- Wi-Fi enabled.
- Predictive capabilities.
- 24 month component guarantee.

TECHNICAL DATA

DMS Code (Ground Water / Foul Water)	DMS-298 / DMS-299
Size (without cable glands)	310mm x 170mm x 78mm
Weight (with battery installed)	1kg
Mains supply	200-250V AC (50Hz)
Internal battery	Pb 6V - 1.2Ah Lead Acid
Sounder	100db @ 30cm
Operating temperature	5-40°C
Power (standby)	<2W
IP	IP2X
Approximate installation time	1 hour
Electrical Requirements (Ground)	2 Spurs
Electrical Requirements (Foul)	1 Spur
Warranty	2 years



LOOKING AFTER PROPERTIES WITH OUR VIRTUAL ENGINEER...

INTELLIGENT LOGGING

Data from the property is uploaded and analysed by SideWinder Tech every 15 minutes.



FLEXIBILITY

Can be connected to almost any single or dual pump system, both existing & new.



ENERGY MONITORING

Provides local real time energy monitoring to show kWh usage per day.



WI-FI ENABLED

Simple connection to the properties Wi-Fi network made by an approved SideWinder Tech installer.



PREDICTIVE CAPABILITIES

Tells you before an event has happened! Predictive intelligence at it's best.



INTERNAL BATTERY BACKUP

Alarms remain operational even when there is a power outage or tripped electrical circuit.



100DB SOUNDER

As loud as a chainsaw, the alarm will easily be heard throughout the entire property.



MAXX BATTERY BACKUPS

Compatible with all Delta's range of battery backups. Battery status info uploaded to SideWinder Tech.



DIGITAL DISPLAY

Shows current status and simple to understand fault codes.



THE JOB OF THE VIRTUAL ENGINEER...

- Gives the property owner complete peace of mind.
- Detects over 70% of failures in advance, so an emergency becomes a scheduled visit.
- Detects pump blockages.
- Detects lime-scale build up.
- Creates triggers to investigate unusual events, i.e. longer or more frequent pump cycles.
- Understand more remotely than an engineer based at the property 24/7/365.

POWERM maxx

PowerMaxx is specifically designed for pump applications. It can run 2 x V3 (not simultaneously) ground water pumps without mains power for up to 10 days depending on the number of cycles/day and is virtually inaudible. 1 or 2 pumps are directly fed through the PowerMaxx. If a power failure occurs, the pump/s automatically take power from the PowerMaxx which will have been fully charged during mains operation.

The PowerMaxx will automatically recharge when mains power returns. Installation is simple, The PowerMaxx is free standing and can be installed in any dry ventilated area. As this unit is fitted in the power line, no additional electrical spurs are required. The PowerMaxx is part of the MaxxConnect family and can operate as a stand alone unit or can be used in conjunction with AlertMaxx2. It can also be used as a direct replacement for previous versions.

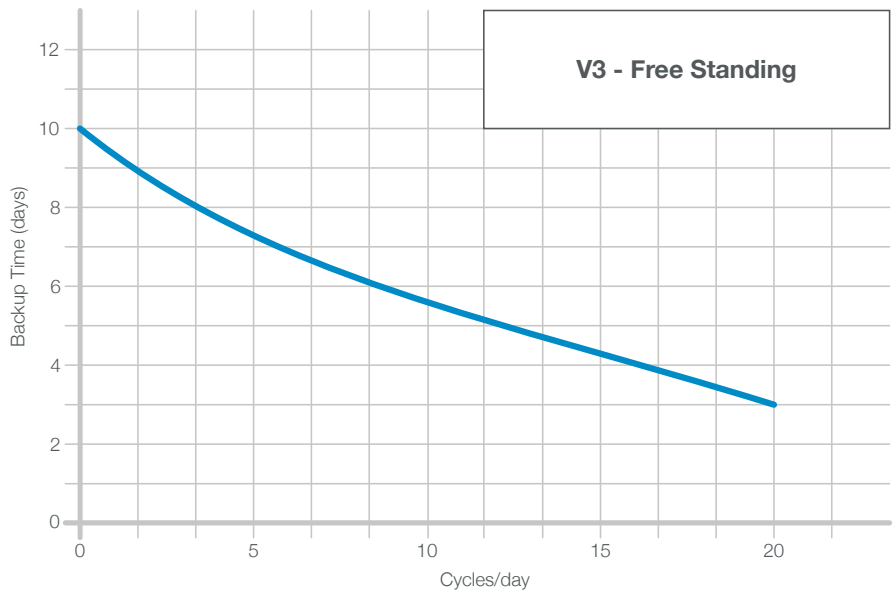
TECHNICAL DATA	
DMS Code	DMS-280
Size (without cable glands)	155mm x 425mm x 300mm
Weight (without battery installed)	6.5kg
Weight (with battery installed)	19.5kg
Mains supply	200-250V AC (50Hz)
Internal battery	24V - 1x22Ah Lead Acid
Power (standby)	<3W
Power (charging)	55W
Peak Power Handling	600W P1
Visual display	Red, Blue, Green LED
Operating temperature	5-35°C
Approximate installation time	1 hour
Warranty	2 years

KEY FEATURES

- Designed for 2 x V3 ground water pumps.
- Powers a V3 for up to 10 days.
- Operates in standby mode during a power outage for at least 10 days.
- 24 month component guarantee.

TOP TIP

Want longer run and standby times? A PowerMaxx+ is available which has been designed to triple the available run and standby statistics of the PowerMaxx.



HI-POWERMAXX

Hi-PowerMaxx is specifically designed for pump applications. It provides battery backup for larger pumps such as the V4 & V6, sits in standby mode for up to 50 days and is virtually inaudible. If a power failure occurs, the pump/s automatically take power from the Hi-PowerMaxx which will have been fully charged during mains operation.

The Hi-PowerMaxx will automatically recharge when mains power returns. Installation is simple, the Hi-PowerMaxx is free standing and can be installed in any dry ventilated area. As this unit is fitted in series between the spur and the pump, no additional electrical spurs are required. The Hi-PowerMaxx is part of the MaxxConnect family and can operate as a stand alone unit or can be used in conjunction with the AlertMaxx2. It can also be used as a direct replacement for previous versions.

TECHNICAL DATA

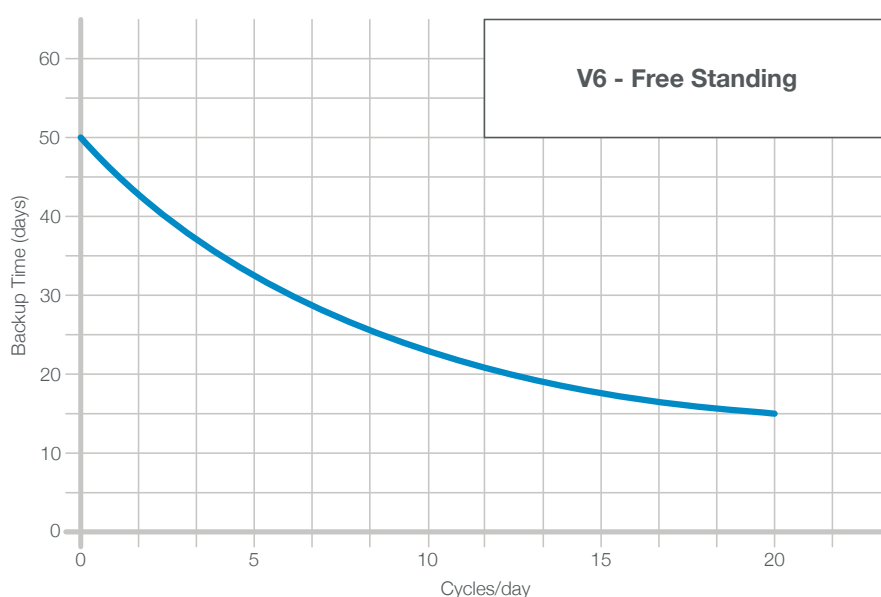
DMS Code	DMS-364
Size (without cable glands)	475mm x 425mm x 300mm
Weight (without battery installed)	15.5kg
Weight (with battery installed)	80.5kg
Mains supply	200-250V AC (50Hz)
Internal battery	24V - 5x22Ah Lead Acid Total = 110Ah
Power (standby)	<3W
Power (charging)	55W
Peak Power Handling	2000W P1
Visual display	Red, Blue, Green LED
Operating temperature	5-35°C
Approximate installation time	1.5 hours
Warranty	2 years

KEY FEATURES

- Designed for 2 x V4/V6 ground water pumps.
- Operates in standby mode during a power outage for at least 50 days.
- 24 month component guarantee.

TOP TIP

The Hi-PowerMaxx can be used to backup manual pumps that run through a DUTY/STANDBY control panel (2000W max.). Please request a wiring diagram before attempting installation.



ANCILLARY PRODUCTS & MAINTENANCE



PIPE & FITTINGS

We can supply a range of pipe and pipe fittings from 1.25" up to 2.5". Our pipe and fittings are all high pressure PVC-U Class C with a pressure rating from 9 bar up to 15 bar depending on the type. We also stock high pressure solvent weld glue in 500ml pots.



VALVES

We can supply a range of brass and cast iron valves including, swing check non return valves, non return ball valves and brass gate valves. Our valves range in size from 1.25" through to 2.50".



PUMP & CHAMBER SPARES

We can supply a range of pump and sump spares. This includes float switches, replacement pump claws, cable harnesses, sounders & beacons and pipework assemblies. Please contact our technical team for more information.

MAINTENANCE

Sump pumps must be maintained. We recommend a qualified engineer examines and services equipment every year. Pumps running frequently due to higher water tables, water drainage, or weather conditions should be examined more frequently, we recommend every 6 months. Sump pumps, being mechanical devices, may fail if not maintained which could lead to a flooded basement and costly repairs.

Regular servicing of sump pumps will increase efficiency and extend the life of the pump. All Delta Membrane pump systems can be maintained by our pump partners, Packaged Pump Systems (PPS) or the installing contractor.

COMMISSIONING

All sump pumps require commissioning. Commissioning provides peace of mind, knowing that the system is installed correctly and in compliance with warranty conditions. When this is done by our pump partners Packaged Pump Systems (PPS), the warranty on the pumps is restarted from the date of commissioning.



'FREE LIME' RISK



The British Standard for waterproofing BS 8102:2009 recognises the requirement of a Type C Waterproofing System or Cavity Drain Membrane System to be maintainable.

The use of inspection ports within a Basement Waterproofing Design is key for maintenance or the ability to carry out periodic inspection. When new concrete is introduced to structures, there is a risk of excess free lime leaching out during the curing process in the form of calcium hydroxide, this free lime, if untreated, can enter the Cavity Drainage System which can impede the flow of water and cause sump pump failure. We recommend during a Cavity Drain System installation that a silicification pre-treatment of concrete be used to reduce the risk of free lime build up. Attention should be observed to dry pack joints often formed between the existing foundation and new concrete underpin, these are classic areas for free lime to infiltrate the structure and should be 'locked' down

KOSTER POLYSIL-TG 500

An 'anti lime' coating product specially blended with Polymers and silicates which is applied by brush or spray application. Applying Koster Polysil-TG 500 will not only reduce the amount of free lime leaching into the Cavity Drainage System but will also improve the water resistance of the basement structure by absorption into the structure and locking in the free lime.





Appendix D: Maintenance Report

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

DRAINAGE MAINTENANCE PLAN

13 and 13A The Drive, Ickenham, UB10 8AF

JOMAS ASSOCIATES LTD

6-9 The Square, Stockley Park, Uxbridge, UB11 1FW

www.jomasassociates.com 0843-289-2187 info@jomasassociates.com

Report Title: DRAINAGE AND SUDS MAINTENANCE PLAN

Report Status: Final v2.0

Job No: P3226J2131

Date: 18 December 2020

Control: Previous Release

Version	Date	Issued By
V1.0	18/12/20	A Wallace
V2.0	19/05/21	A Wallace

Prepared by: JOMAS ASSOCIATES LTD **For** Matthew Singh

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

JOMAS ASSOCIATES LTD

www.jomasassociates.com

0843 289 2187

info@jomasassociates.com

1.0 GENERAL

- 1.1** Sustainable Drainage Systems (SuDS) are an environmentally friendly approach to managing rainfall. SuDS techniques use landscape features to deal with surface water with the aim to:
- 1.1.1 Control the flow, volume and frequency of water leaving a development.
 - 1.1.2 Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
 - 1.1.3 Provide attractive surroundings for the community.
- 1.2** The surface water drainage strategy for this development utilises permeable paving as the main SUDS feature along with minor features including permeable paving, grassed areas, silt traps and sumps. The following sections provides a brief description of these features and outlines the maintenance programme that should be adopted.

2.0 CLEANING OF THE DRAINAGE SYSTEM

- 2.1** Drainage systems should be inspected at regular intervals and where necessary, thoroughly cleaned out at the same time. Any defects discovered should be made good.
- 2.2** The following operations should be carried out during the periodic cleaning of a drainage system:-

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

Product Type	Period	Responsibility	Maintenance Methods
			Renew/replace any damaged/missing bolts and damaged/missing manhole covers.
Drainage Pipes	Six monthly interval	Owner or Maintenance Company for communal areas	Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.
Permeable Paving	As required	Site Owner for private areas. Maintenance Company for communal areas	Inspect the paving after any precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
	Six monthly (Ideally, this activity to be carried out in spring and autumn seasons)	Site Owner for private areas. Maintenance Company for communal areas	Agitate (e.g. brush, vacuum, etc.) the block paving to ensure no vegetation of any sort is allowed to grow and develop in the joints (where may affect performance).
	Winter season	Site Owner for private areas. Maintenance Company for communal areas	De-icing may be used without causing significant detrimental effects towards the permeable pavement's performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.

3.0 SKETCHES AND PLANS

3.1 The locations of the above features can be found by examining Drawing P3226J2132-C01

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