

AMBI^{ENT}AL

ENVIRONMENTAL ASSESSMENT

Surface Water Drainage
Strategy 5038_SWDS

Mulberry House

1a Eldon Road

Reading

RG1 4DJ

Document Issue Record

Project type: Surface Water Drainage Strategy (SWDS)

Prepared for: The Faculty Limited

Reference: 5038_SWDS

Site Location: Mulberry House, 1a Eldon Road, Reading, RG1 4DJ

Proposed Development: It is understood that the development is for the construction of a block of 11 flats, with a basement level for parking.

Consultant		Date	Signature
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Update V2.0	Mark Naumann	10/02/20	

Update v2.0 clarifies the location of the soakaway into the garden and provides typical detail to the green podium roof.

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1. Introduction

- 1.1 Ambiental Environmental Assessment has been appointed by Trevor Jenkin at The Faculty Limited to undertake a Surface Water Drainage Strategy for the proposed development at Mulberry House, 1a Eldon Road, Reading, RG1 4DJ.

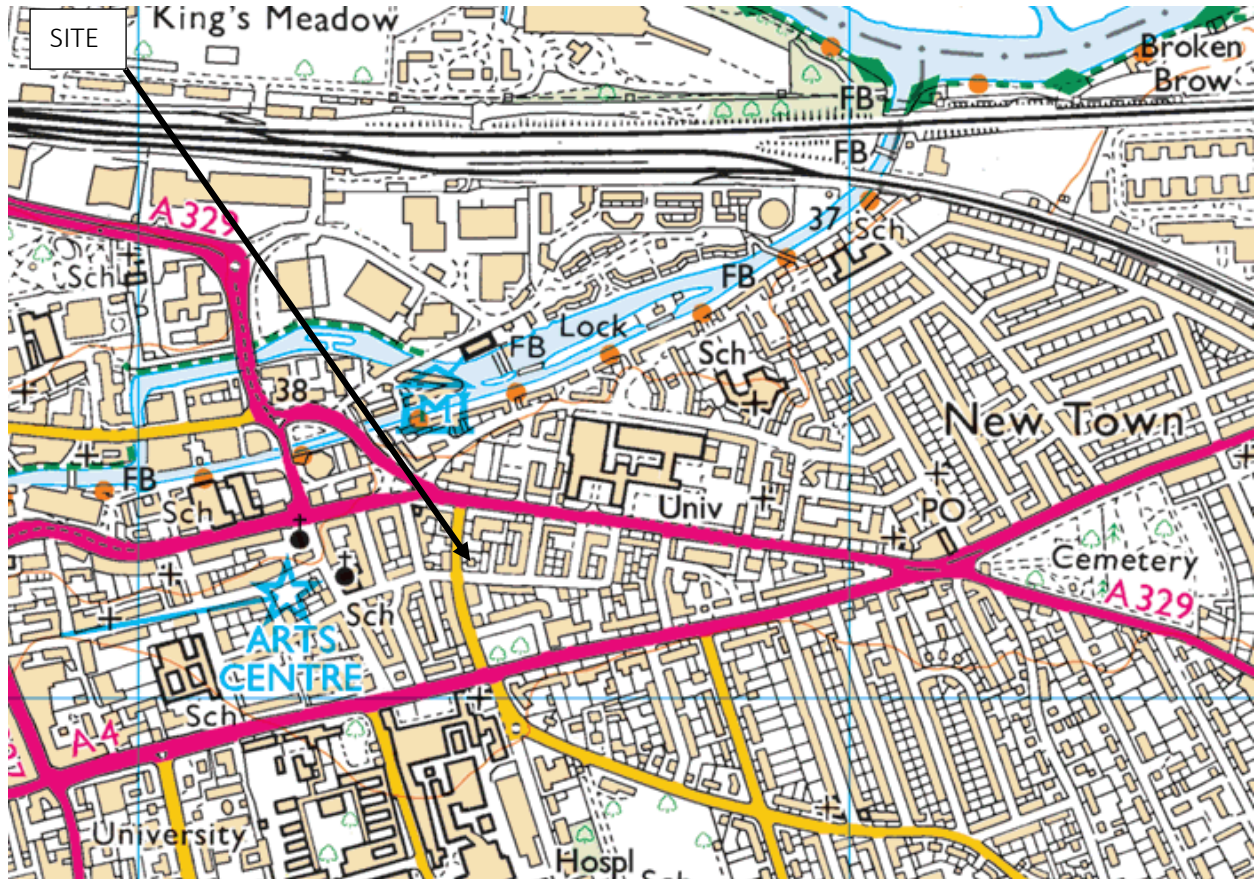


Figure 1: Site Location plan

- 1.2 The proposed development site comprises a single storey building and associated car-parking / lawn located on the east side of Eldon Road, close to the junction with Kings Road (to the north). Immediately to the north of the building is Hanover House, a part-five, part-seven storey 'L' shaped building located on the junction of Kings Road and Eldon Road.
- 1.3 The existing single storey dental surgery (Class D1) building known as Mulberry House has been previously demolished and proposals are for the erection of a 3 to 5 storey building and semi-open basement providing 11 (5 x 1 bed, 3x2 bed, and 3x3 bed) residential units (Use Class C3), 10 parking spaces, landscaping and associated works.
- 1.4 The developed site area, as indicated on the plans provided is approximately 835m² (0.0835ha). The existing impermeable area associated with the existing impermeable surface within the proposed development redline boundary is approximately 210m² (0.021ha) based on the topographic survey. See proposed layout plans in Appendix 1.
- 1.5 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without worsening flood risk for the area, and without placing the development itself at risk of flooding, as per National guidance provided within the National Planning Policy Framework (NPPF) 2019, the National Planning Practice Guidance (NPPG), DEFRA's National Standards for Sustainable Drainage and Local guidance provided within Reading Borough Council Sustainable Design And Construction SPD.

2. Development Description and Site Area

Proposed Development and Location

- 2.1 The proposed development site comprises a single storey building and associated car-parking / lawn located on the east side of Eldon Road, close to the junction with Kings Road (to the north). Immediately to the north of the building is Hanover House, a part-five, part-seven storey 'L' shaped building located on the junction of Kings Road and Eldon Road.
- 2.2 The existing single storey dental surgery (Class D1) building known as Mulberry House has been previously demolished and proposals are for the erection of a 3 to 5 storey building and semi-open basement providing 11 (5 x 1 bed, 3x2 bed, and 3x3 bed) residential units (Use Class C3), 10 parking spaces, landscaping and associated works.
- 2.3 The developed site area, as indicated on the plans provided is approximately 835m² (0.0835ha). The existing impermeable area associated with the existing impermeable surface within the proposed development redline boundary is approximately 210m² (0.021ha) based on the topographic survey. See proposed layout plans in Appendix 1.
- 2.4 A Topographic Survey has been undertaken of the site to inform the design and existing ground levels at the site vary from 9.7mAOD at the existing building to 8.4mAOD at the west boundary. Land adjacent to the north boundary, adjacent to Hanover House, is shown at 7.3mAOD. The topographic survey is included in Appendix 1.

Existing Drainage Infrastructure

- 2.5 The Thames Water sewer records indicates the presence of 225mm storm sewer located within the roads to the south and west of the site draining west and north respectively. Foul sewers are also shown within the roads to the south and west of the site. See sewer record plans in Appendix 2.
- 2.6 A CCTV drain survey of the existing drainage on site has been undertaken by Happy Drains but was restricted by demolition debris in the manholes. A single foul offsite connection is shown present. The CCTV survey report is included in Appendix 2.

Geology and Infiltration Potential

- 2.7 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the bedrock underlying the site is Seaford Chalk Formation and Newhaven Chalk Formation - Chalk Sedimentary bedrock. Superficial deposits are shown as Kempton Park Gravel Member - Sand and gravel on the BGS online viewer at the site although there are Taplow Gravel Member - Sand and gravels shown just south of the development site.
- 2.8 The *DEFRA MagicMAP Groundwater Source Protection Zone (SPZ) Map* indicates that the site is located within the boundary of groundwater source protection zone 3. Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.

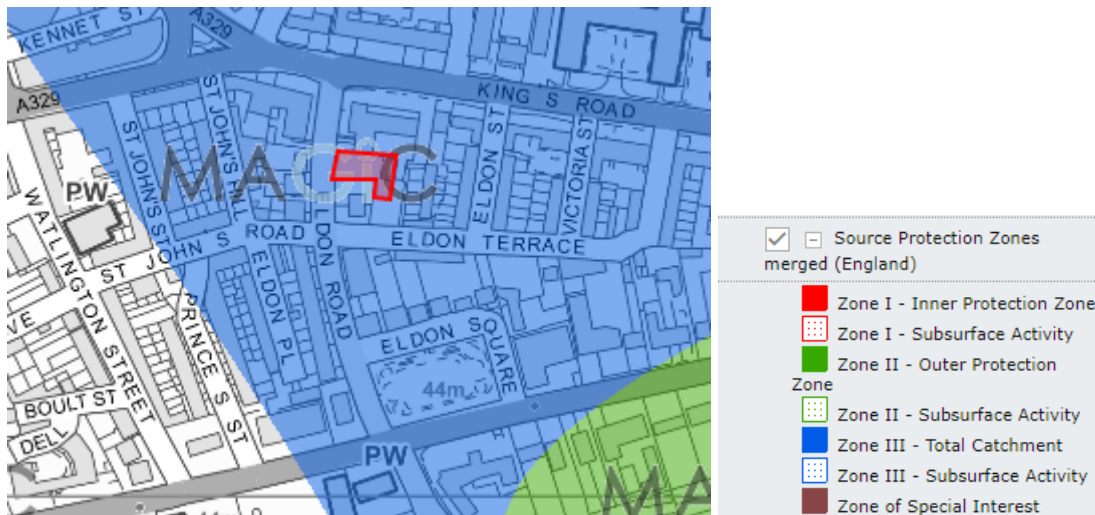


Figure 2: EA Drinking Water Source protection zone map extract

- 2.9 The DEFRA Aquifer Bedrock Designation Map indicates that the site is located over a Principle Aquifer. DEFRA Superficial Bedrock Designation Map shows the site to be located over a Secondary A superficial aquifer.

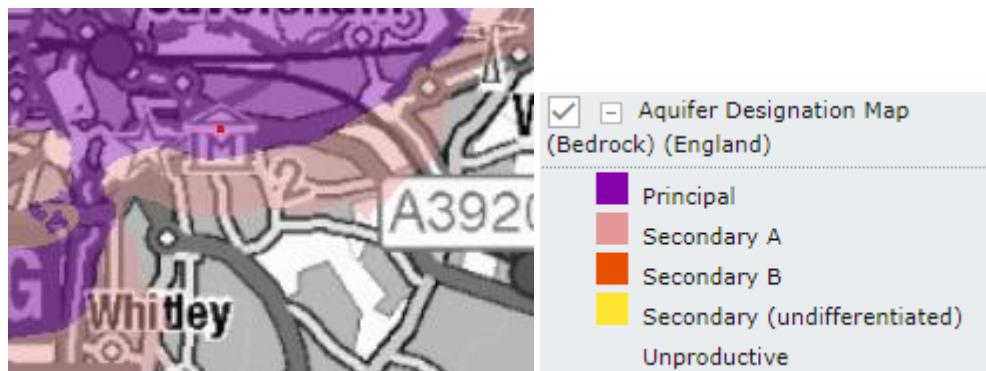


Figure 3a: Bedrock aquifer designation map extract

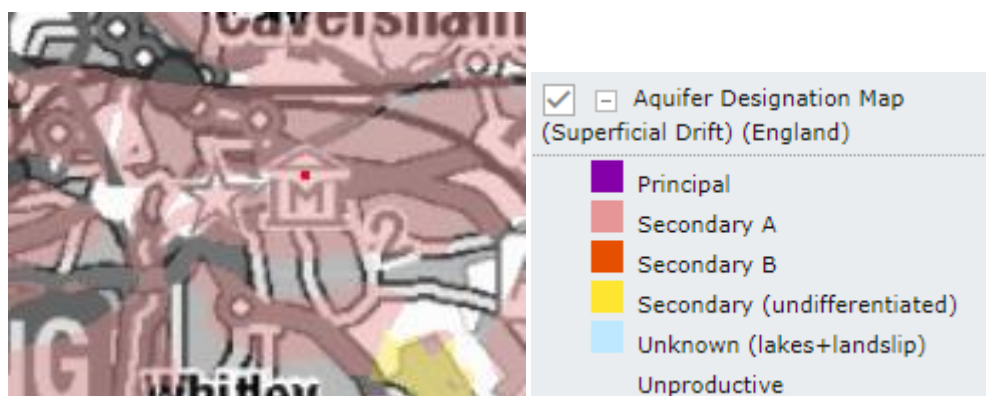


Figure 4b: Bedrock aquifer designation map extract

- 2.10 The *DEFRA Groundwater Vulnerability map* indicates that the site is located over a medium to high groundwater vulnerability. The Groundwater Vulnerability Maps show the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties. It also shows a soluble rock risk associated with the Chalk bedrock.

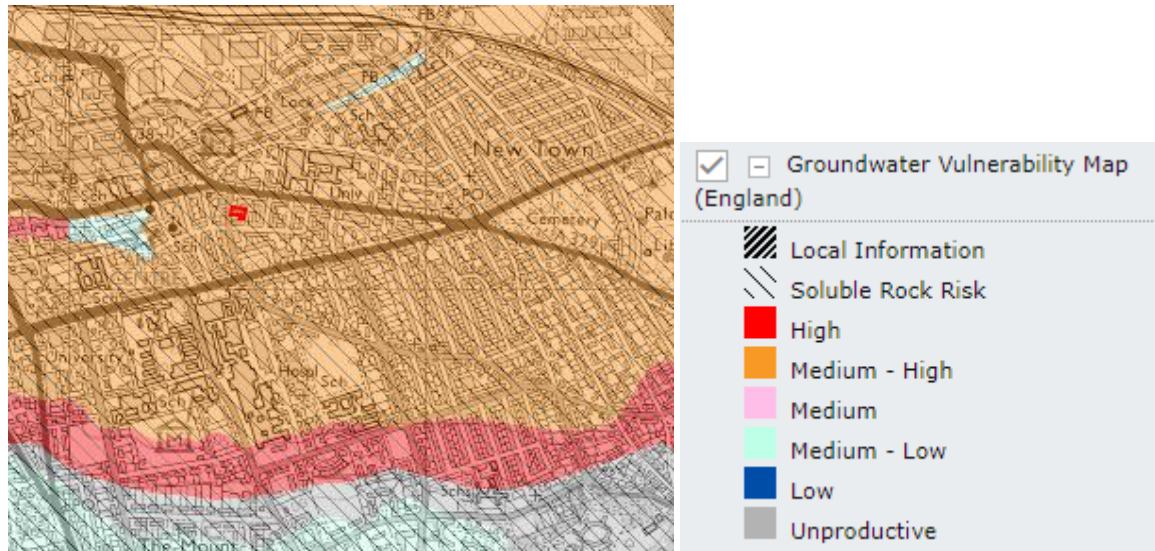


Figure 5: Groundwater Vulnerability map extract

- 2.11 At the time of writing, the client has not commissioned site-specific infiltration data. On the basis of the expected geology of gravels over chalk it appears that infiltration would likely be viable within the local geology. Infiltration testing to BRE365 should be undertaken to inform any detailed design. A nearby borehole on the BGS mapping shows resting groundwater to be 7.35m depth (BGS ID: 428802 : BGS Reference: SU77SW650).

3. Flood Risk

EA Flood Map for Planning

- 3.1 With reference to the NPPF 2019 and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA, the application site is shown located within Flood Zone 1 (Figure 5). Flood Zone 1 is described as: *Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3).*



Figure 6: Flood risk map for planning (Source: Environmental Agency, EA)

EA Risk Of Flooding from Surface Water

- 3.2 The EA's Risk of Flooding from Surface Water map (RoFSW) shows the site in a Very Low surface water risk area but directly adjacent to a Medium risk area associated with the car park of the adjacent Hanover House as indicated in Figure 6 below. Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.



Figure 7: EA RoFSW risk map extract

- 3.3 It can be seen from the proposed plans in Appendix 1 that the habitable rooms of the proposed development are located at the level of Eldon Road and the basement is car parking and storage only. As such, risk from surface flooding to the proposed habitable rooms is very low as these are raised above the potential surface risk.

Vulnerability Classification

- 3.4 The proposed development usage is for residential purposes and as such, under the NPPF 2019, is classified as a 'More Vulnerable'. Table 1 below, extracted from the NPPF 2019, indicates the proposed residential, 'More Vulnerable', development is appropriate development for Flood Zone 1.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b <i>Functional Floodplain</i>	Exception Test Required	✓	✗	✗	✗

Table 1: Flood risk vulnerability and flood zone 'Compatibility' table as specified by NPPF 2019.
Shaded cells denote the proposed re-development. Please note: ✓ means development is appropriate;
✗ means the development should not be permitted

4. SUDS Assessment

- 4.1 In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development.
- 4.2 Paragraph: 080 Reference ID: 7-080-20150323 of the Flood risk and coastal change Planning Practice Guidance associated with the National Planning Policy Framework (NPPF) states that: generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable, see Table 2.
- 4.3 The management of surface water has been considered in respect to the SuDS hierarchy (below) (as detailed in Building Regulations Part H and within the the *CIRIA 753 'The SUDS Manual', Section 3.2.3*):

SuDS Drainage Hierarchy				
			Suitability	Comment
	1.	Infiltration	✓	Infiltration appears feasible based on geology
	2.	Discharge to Surface Water	-	No watercourse on or adjacent to site
	3.	Discharge to Surface Water Sewer, Highway Drain or another Drainage System	-	Existing surface drainage unknown
	4.	Discharge to Combined Sewer	-	

Table 2: SuDS Hierarchy

- 4.4 To achieve the reduction in site run off rates, the use of various SuDS have been considered for the development as follows:

Suitability of SuDS Components		
SuDS Component	Description	Suitability
Permeable Pavement	Pervious surfaces can be used in combination with aggregate sub-base and/or geocellular/modular storage to attenuate and/or infiltrate runoff from surrounding surfaces and roofs. Liners can be used where ground conditions are not suitable for infiltration.	✓
Green Roofs	Green Roofs provide areas of visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. They are generally more costly to install and maintain than conventional roofs but can provide many long-term benefits and reduce the on-site storage volumes.	✓
Infiltration systems	Systems that collect and store runoff and allow it to infiltrate into the ground	✓
Rainwater Harvesting	Rainwater Harvesting is the collection of rainwater runoff for use. It can be collected from roofs or other impermeable area, stored, treated (where required) and then used as a supply of water for domestic, commercial and industrial properties.	✓
Swales	Swales are designed to convey, treat and attenuate surface water runoff and provide aesthetic and biodiversity benefits. They can replace conventional pipework as a means of conveying runoff, however space constraints of some sites can make it difficult incorporating them into the design.	x
Rills and Channels	Rills and Channels keep runoff on the surface and convey runoff along the surface to downstream SuDS components. They can be incorporated into the design to provide a visually appealing method of conveyance, they also provide effectiveness in pre-treatment removal of silts.	x

Bioretention Systems	Bioretention systems can reduce runoff rates and volumes and treat pollution through the use of engineer soils and vegetation. They are particularly effective in delivering interception, but can also be an attractive landscape feature whilst providing habitat and biodiversity.	x
Retention Ponds and Wetlands	Ponds and Wetlands are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff. They enhance treatment processes and have great amenity and biodiversity benefits. Often a flow control system at the outfall controls the rates of discharge for a range of water levels during storm events.	x
Detention Basins	Detention Basins are landscaped depressions that are usually dry except during and immediately following storm events, and can be used as a recreational or other amenity facility. They generally appropriate to manage high volumes of surface water from larger sites such as a neighbourhoods.	x
Geocellular Systems	Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before infiltration, controlled release or use. The inherent flexibility in size and shape means they can be tailored to suit the specific characteristics and requirements of any site.	✓
Proprietary Treatment Systems	Proprietary treatment systems are manufactured products that remove specific pollutants from surface water runoff. They are especially useful where site constraints preclude the use of other methods and can be useful in reducing the maintenance requirements of downstream SuDS	x
Filter Drains and Filter Strips	Filter drains are shallow trenches filled with stone, gravel that create temporary subsurface storage for the attenuation, conveyance and filtration of surface water runoff. Filter strips are uniformly graded and gently sloping strips of grass or dense vegetation, designed to treat runoff from adjacent impermeable areas by promoting sedimentation, filtration and infiltration.	x

Table 3: Suitability of SuDS Components

- 4.5 A number of SuDS components are deemed feasible for use on site. Given the sloping nature of the site it is suggested the use of ***infiltration devices (using Geocellular Systems or traditional soakaway)*** can be used on site based on the infiltration into the gravels and chalk subgrade. A **green roof** is shown over the underground car park.
- 4.6 It is recommended to provide **Rainwater harvesting** in the form of water butts to the new property to provide water for use within the garden areas.
- 4.7 SuDS components should be designed to accommodate and dispose of surface water runoff from storms up to and including the 1:100 year +40% climate change event without flooding.

Rainwater Harvesting

- 4.8 Rainwater Harvesting (RWH) Systems should be considered for rainwater re-use. Rainwater harvesting can take various forms including simple water butts to utilise runoff for watering and irrigation, to more complex pumped RWH systems to be used in grey water uses. It is strongly recommended that rainwater harvesting is considered, however, the viability and suitability of a RWH system should be reviewed by a specialist to determine the suitability in context to the rest of the site proposals. For the purposes of attenuation and storage calculations, it is considered the harvesting devices are full at the time of the design rainfall event.

Geocellular System

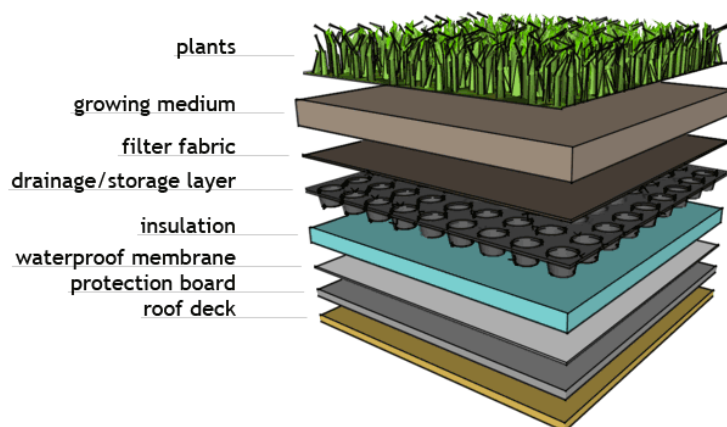
- 4.9 Geocellular Systems are generally built by placing together (e.g. stacking) cuboid plastic structures with very high void ratios (90-95%). The formed volume is then surrounded by a permeable geomembrane and backfilled with the excavated soil to form the infiltration device. Within the proposed SuDS scheme the Geocellular tanks are used to provide the storage volume requirement. They are proposed to be located within the southern courtyard area, however, the exact layout is to be determined at the detailed design stage.

Infiltration devices

- 4.10 Infiltration components are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below. Infiltration components can be incorporated into a range of SuDS components. Soakaways are the most common type of infiltration device in the UK. They store runoff from a single house or from a development and allow efficient infiltration into the surrounding soil. Drainage from individual properties is often connected to over-sized square or rectangular, rubble-filled voids, or perforated concrete chambers, sited beneath lawns. A soakaway will temporarily hold water before allowing it to either soak into the ground.

Green Roof

- 4.11 Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping. The roof is likely to consist of an impermeable layer, a substrate or growing medium and a drainage layer (although not all green roofs require a drainage layer).
- 4.12 Green roofs are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.
- 4.13 A green roof is shown on the architects plans over the car park podium towards the west of the site which forms part of the site amenity area. There are also footpaths and hard surface areas shown on this area. A typical green roof make-up is shown below



Blue Roof

- 4.14 A blue roof is a roof of a building that is designed explicitly to provide initial temporary water storage and then gradual release of stored water, typically rainfall. Blue roofs are typically constructed on flat or low sloped roofs in urban communities where flooding is a risk due to a lack of permeable surfaces for water to infiltrate, or seep back into the ground.
- 4.15 Water is stored in blue roof systems until it either evaporates or is released downstream after the storm event has passed. Blue roofs that are used for temporary rooftop storage can be classified as "active" or "passive" depending on the types of control devices used to regulate drainage of water from the roof.

5. Surface Water Drainage Strategy

- 5.1 In order to mitigate flood risk posed by the proposed development, adequate control measures are required to be considered. This will ensure that surface water runoff is dealt with at source and the flood risk on/off site is not increased over the lifetime of the development.
- 5.2 The runoff generated will need to be managed in accordance with the National Planning Policy Framework (NPPF 2019) policy which requires the use of Sustainable Drainage Systems (SuDS). The design guidelines for the SuDS should follow the recommendations set out in Local guidance provided within Reading Borough Council Sustainable Design and Construction SPD.
- 5.3 Within the proposed SuDS scheme infiltration devices can be positioned west of the proposed development at distances greater than 5m from the main structure, and within the wider site ownership boundary to capture and manage runoff generated by the development.
- 5.4 The green roof is shown over the underground car park element of the scheme.
- 5.5 The developed site area, as indicated on the plans provided is approximately 835m² (0.0835ha). The existing impermeable area associated with the existing impermeable surface within the proposed development redline boundary is approximately 210m² (0.021ha) based on the topographic survey. The proposed hard surface is approximately 480m². See proposed layout plans in Appendix 1.
- 5.6 See Appendix 3 for the Surface Water Drainage Strategy Layout plan.

Climate Change

- 5.7 The design lifetime of a residential site is 100 years and an allowance for climate change should be considered in accordance with published guidance within the NPPF 2019. The climate change criteria are reproduced below, and as it is likely that the 'upper end' allowance for 2070 to 2115 is deemed suitable for the proposed development. To provide a worst-case scenario, the 'upper end' 40% climate change allowance will be used (Table 4).

PEAK RAINFALL INTENSITY ALLOWANCE IN SMALL AND URBAN CATCHMENTS			
Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 4: Peak rainfall intensity allowance in small and urban catchments

- 5.8 The SuDS system proposed for the new development adheres to the Council's requirement of demonstrating surface water control and attenuation storage on site, with the intention of mitigating the impact on the existing flooding regime.

Runoff rates

- 5.9 According to the plans provided by the client, the proposed site area amended as part of the proposed works would be approximately 101m². This is associated with a Greenfield Runoff Rate (Q_{BAR}) of 0.0 l/s. Other results factored for each return period and area of the site are shown in Appendix 4, Calculations and also in Table 5 below.
- 5.10 Given an infiltration device can be accommodated at ground level within the site boundary it is proposed to infiltrate the design rainfall events of 1 in 1 year, 1 in 30 year, 1 in 100 year (with an

allowance for climate change) into the subgrade on site with no formal offsite connection. As no formal infiltration testing has been undertaken on site a conservative assumed infiltration rate into the chalk of 2.0×10^{-5} m/s has been assumed to inform the strategy.

SURFACE WATER DISCHARGE RATES SUMMARY					
	Area (ha)	Discharge Rates (l/s)			
		1 year	2 year/ Q_{BAR}	30 year	100 year
Greenfield Rates	0.0835	0.0	0.0	0.1	0.1
Proposed Site (+40% CC)	0.0480	0.0	-	0.0	0.0

Table 5: Surface water discharge rates summary

On Site Drainage and Storage Systems

- 5.11 Attenuation storage is needed to temporarily store water during periods when the runoff rates from the development site exceed the allowable discharge rates from the site.
- 5.12 Rainfall depths for the 1 in 100 years return period plus 40% of CC were produced using Micro Drainage software to estimate the largest volume and critical storm, for typical storm durations.
- 5.13 The green roof shown in the amenity area over the basement roof slab has not been included in the calculations at this time subject to final design.
- 5.14 Calculations indicate that for the soakaway, with a drained area of approximately 480sqm, geocellular crate soakaway 3x6x2m deep is required to offer 27.1 m³ of storage to attenuate and infiltrate runoff from the 1:100 year +40% climate change, at the assumed infiltration rate of 2.0×10^{-5} m/s. Half drain time would be 601mins.
- 5.15 Drainage should be routed through a catchpit manhole prior to entering the soakaway. External pedestrian paving and the vehicle access to the garage should be laid in a permeable surface to infiltrate itself.
- 5.16 Infiltration testing in accordance with BRE365 should be carried out prior to construction to verify the design of the soakaway.
- 5.17 Guidance about proper use, installation and maintenance of any proprietary system must be provided by the supplier and incorporated into the site proposals at detailed design stage. Results are shown in Appendix 4.

6. Design Exceedance

- 6.1 In the event of drainage system failure under extreme rainfall events or blockage, overland flow may occur within the site. In the event of the development's drainage system failure, the runoff flow will be dictated by topography on site. Design of external ground levels should be completed at detailed design stage to finalise these overland routes, but some indicative flow paths have been indicated on the outline strategy drawings. External levels should be designed to direct overland flow away from buildings and threshold as depicted on the proposed surface water drainage layout in Appendix 3.
- 6.2 It is advised that the ground floor finished ground floor level, containing habitable rooms, of the proposed building should be 300mm above adjacent road levels to ensure that surface flooding does not impact the proposed development.

7. Water Quality

- 7.1 Adequate treatment must be delivered to the water runoff to remove pollutants through SuDS devices, which are able to provide pollution mitigation. Pollution Hazards and the SuDS Mitigation have been indexed in the CIRIA 753 'The SUDS Manual'.
- 7.2 The Pollution Hazard Indices are summarized in Table 6 – Summary of Pollution Hazard Indices for different Land Use below (reference: Table 26.3.CIRIA SuDS Manual 2015).

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
LAND USE	Pollution Hazard Level	Total suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property driveways	Low	0.5	0.4	0.4

Table 6: Summary of Pollution hazard Indices for different Land Use.

- 7.3 Runoff from roof areas is considered to generally be uncontaminated. However, to prevent any potential sediment from impacting on the storage structure, *Sediments Traps* should be provided on the outlet to the storage structure to prevent sedimentation, with rodding access provided either side for cleaning and maintenance.
- 7.4 The runoff from the basement car park should be routed to the foul system in accordance with best practice given the low flows from this area and the resulting higher contaminant concentrations.

8. Adoption and Maintenance

- 8.1 All onsite SuDS and drainage systems will be privately maintained. A long-term maintenance regime should be agreed with the site owners before adoption. In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction.

GENERAL REQUIREMENTS		RESPONSIBILITY	
Generally	Frequency	Maintenance Company	Home Owner
Pipes and Litter: collect all litter or other debris and remove from site at each visit	Monthly	Yes, where draining more than one property or located in communal areas	Yes, where drains serve the one property only or within property boundary
INLETS, OUTLETS, CONTROLS, GULLIES, CHANNEL DRAINS, GEOCELLULAR ATTENUATION TANKS AND INSPECTION CHAMBERS			
Regular Maintenance	Frequency		
Inspect surface structures removing obstructions, sediment, oil/grease and floating debris and silt as necessary. Check there is no physical damage. Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris.	Monthly	Yes, where draining more than one property or located in communal areas	Yes, where drains serve the one property only or within property boundary
Inspection chambers, Gullies, Channel Drains: Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn and major storm events	Annually	Yes, where draining more than one property or located in communal areas	Yes, where drains serve the one property only or within property boundary
Infiltration Tank (Geocellular): Inspect and remove blockages, Jet and camera as required, check flow. CCTV inspection at every inspection point is recommended: — after every major storm — at regular intervals. Silt traps prior to inlet pipework should be routinely inspected and cleaned out to minimise debris reaching the tank	Annually	Yes, maintenance to be undertaken by maintenance company.	
Occasional Maintenance			
Cleaning of the system if necessary. CCTV Survey and Jetting	As necessary	Yes, where draining more than one property or located in communal areas	Yes, where drains serve the one property only or within property boundary
Remedial work			
Inspect and remove baskets or similar silt-traps, clean and replace. Repair physical damage if necessary.	As necessary	Yes, where draining more than one property or located in communal areas	Yes, where drains serve the one property only or within property boundary

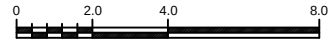
PERMEABLE AND POROUS SURFACES			
Regular Maintenance			
Cleaning Brush regularly and remove sweepings from all hard surfaces	Monthly	Yes, shared access road	Yes, private driveways
Occasional Maintenance			
Permeable Pavements. Brush and vacuum surface once a year to prevent silt blockage and enhance design life.	Annually	Yes, shared access road	Yes, private driveways
Remedial work			
Monitor effectiveness of permeable pavement and when water does not infiltrate immediately advise Client of possible need for reinstatement of top layers or specialist cleaning. Recent experience suggests jet washing and suction cleaning will substantially reinstate pavement to 90% efficiency.	As required	Yes, shared access road	Yes, private driveways
OVERLAND FLOW AND DESIGNED FLOODABLE AREAS			
Regular Maintenance			
Ensure flood flow routes or areas that are design to temporarily store flood water are not obstructed. Remove obstructions from site	Monthly	Maintenance Company in communal areas, home owners in private areas.	

9. Conclusion

- 9.1 Ambient Environmental Assessment has been appointed by Trevor Jenkin at The Faculty Limited to undertake a Surface Water Drainage Strategy for the proposed development at Mulberry House, 1a Eldon Road, Reading, RG1 4DJ.
- 9.2 The proposed development site comprises a single storey building and associated car-parking / lawn located on the east side of Eldon Road, close to the junction with Kings Road (to the north). Immediately to the north of the building is Hanover House, a part-five, part-seven storey 'L' shaped building located on the junction of Kings Road and Eldon Road.
- 9.3 The existing single storey dental surgery (Class D1) building known as Mulberry House has been previously demolished and proposals are for the erection of a 3 to 5 storey building and semi-open basement providing 11 (5 x 1 bed, 3x2 bed, and 3x3 bed) residential units (Use Class C3), 10 parking spaces, landscaping and associated works.
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- 9.5 At the time of writing, the client has not commissioned site-specific infiltration data. On the basis of the expected geology it appears that infiltration would likely be viable within the bedrock chalk geology. Infiltration testing to BRE365 should be undertaken to inform any detailed design.
- 9.6 The EA's Risk of Flooding from Surface Water map (RoFSW) shows the site in a Very Low surface water risk area, but directly adjacent to a Medium risk area associated with the car park of the adjacent Hanover House.
- 9.7 In order to mitigate flood risk posed by the proposed development, adequate control measures are required to be considered. This will ensure that surface water runoff is dealt with at source and the flood risk on/off site is not increased over the lifetime of the development. Rainfall depths for the 1 in 100 years return period plus 40% of CC were produced using Micro Drainage software to estimate the largest volume and critical storm, for typical storm durations.
- 9.8 The main building roof would drain to underground infiltration device located externally within the site boundary to capture, store and infiltrate surface water into the subgrade. The proposals are for one soakaway to the west of the property in the garden area. Given the nature of the site a geocellular soakaway is proposed for robustness.
- 9.9 Design of external ground levels should be completed at detailed design stage to finalise these overland routes, but some indicative flow paths have been indicated on the outline strategy drawings. It is advised that the ground floor finished ground floor level, containing habitable rooms, of the proposed building should be 300mm above adjacent road levels to ensure that surface flooding does not impact the proposed development.
- 9.10 Runoff from roof areas is considered to generally be uncontaminated. However, to prevent any potential sediment from impacting on the storage structure, *Sediments Traps* should be provided on the outlet to the storage structure to prevent sedimentation, with rodding access provided either side for cleaning and maintenance.
- 9.11 The runoff from the basement car park should be routed to the foul system in accordance with best practice given the low flows from this area and the resulting higher contaminant concentrations.

- 9.12 All onsite SuDS and drainage systems should be privately maintained. A long-term maintenance regime should be implemented by the client, or managing agents, as outlined in this report. In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction.
- 9.13 This report demonstrates that the development proposal can be satisfactorily accommodated without worsening the flood risk for the area and without placing the development itself at risk of flooding, as per National guidance provided within the National Planning Policy Framework (NPPF) 2019, the National Planning Practice Guidance (NPPG), DEFRA's National Standards for Sustainable Drainage and Local guidance provided within Reading Borough Council Sustainable Design And Construction SPD.

Appendix 1 – Architects plans



Rev.	Date	Comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN		
Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings.		
Where this drawing relates to existing buildings or completed construction the contractor shall check that there is no conflict between actual building dimensions and drawing dimensions.		
In the event of conflict between this drawing and subcontractor's working drawings for relevant building components the subcontractor's drawing shall take precedence.		
Such conflicts noted above shall be reported immediately ICEWIT DESIGN PTN		
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All Dimensions are in Millimetres unless otherwise stated.		
ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935 Client		
Trevor Jenkin		
Project MULBERRY HOUSE, 1A ELDON ROAD READING		
Title PROPOSED SITEPLAN		
Scale 1:200 @ A3		
Date NOVEMBER 2019		
PLANNING		
Drawing Number 8694/ PL-00		Rev. -



BASEMENT PLAN



GROUND FLOOR

Rev.	Date	Comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN		
Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings.		
Where this drawing relates to existing buildings or completed construction the contractor shall check that there is no conflict between actual building dimensions and drawing dimensions.		
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All Dimensions are in Millimetres unless otherwise stated.		
ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935 Client		
Trevor Jenkin		
Project MULBERRY HOUSE, 1A ELDON ROAD READING		
Title PROPOSED BASEMENT PLAN & GROUND FLOOR		
Scale 1:200 @ A3		
Date NOVEMBER 2019		
PLANNING		
Drawing Number 8694/ PL-01		Rev. -

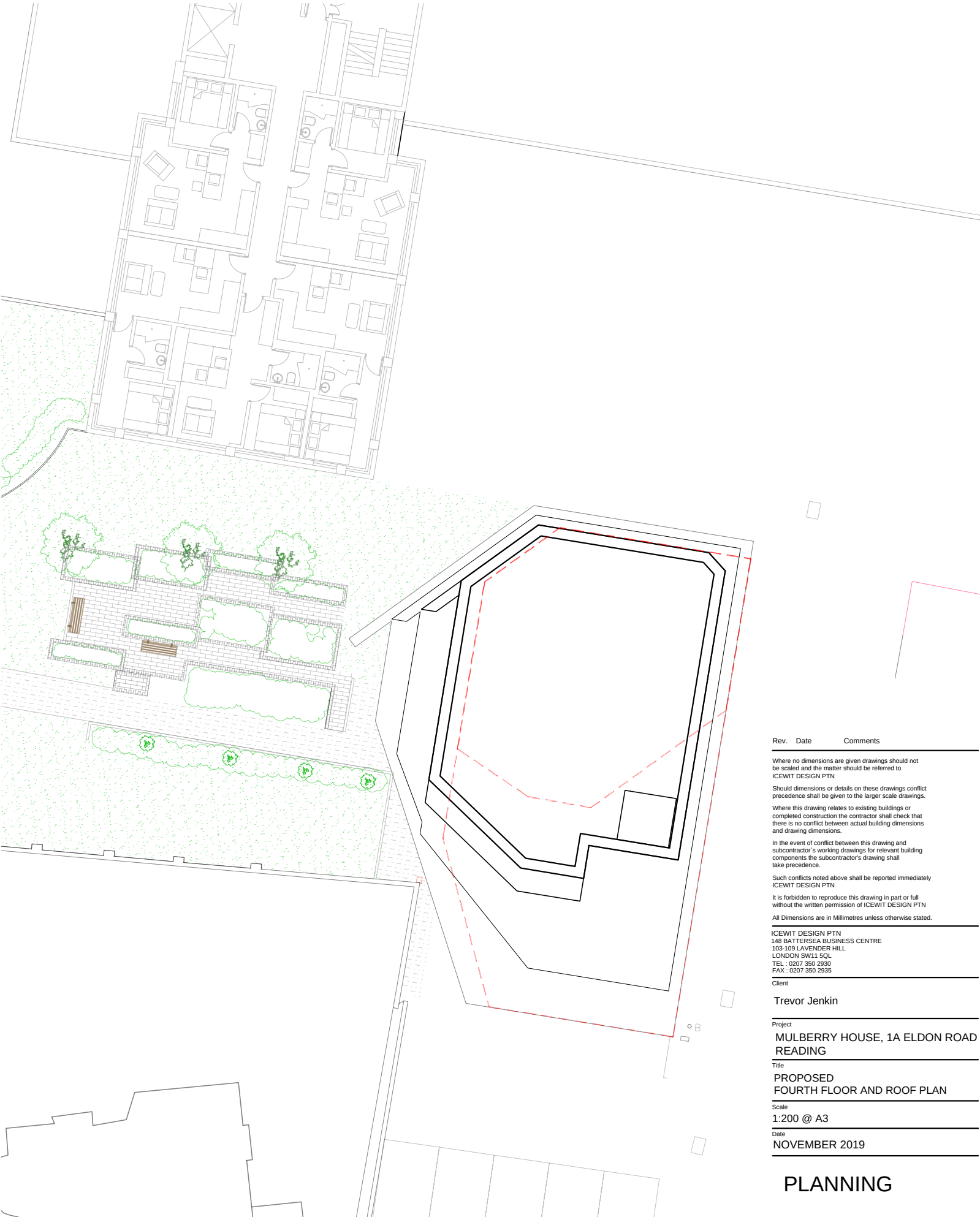


Rev.	Date	Comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN		
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ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935 Client		
Trevor Jenkin		
Project MULBERRY HOUSE, 1A ELDON ROAD READING		
Title PROPOSED FIRST , SECOND AND THIRDFLOORS		
Scale 1:200 @ A3		
Date NOVEMBER 2019		

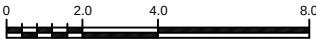
PLANNING



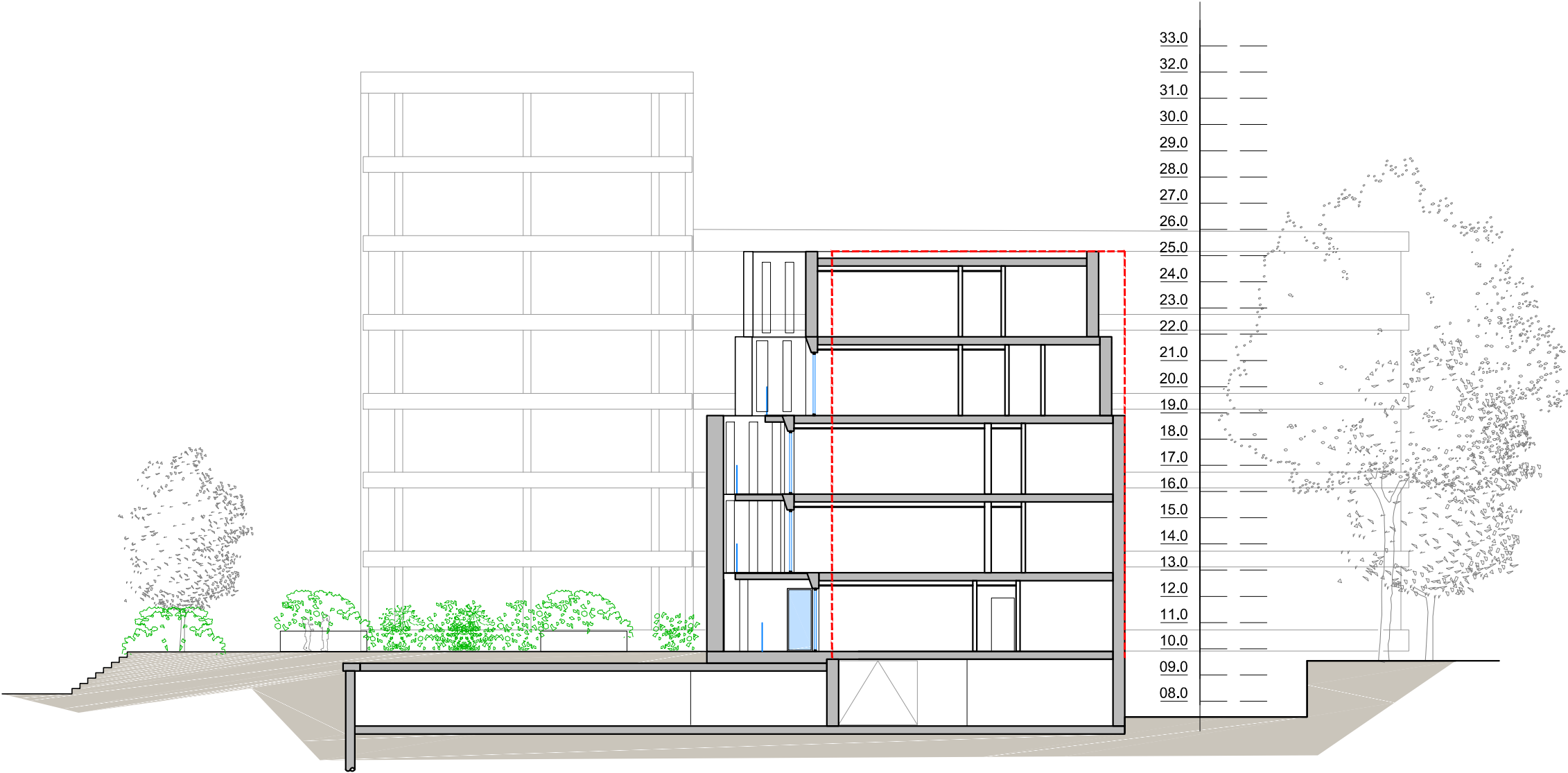
FOURTH FLOOR



ROOF PLAN



Rev.	Date	Comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings. Where this drawing relates to existing buildings or completed construction the contractor shall check that there is no conflict between actual building dimensions and drawing dimensions. In the event of conflict between this drawing and subcontractor's working drawings for relevant building components the subcontractor's drawing shall take precedence. Such conflicts noted above shall be reported immediately ICEWIT DESIGN PTN It is forbidden to reproduce this drawing in part or full without the written permission of ICEWIT DESIGN PTN All Dimensions are in Millimetres unless otherwise stated.		
ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935 Client		
Trevor Jenkin		
Project MULBERRY HOUSE, 1A ELDON ROAD READING		
Title PROPOSED FOURTH FLOOR AND ROOF PLAN		
Scale 1:200 @ A3		
Date NOVEMBER 2019		
PLANNING		
Drawing Number	8694/ PL-03	Rev. -



Section A-A 1: 200 @ A3

A	30/7/19	Planning comments
Rev.	Date	Comments

Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN

Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings.

Where this drawing relates to existing buildings or completed construction the contractor shall check that there is no conflict between actual building dimensions and drawing dimensions.

In the event of conflict between this drawing and subcontractor's working drawings for relevant building components the subcontractor's drawing shall take precedence.

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148 BATTERSEA BUSINESS CENTRE
103-109 LAVENDER HILL
LONDON SW11 5QL
TEL : 0207 350 2930
FAX : 0207 350 2935

Client

Trevor Jenkin

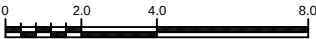
Project
MULBERRY HOUSE, 1A ELDON ROAD
READING

Title
PROPOSED
Elevation 1 and Section AA

Scale
1:200 @ A3

Date
AUG 2019

PLANNING



Drawing Number	Rev.
8694/ PL-04	-



Elevation 1 (south) 1: 200 @ A3

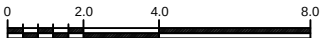


Elevation 2 (west) 1: 200 @ A3

Rev.	Date	Comments
A	30/7/19	Planning comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN		
Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings.		
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ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935		
Client		
Trevor Jenkin		
Project		
MULBERRY HOUSE, 1A ELDON ROAD READING		
Title		
PROPOSED Elevations 1 and 2		
Scale		
1:200 @ A3		
Date		
AUG 2019		

PLANNING

Drawing Number	Rev.
8694/ PL-05	-





Elevation 3 (north) 1: 200 @ A3

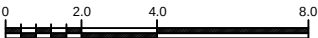


Elevation 4 (east) 1: 200 @ A3

Rev.	Date	Comments
A	30/7/19	Planning comments
Where no dimensions are given drawings should not be scaled and the matter should be referred to ICEWIT DESIGN PTN		
Should dimensions or details on these drawings conflict precedence shall be given to the larger scale drawings.		
Where this drawing relates to existing buildings or completed construction the contractor shall check that there is no conflict between actual building dimensions and drawing dimensions.		
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Such conflicts noted above shall be reported immediately ICEWIT DESIGN PTN		
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All Dimensions are in Millimetres unless otherwise stated.		
ICEWIT DESIGN PTN 148 BATTERSEA BUSINESS CENTRE 103-109 LAVENDER HILL LONDON SW11 5QL TEL : 0207 350 2930 FAX : 0207 350 2935		
Client		
Trevor Jenkin		
Project		
MULBERRY HOUSE, 1A ELDON ROAD READING		
Title		
PROPOSED Elevations 1 and 2		
Scale		
1:200 @ A3		
Date		
AUG 2019		

PLANNING

Drawing Number	Rev.
8694/ PL-06	-



Appendix 2 – Thames Water record plans & CCTV Survey

Asset location search



Property Searches

Ambiental
Sussex Innovation Centre
Science Park Square
BRIGHTON
BN1 9SB

Search address supplied Mulberry House
1a
Eldon Road
Reading
RG1 4DJ

Your reference 5038

Our reference ALS/ALS Standard/2019_4111122

Search date 14 November 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.



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: Mulberry House, 1a, Eldon Road, Reading, RG1 4DJ

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.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.



For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

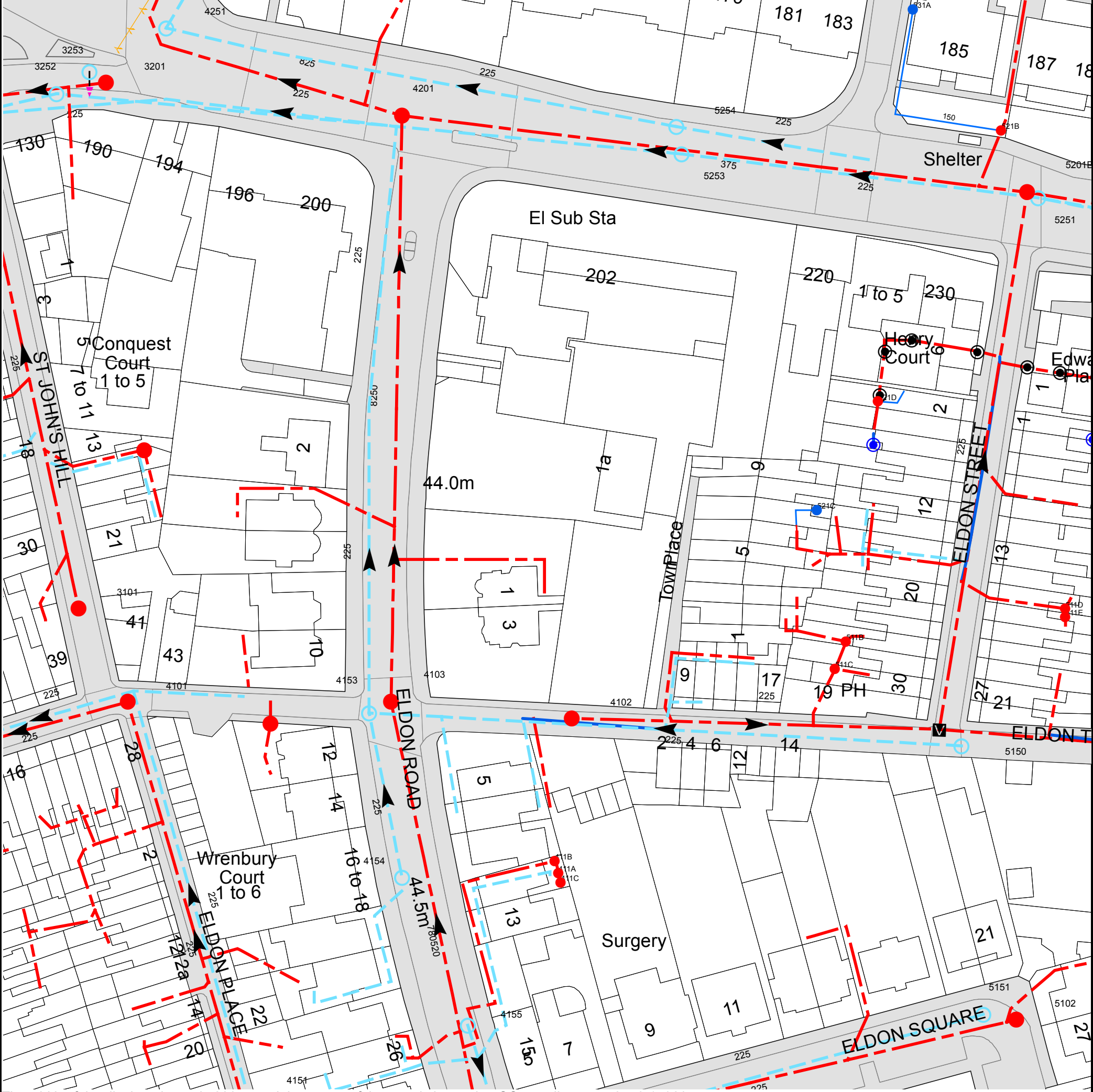
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2019 4111122



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 472478,173204
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
3252	40.79	39.52
3253	43.64	40.53
3201	40.83	n/a
4251	41.03	n/a
4201	41.78	36.46
5254	42.14	41.41
5253	42.19	40.95
531A	n/a	n/a
521B	n/a	n/a
5201B	42.72	37.48
5251	42.68	41.48
511C	n/a	n/a
511B	n/a	n/a
521D	n/a	n/a
5150	44.64	43.22
5151	44.07	43.04
5102	43.98	40.88
511E	n/a	n/a
511D	n/a	n/a
3101	44.11	n/a
4101	44.63	41.51
4252	n/a	n/a
41RY	n/a	n/a
4153	44.29	43.04
4103	44.34	36.98
4154	44.3	43.16
4155	44.19	42.99
411B	n/a	n/a
411A	n/a	n/a
411C	n/a	n/a
4102	45.1	42.3
521C	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



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

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.



ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"	Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
16"	Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
3" SUPPLY	Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.
3" FIRE	Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
3" METERED	Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
	Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
	Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

	General Purpose Valve
	Air Valve
	Pressure Control Valve
	Customer Valve

Hydrants

	Single Hydrant
--	----------------

Meters

	Meter
--	-------

End Items

Symbol indicating what happens at the end of a water main.

	Blank Flange
	Capped End
	Emptying Pit
	Undefined End
	Manifold
	Customer Supply
	Fire Supply

Operational Sites

	Booster Station
	Other
	Other (Proposed)
	Pumping Station
	Service Reservoir
	Shaft Inspection
	Treatment Works
	Unknown
	Water Tower

Other Symbols

	Data Logger
--	-------------

Other Water Pipes (Not Operated or Maintained by Thames Water)

	Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
	Private Main: Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

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

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

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

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

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

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



Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

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

The Search Code:

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

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

The Code's core principles

Firms which subscribe to the Search Code will:

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

Complaints

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

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

TPOs Contact Details

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

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

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



Happy Drains Ltd,
Unit 12A Chalex Industrial Estate, Manor Hall Road, Southwick., BN42 4NH
Tel 0800 849 8099
Email :- Service@happydrains.co.uk

www.happydrains.co.uk

Ref No. C0011865

The Faculty Ltd
Mulberry house
1A Eldon Road
Reading
RG1 4DJ

Date. 25/11/2019

Dear Sir

1. DESCRIPTION OF PROPERTY

Empty plot of land

2. DRAINAGE SYSTEM

This is a foul/storm drainage system accessible by Manhole. The pipework is circular in shape, 100mm in diameter and vitrified clay material. Further specific variations can be found in the report content.

3. SHARED

The sections identified within the property boundary are for the sole use of this property and therefore the responsibility of the site owner to maintain.

The sections as shared or beyond the property boundary generally are the legal responsibility of the local water company to maintain. 2.2m downstream from F1 is the property boundary and therefore the responsibility of the local water authorities to maintain.

4. CIRCUMSTANCES

- General investigation Works.

5. CAUSE AND EXTENT OF DAMAGE

The defects are fully noted in the attached report, joint displacements, fractures, broken pipe observed causing water loss in the system and restricting flow. F1 has broken cover and bricks in chamber. MH1 and MH2 has been backfilled.

CON'T.....



Happy Drains Ltd ,
Unit 12A Chalex Industrial Estate, Manor Hall Road, Southwick., BN42 4NH
Tel 0800 849 8099
Email :- Service@happydrains.co.uk

www.happydrains.co.uk

PAGE 2

6. Quotation and Specification of Repairs

To attend the above site and provide crew, equipment and labour to: -

Set up barrier protection

To carry out **deep manhole entry** (full confined space regulations apply) to retrieve broken manhole cover and bricks laying in bottom of chamber. Due to chamber narrowing significantly at the bottom restricting access, this will also determine if we can cap off disused run and to carry out in situ repairs leading out to sewer and or excavation being required.

We will be pleased to carry out the above works for the sum of £595.00 + VAT.

7. COST SAVINGS

The proposed repair methods have been specifically selected as the most cost-effective method and expedient to rectify the defects noted.

8. GUARANTEE

Please note that all repair works proposed are guaranteed for up to 5 years for repairs and our guarantee does not affect your statutory rights.

Due to the nature of working underground it is not possible to state conclusively that there will be no further damage discovered once the repairs are commenced, if this occurs, we will make all efforts to mitigate the costs and seek the authority through the proper channels before carrying out additional repairs.

Please ensure that appropriate access to water and electricity are provided on site to complete the repair (the engineer will confirm these details with you) If you require more information or wish to discuss this matter, please contact us.

Yours sincerely

Happy Drains



Project

Project Name: Trevor - Mulberry House - 1A Eldon Road - Reading RG1 4DJ

Project Date: 20/11/2019

Project Standard: MSCC5 Sewers & Drainage GB (SRM5 Scoring)



Table of Contents

Project Name	Project Number	Project Date
Trevor - Mulberry House - 1A Eldon Road - Reading RG1 4DJ		20/11/2019

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Section: 2; F1 > Sewer (F1X)	4
Section: 3; Overview 1 > F1 (Overview 1X)	10
Section: 4; Overview 2 > MH1 (Overview 2X)	12
Section: 5; Overview 3 > MH2 (Overview 3X)	14
.....	16



Project Information

Project Name	Project Number	Project Date
Trevor - Mulberry House - 1A Eldon Road - Reading RG1 4DJ		20/11/2019

Site

Company: The Faculty Ltd
Contact: Trevor
Department: Site Contact
Street: Mulberry House - 1A Eldon Road
Town or City: Reading
County: Berkshire
Post Code: RG1 4DJ
Mobile: 07798686706

Contractor

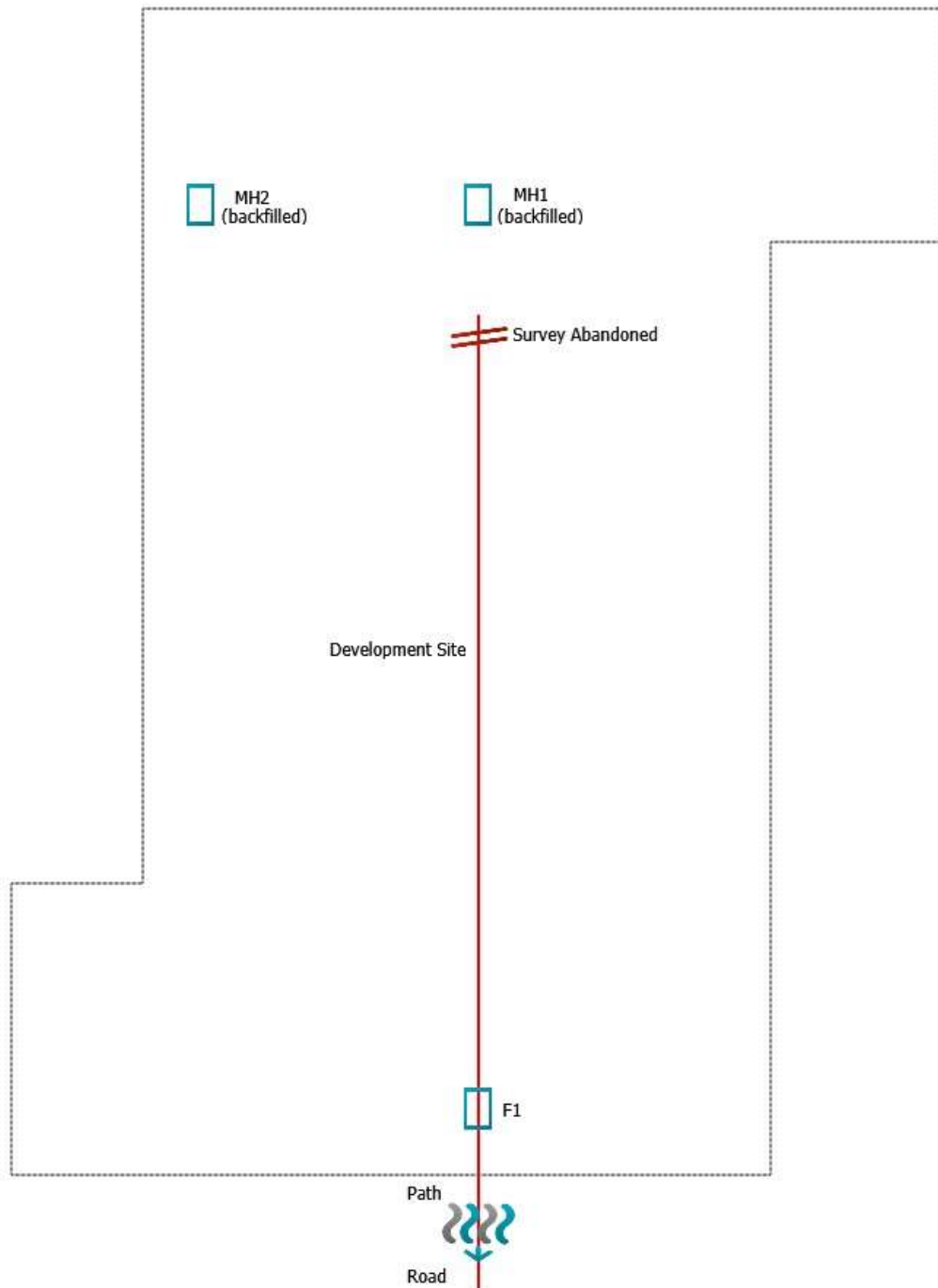
Company: Happy Drains
Contact: David Miele
Department: Director
Street: Chalex Industrial Estate, Manor Hall Road
Town or City: Soutwick
County: Brighton
Post Code: BN42 4NH
Phone: 0800 849 8099
Email: service@happydrains.co.uk



Project Information

Project Name	Project Number	Project Date
Trevor - Mulberry House - 1A Eldon Road - Reading RG1 4DJ		20/11/2019

Project Drawing





Section Inspection - 20/11/2019 - Main LineX

Section 1	Inspection 2	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR MAIN LINEX
Operator Lee Rowland		Vehicle FH09 HUZ	Camera Pearpoint 330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified

Town or Village:	Reading	Inspection Direction:	Upstream	Upstream Node:	MAIN LINE
Road:	Mulberry House - 1A Eldon Road	Inspected Length:	18.22 m	Upstream Pipe Depth:	
Location:	Other (state in comments)	Total Length:	18.22 m	Downstream Node:	F1
Surface Type:	Concrete	Joint Length:	0.00 m	Downstream Pipe Depth:	1.900 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Material:	Vitrified clay pipe		
Flow Control:	No flow control	Lining Type:	Cured in place lining		
Inspection Purpose:	Sample survey to determine asset condition of a sewer system	Lining Material:	Polyester		
Comments:	Scale, debris, manhole upstream been back filled making run redundant				
Recommendations:	To excavate debris from F1 and cap off disused run				

Scale: 1:159	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 1.90 m F1 						
0.00		MH	Start node type, manhole, reference number: F1	00:00:00		
0.00		DER	Settled deposits, coarse, 10% cross-sectional area loss	00:00:00		3
0.00		WL	Water level, 0% of the vertical dimension	00:00:02		
0.00	S01	DEC	Settled deposits, hard or compacted, 5% cross-sectional area loss, start: Scale	00:00:03		
0.00		LCCIP	Cured-in-place lining material changes at this point, new material: polyester	00:00:06		
18.22		DEX	Settled deposits, other, 85% cross-sectional area loss: Debris	00:02:26		5
18.22		WL	Water level, 0% of the vertical dimension	00:02:32		
18.22	F01	DEC	Settled deposits, hard or compacted, 5% cross-sectional area loss, finish: Scale	00:02:32		3
18.22		SA	Survey abandoned: Unable to Pass	00:02:32		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	3	12.0	2.7	50.0	5.0

Section Pictures - 20/11/2019 - Main LineX

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Upstream	MAIN LINEX		C0011865



Main
LineX_b1ea2241-b4df-464b-a751-1b9bd1c5c73e_20191125_145016_206.jpg, 00:00:00, 0.00 m
Start node type, manhole, reference number: F1



Main
LineX_c6e470b9-2d3d-428f-a776-36c736051274_20191125_145234_427.jpg, 00:00:00, 0.00 m
Settled deposits, coarse, 10% cross-sectional area loss



Main
LineX_4626f6d1-c223-48ac-9156-7b01283da7fd_20191125_145059_254.jpg, 00:00:02, 0.00 m
Water level, 0% of the vertical dimension



Main
LineX_9a2cc2c2-2659-4514-84a9-1f36fc219581_20191125_145615_714.jpg, 00:02:26, 18.22 m
Settled deposits, other, 85% cross-sectional area loss, Debris



Section Pictures - 20/11/2019 - Main LineX

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Upstream	MAIN LINEX		C0011865



Main
LineX_9175a137-e550-4076-afa4-87df49136cda_20191125_1
45719_215.jpg, 00:02:32, 18.22 m
Survey abandoned, Unable to Pass



Section Inspection - 20/11/2019 - F1X

Section 2	Inspection 3	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR F1X
Operator Lee Rowland		Vehicle FH09 HUZ	Camera Pearpoint330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified

Town or Village:	Reading	Inspection Direction:	Downstream	Upstream Node:	F1
Road:	Mulberry House - 1A Eldon Road	Inspected Length:	8.61 m	Upstream Pipe Depth:	1.900 m
Location:	Other (state in comments)	Total Length:	8.61 m	Downstream Node:	SEWER
Surface Type:	Concrete	Joint Length:	0.00 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular	Dia/Height:	100 mm
Type of Pipe:	Gravity drain/sewer	Material:	Vitrified clay pipe	Lining Type:	No Lining
Year Constructed:		Lining Material:	No Lining		
Flow Control:	No flow control				
Inspection Purpose:	Sample survey to determine asset condition of a sewer system				
Comments:	joint displacements, fractures and broken pipe observed				
Recommendations:	Excavate debris from deep manhole and repairs carried out.				

Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 1.90 m F1 						
0.00		MH	Start node type, manhole, reference number: F1	00:00:00		
0.00		WL	Water level, 0% of the vertical dimension	00:00:01		
0.00	S02	DEC	Settled deposits, hard or compacted, 5% cross-sectional area loss, start: Scale	00:00:10		
1.04		FCJ	Fracture, circumferential at joint from 12 o'clock to 2 o'clock	00:00:20		3 / 2
1.61		FCJ	Fracture, circumferential at joint from 12 o'clock to 12 o'clock	00:00:27		3 / 2
3.78	S01	B	Broken pipe from 11 o'clock to 3 o'clock, start	00:00:54		
3.94		FC	Fracture, circumferential from 3 o'clock to 11 o'clock	00:01:00		3 / 2
3.94	F01	B	Broken pipe from 11 o'clock to 3 o'clock, finish	00:01:00		4
4.50		JDM	Joint displaced, medium	00:01:06		1 / 3
4.50		FCJ	Fracture, circumferential at joint from 8 o'clock to 4 o'clock	00:01:07		3 / 2
4.58		CN	Connection other than junction at 12 o'clock, diameter: 100mm	00:01:08		
4.83		FM	Fractures, multiple from 12 o'clock to 12 o'clock	00:01:10		4 / 2
4.99		LD	Line deviates down	00:01:14		



Section Inspection - 20/11/2019 - F1X

Section 2	Inspection 3	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR F1X
Operator Lee Rowland		Vehicle FH09 HUZ	Camera Pearpoint 330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified

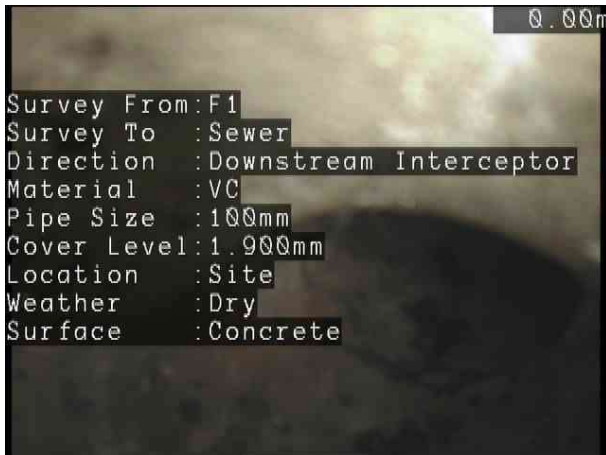
Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Diagram showing a vertical sewer pipe with depth markers at 5.23, 5.23, 5.23, 5.47, 6.11, 7.00, 8.61, 8.61, and 8.61 meters. A blue arrow points downwards, indicating the direction of flow.	5.23	LD	Line deviates down	00:01:19		
	5.23	CN	Connection other than junction at 12 o'clock, diameter: 100mm	00:01:19		
	5.23	FL	Fracture, longitudinal at 10 o'clock: Junction fractured	00:01:19		3 / 2
	5.47	BJ	Broken pipe at joint from 12 o'clock to 12 o'clock	00:01:29		4
	6.11	CN	Connection other than junction at 4 o'clock, diameter: 100mm	00:01:42		
	7.00	FCJ	Fracture, circumferential at joint from 12 o'clock to 12 o'clock	00:01:52		3 / 2
	8.61	BRF	Finish node type, major connection without manhole, reference number: Sewer: FH on Connection to Sewer	00:02:08		
	8.61	WL	Water level, 0% of the vertical dimension	00:02:08		
	8.61	F02 DEC	Settled deposits, hard or compacted, 5% cross-sectional area loss, finish: Scale	00:02:12		3

Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
10	160.0	55.9	481.0	4.0	9	6.0	3.1	27.0	3.0

Section Pictures - 20/11/2019 - F1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	F1X		C0011865



F1X_5d599d9b-1446-4375-a1fa-1c356316b699_20191125_175031_128.jpg, 00:00:00, 0.00 m
Start node type, manhole, reference number: F1



F1X_3bbeab53-0528-487b-bbd0-238e28fb5ff6_20191125_175133_215.jpg, 00:00:20, 1.04 m
Fracture, circumferential at joint from 12 o'clock to 2 o'clock



F1X_bb7ff867-2fc6-4f60-87ac-8c568a1e6035_20191125_175225_183.jpg, 00:00:27, 1.61 m
Fracture, circumferential at joint from 12 o'clock to 12 o'clock



F1X_d0e06b4e-aba8-4dad-ad2e-5b22f246f8a6_20191125_175354_812.jpg, 00:00:54, 3.78 m
Broken pipe from 11 o'clock to 3 o'clock, start

Section Pictures - 20/11/2019 - F1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	F1X		C0011865



F1X_0396c4b3-f5ed-4424-a9ca-b6ae0c67a1f3_20191125_175417_276.jpg, 00:01:00, 3.94 m
Fracture, circumferential from 3 o'clock to 11 o'clock



F1X_78ddbc7b-9639-4ab2-9d72-13d2d7a550ed_20191125_175454_481.jpg, 00:01:06, 4.50 m
Joint displaced, medium



F1X_bb75f851-30d7-4288-aa69-ee090f5fe07f_20191125_17540_290.jpg, 00:01:08, 4.58 m
Connection other than junction at 12 o'clock, diameter: 100mm



F1X_c9e00913-5fde-40ec-9ee5-e999b6c307ce_20191125_175639_021.jpg, 00:01:10, 4.83 m
Fractures, multiple from 12 o'clock to 12 o'clock

Section Pictures - 20/11/2019 - F1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	F1X		C0011865



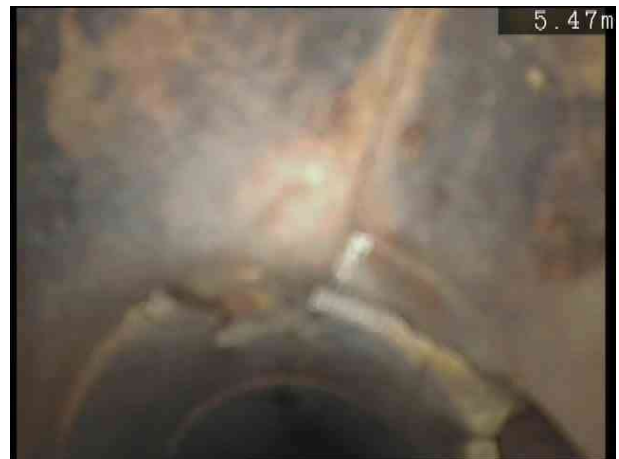
F1X_f542f806-2ee1-4d70-b3bb-59ebec874b68_20191125_175703_604.jpg, 00:01:14, 4.99 m
 Line deviates down



F1X_36b79757-2361-402a-a0cf-dfdcf61e96b8_20191125_175725_826.jpg, 00:01:19, 5.23 m
 Line deviates down



F1X_5b72d655-f6e5-40ba-907f-d260f462b7c9_20191125_180005_275.jpg, 00:01:19, 5.23 m
 Fracture, longitudinal at 10 o'clock, Junction fractured



F1X_001a37f5-2c32-4189-8342-12ef55c2243a_20191125_180053_763.jpg, 00:01:29, 5.47 m
 Broken pipe at joint from 12 o'clock to 12 o'clock

Section Pictures - 20/11/2019 - F1X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	F1X		C0011865



F1X_231ff565-22a5-4d0c-97a5-77decbbc0660_20191125_180143_226.jpg, 00:01:42, 6.11 m
 Connection other than junction at 4 o'clock, diameter: 100mm



F1X_38c6b55f-6a66-4cf7-b4d5-6c4ec9efcc96_20191125_180206_623.jpg, 00:01:52, 7.00 m
 Fracture, circumferential at joint from 12 o'clock to 12 o'clock



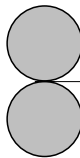
F1X_367a38c3-5331-4139-8343-bfec51ef7a60_20191125_180257_132.jpg, 00:02:08, 8.61 m
 Finish node type, major connection without manhole, reference number: Sewer, FH on Connection to Sewer



Section Inspection - 20/11/2019 - Overview 1X

Section 3	Inspection 4	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR OVERVIEW 1X
Operator Lee Rowland	Vehicle FH09 HUZ	Camera Pearpoint 330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified	

Town or Village:	Reading	Inspection Direction:	Downstream	Upstream Node:	OVERVIEW 1
Road:	Mulberry House - 1A Eldon Road	Inspected Length:	0.00 m	Upstream Pipe Depth:	
Location:	Other (state in comments)	Total Length:	0.00 m	Downstream Node:	F1
Surface Type:	Concrete	Joint Length:	0.00 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:			
Year Constructed:		Material:			
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition of a sewer system	Lining Material:	No Lining		
Comments:	Broken manhole cover and bricks in chamber				
Recommendations:	Deep manhole entry to remove				

Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m Overview 1						
	0.00	REM	General remark: Broken manhole cover and bricks in chamber			
F1 Depth: m						

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0

Section Pictures - 20/11/2019 - Overview 1X

Section 3	Inspection Direction Downstream	PLR OVERVIEW 1X	Client's Job Ref	Contractor's Job Ref C0011865
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Overview

1X_48d8bc8d-a335-478c-bd1d-47c125994285_20191125_185921.jpeg, 0.00 m

General remark, Broken manhole cover and bricks in chamber



Overview

1X_e1a7f76c-7764-4f8c-8c13-43d3c663110a_20191125_190114.jpeg, 0.00 m

General remark, Broken manhole cover and bricks in chamber



Section Inspection - 20/11/2019 - Overview 2X

Section 4	Inspection 5	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR OVERVIEW 2X
Operator Lee Rowland	Vehicle FH09 HUZ	Camera Pearpoint 330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified	

Town or Village:	Reading	Inspection Direction:	Downstream	Upstream Node:	OVERVIEW 2
Road:	Mulberry House - 1A Eldon Road	Inspected Length:	0.00 m	Upstream Pipe Depth:	
Location:	Other (state in comments)	Total Length:	0.00 m	Downstream Node:	MH1
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:			
Year Constructed:		Material:			
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition of a sewer system	Lining Material:	No Lining		
Comments:	disused manhole backfilled				
Recommendations:	None				

Scale: 1:50

Position [m]

Code

Observation

MPEG

Photo

Grade

Depth: m

Overview 2

0.00

MH1

Depth: m

REM

General remark: Manhole backfilled

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0

Section Pictures - 20/11/2019 - Overview 2X

Section 4	Inspection Direction Downstream	PLR OVERVIEW 2X	Client's Job Ref	Contractor's Job Ref C0011865
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Overview
 2X_eefc8aa2-ef4a-4f57-b26c-8d9556696361_20191125_1903
 43.jpeg, 0.00 m
 General remark, Manhole backfilled



Overview
 2X_5649e633-bffe-4f89-ac61-9344dc957eeb_20191125_1904
 43.jpeg, 0.00 m
 General remark, Manhole backfilled



Section Inspection - 20/11/2019 - Overview 3X

Section 5	Inspection 6	Date 20/11/19	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR OVERVIEW 3X
Operator Lee Rowland	Vehicle FH09 HUZ	Camera Pearpoint 330+ Flexiprobe	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified	

Town or Village:	Reading	Inspection Direction:	Downstream	Upstream Node:	OVERVIEW 3
Road:	Mulberry House - 1A Eldon Road	Inspected Length:	0.00 m	Upstream Pipe Depth:	
Location:	Other (state in comments)	Total Length:	0.00 m	Downstream Node:	MH2
Surface Type:	Grass	Joint Length:	0.00 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:			
Year Constructed:		Material:			
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition of a sewer system	Lining Material:	No Lining		
Comments:	disused manhole backfilled				
Recommendations:	None				

Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
--------------------	---------------------	-------------	--------------------	-------------	--------------	--------------

Depth: m
Overview 3



0.00

REM

General remark: Manhole backfilled



MH2
Depth: m



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0

Section Pictures - 20/11/2019 - Overview 3X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
5	Downstream	OVERVIEW 3X		C0011865



Overview
 3X_7080f3bd-75e3-4ad2-90a0-380c0e1cf8fc_20191125_1906
 41.jpeg, 0.00 m
 General remark, Manhole backfilled



Overview
 3X_f34978a8-fce4-4c84-b07a-6b0ad8b078fd_20191125_1907
 17.jpeg, 0.00 m
 General remark, Manhole backfilled



Happy Drains

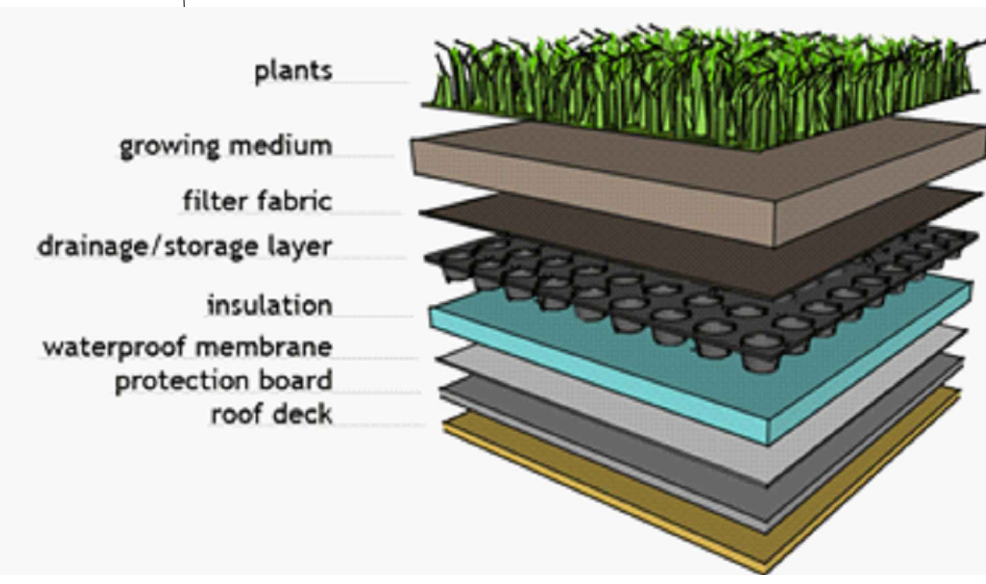
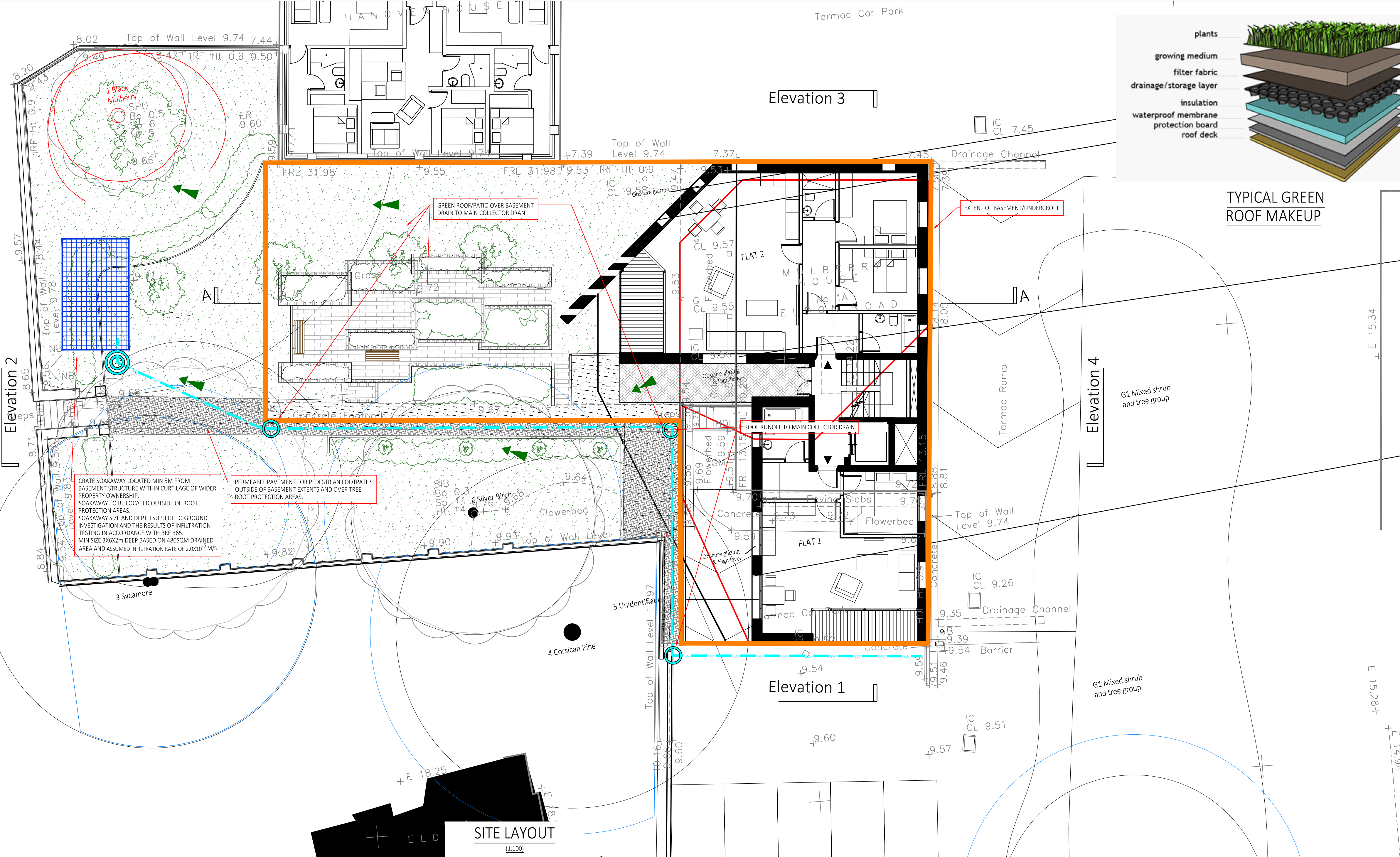
Chalex Industrial Estate, Manor Hall Road, Soutwick

Tel. 0800 849 8099

service@happydrains.co.uk

Appendix 3 – Preliminary Surface Water Drainage Strategy Layout

Drawing No. V:\PROJECTS\5038_Ambi_Mulberry_Reading_SVDS.dwg
Drawing No. V:\PROJECTS\5038_Ambi_Mulberry_Reading_SVDS.dwg



TYPICAL GREEN ROOF MAKEUP

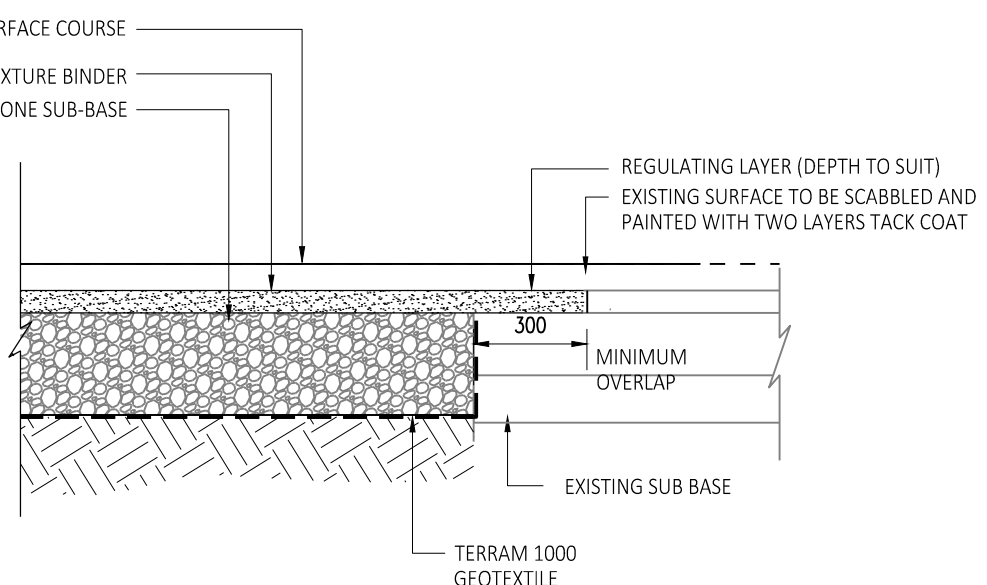
- GENERAL
a. THIS DRAWING IS NOT TO BE SCALED, WORK TO FIGURED DIMENSIONS ONLY, CONFIRMED ON SITE.
b. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS, DETAILED SPECIFICATIONS WHERE APPLICABLE AND ALL ASSOCIATED DRAWINGS IN THIS SERIES.
c. ANY DISCREPANCY ON THIS DRAWING IS TO BE REPORTED IMMEDIATELY TO THE PARTNERSHIP FOR CLARIFICATION.
d. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND FOR THE STABILITY OF THE WORKS IN PROGRESS.
e. CDM REGULATIONS 2015. ALL CURRENT DRAWINGS AND SPECIFICATIONS MUST BE READ IN CONJUNCTION WITH THE DESIGNER'S HAZARD RISK AND ENVIRONMENTAL ASSESSMENT RECORD. DESIGN HAS BEEN PRODUCED BASED ON INFORMATION PROVIDED BY THE CLIENT/PRINCIPLE DESIGNER AVAILABLE AT TIME OF ISSUE. CONTRACTOR TO REVIEW DRAWING AND SPECIFICATION IN CONTEXT WITH THE WIDER SITE AND SPECIFIC SITE INVESTIGATION, CONTAMINATION ASSESSMENT, ASBESTOS SURVEY, ENVIRONMENTAL SURVEY, LIDAR SURVEY AND ANY OTHER RELEVANT INFORMATION AND MANAGE RISKS RELATING TO THE WORKS OUTLINED IN THE DRAWINGS AND SPECIFICATION. PRINCIPLE CONTRACTOR TO MAKE DESIGNER AND CLIENT AWARE OF SITE SPECIFIC RISKS THAT MAY AFFECT THE DRAWING AND SPECIFICATION.
f. CDM REGULATIONS 2015. FOR GENERIC MAINTENANCE AND MANAGEMENT RISKS REFER TO CHAPTER 36 OF CIRIA 752 SUDS MANUAL FOR PROPRIETARY SYSTEMS. SEE MANUFACTURER'S MANAGEMENT AND MAINTENANCE DETAILS AND RISK ASSESSMENT WITH REGARDS TO MAINTENANCE OF PROPRIETARY SYSTEMS.
- CONSTRUCTION NOTE
a. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.
b. THE MAIN CONTRACTOR IS RESPONSIBLE FOR ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.
c. ANY INFORMATION GIVEN REGARDING EXISTING UNDERGROUND SERVICES IS GIVEN IN GOOD FAITH AFTER CONSULTATION WITH THE RELEVANT AUTHORITY, HOWEVER ACCURACY IS NOT CERTAIN. THE MAIN CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL INFORMATION ON SITE PRIOR TO WORK COMMENCING AND TAKING DUE CARE AND ATTENTION WHILST UNDERTAKING THE WORKS.
d. THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.
e. ALL PRODUCTS SPECIFIED SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS. IF THERE ARE DISCREPANCIES BETWEEN THAT INFORMATION AND THE DETAILS ON ANY AMBIENTAL DRAWINGS, THE MANUFACTURER'S INSTRUCTIONS MUST BE USED.
- BELOW GROUND DRAINAGE
a. PIPEWORK TO BE UPVC/CLP PIPES TO BS 4660 : 2000 AND INSPECTION CHAMBERS TO BS 7158 : 2001.
b. ALL ADAPTABLE DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH 'SEWERS FOR ADOPTION' 7TH EDITION AND THE RELEVANT COUNCIL DESIGN GUIDE.
c. ALL PRIVATE SURFACE WATER SEWERS TO BE LAID AT 1 IN 100 UNLESS OTHERWISE STATED ON THE DRAWING.
d. ALL PRIVATE FOUL WATER SEWERS TO BE LAID AT 1 IN 40 AT THE HEAD OF PIPE RUNS AND 1 IN 80 ELSEWHERE UNLESS OTHERWISE STATED.
e. ALL PRIVATE FOUL SEWER PIPES TO BE 150MM DIAMETER UNLESS OTHERWISE STATED ON THE DRAWING. ALL PRIVATE SURFACE WATER SEWER PIPES TO BE 100MM DIAMETER FROM DOWNPIPES AND 150MM DIAMETER ELSEWHERE UNLESS OTHERWISE STATED ON THE DRAWING.
f. ALLOW FOR RODDING ACCESS ABOVE GROUND WHERE RAINWATER DOWNPIPES DO NOT HAVE A DIRECT CONNECTION TO AN INSPECTION CHAMBER. EXISTING SEWER PIPE TO BE RE-USED TO BE SURVEYED AND LEVELLED PRIOR TO COMMENCEMENT OF THE DRAINAGE WORKS AND REFURBISHED IF NECESSARY.
g. CONNECTIONS TO AN ADOPTED SEWER ONLY TO BE MADE FOLLOWING APPROVAL FROM THE RELEVANT ADOPTING AUTHORITY.
h. ALL DRAINS, SEWER PIPES AND MANHOLES TO BE CLEANED AND TESTED FOR WATER TIGHTNESS ON COMPLETION OF CONSTRUCTION.
- MANHOLE COVERS AND FRAMES
a. MANHOLE COVERS TO BE CLASS D400 IN HIGHWAYS, CLASS B125 IN FOOTWAYS AND VERGES, CLASS A15 IN NON-TRAFFICKED AREAS.
b. MANHOLE COVER AND FRAME TO BE BEDDED AND SURROUNDED IN 1:3 MORTAR.

LEGEND

- PRIVATE SURFACE WATER DRAIN
- TYPE 2 CATCHPIT MANHOLE
- TYPE 3 INSPECTION CHAMBER
- PERMEABLE PAVING
- ATTENUATION SYSTEM
- OVERLAND FLOW

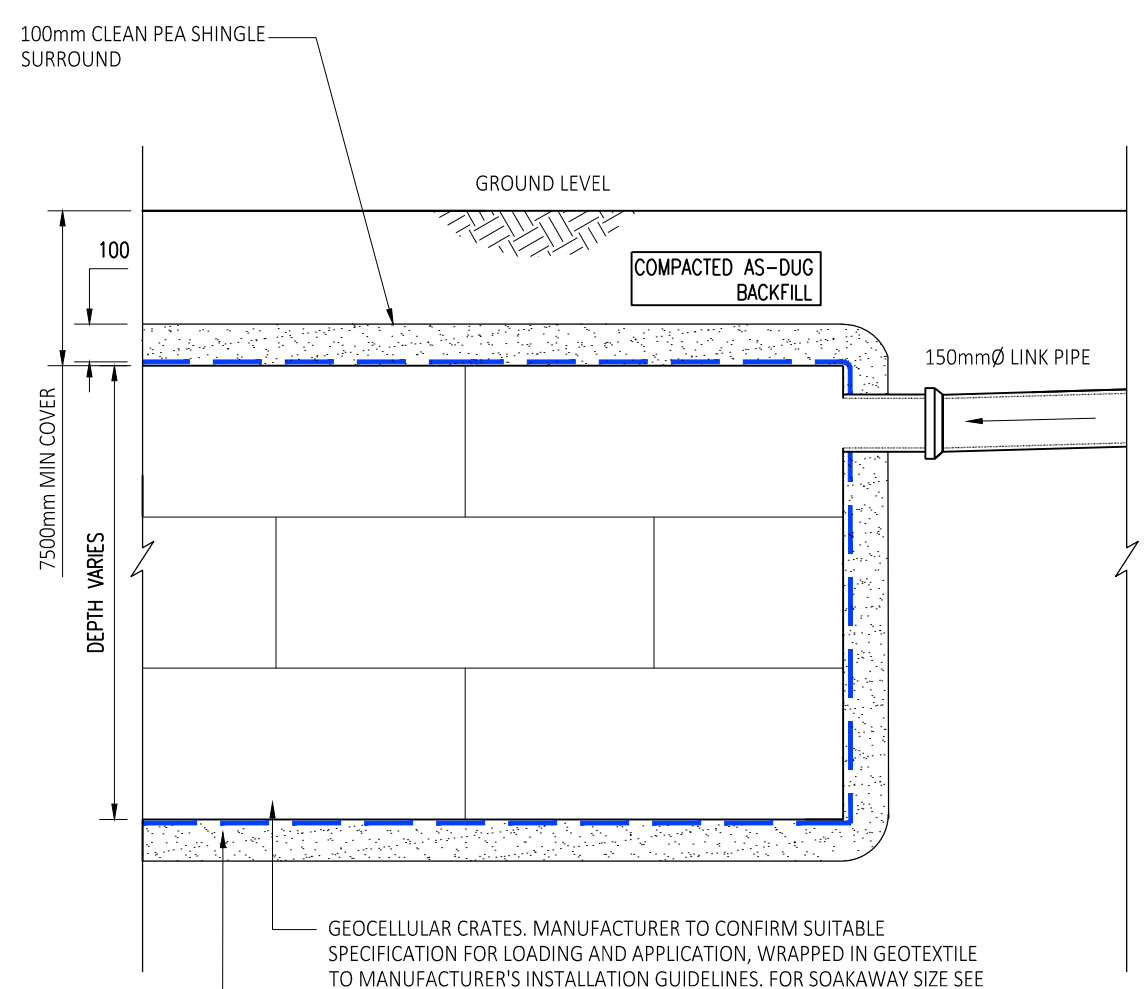
PERMEABLE TARMAC SURFACING TIE-IN DETAIL.

(1:20)



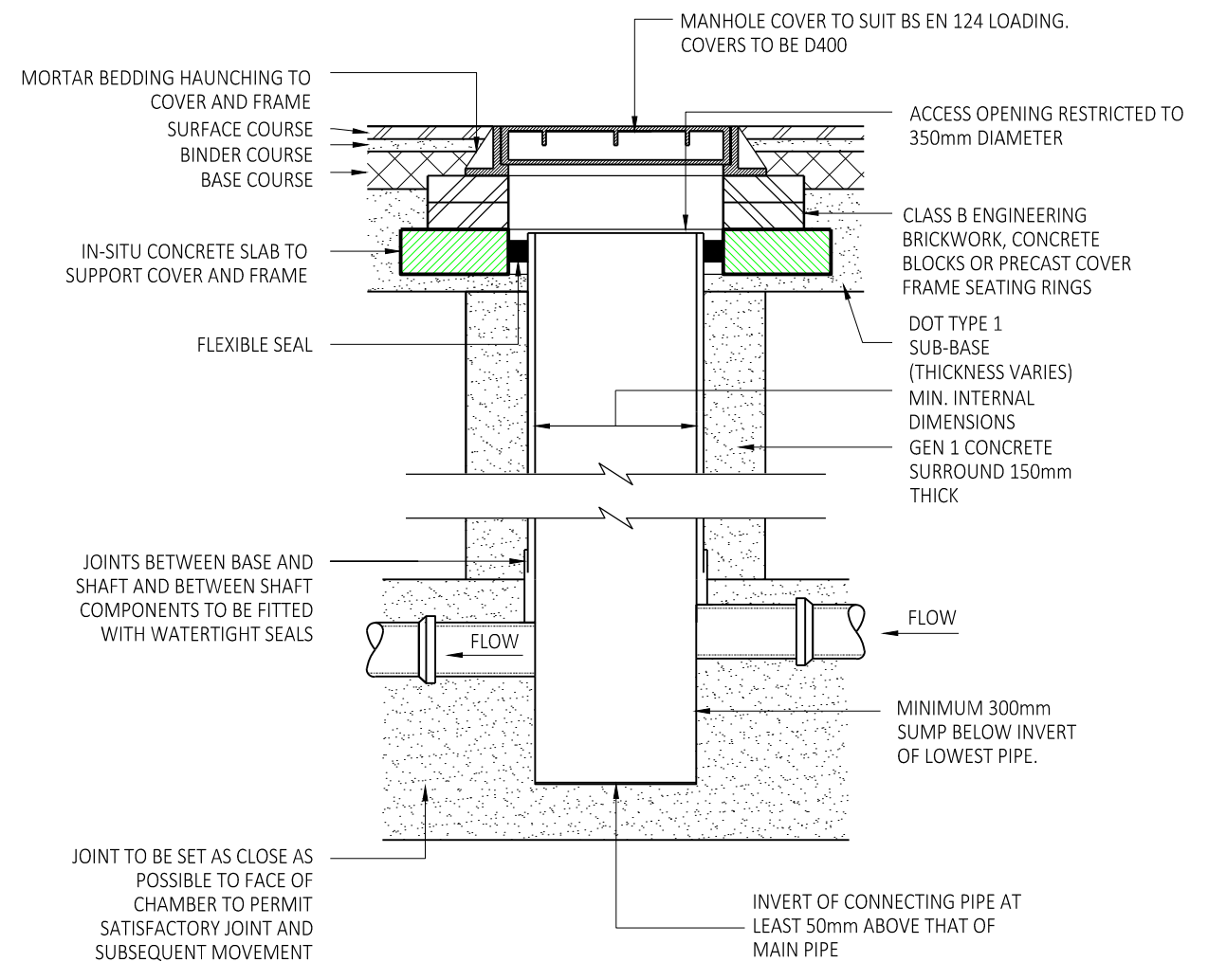
SOAKAWAY DETAIL.

(1:20)



TYPE 3 CATCHPIT MANHOLE.
(PREFORMED POLYPIPE RIGIDRAIN 600Ø CATCHPIT MANHOLE OR SIMILAR),
MAX. DEPTH 3m, NON-ENTRY

(1:20)



A 10/10/20 5A LOCATION UPDATED: TYPICAL GREEN ROOF DETAIL ADDED	
REV	DATE BY CKD APPDDESCRIPTION
PRELIMINARY DRAWING FOR INFORMATION ONLY, NOT FOR CONSTRUCTION.	
Client The Faculty Limited	
Project Mulberry House, 1a Eldon Road Reading.	
Drawing Site Layout Drainage Strategy	
Drawn by: MN	Date: JAN - 2020
Drawing No. 5038 - DR01	Revision A
Drawing Scale: 1:100 @ A1 0 1m 2m 3m 4m 5m	

Appendix 4 – Calculations

AEA - Ambiental		Page 1																								
Science Park Square Brighton East Sussex																										
Date 20/12/2019 16:18 File	Designed by Mark.Naumann Checked by																									
XP Solutions																										
Source Control 2019.1																										
<u>ICP SUDS Mean Annual Flood</u> Input <table><tr><td>Return Period (years)</td><td>100</td><td>Soil</td><td>0.150</td></tr><tr><td>Area (ha)</td><td>0.084</td><td>Urban</td><td>0.000</td></tr><tr><td>SAAR (mm)</td><td>700</td><td>Region Number</td><td>Region 6</td></tr></table> Results 1/s <table><tr><td>QBAR Rural</td><td>0.0</td></tr><tr><td>QBAR Urban</td><td>0.0</td></tr><tr><td>Q100 years</td><td>0.1</td></tr><tr><td>Q1 year</td><td>0.0</td></tr><tr><td>Q30 years</td><td>0.1</td></tr><tr><td>Q100 years</td><td>0.1</td></tr></table>			Return Period (years)	100	Soil	0.150	Area (ha)	0.084	Urban	0.000	SAAR (mm)	700	Region Number	Region 6	QBAR Rural	0.0	QBAR Urban	0.0	Q100 years	0.1	Q1 year	0.0	Q30 years	0.1	Q100 years	0.1
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AEA - Ambiental				Page 1																																																																																																																																																																																																																			
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 601 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>7.500</td><td>0.800</td><td>0.3</td><td>11.4</td><td>O K</td></tr><tr><td>30 min Summer</td><td>7.741</td><td>1.041</td><td>0.3</td><td>14.8</td><td>O K</td></tr><tr><td>60 min Summer</td><td>7.979</td><td>1.279</td><td>0.4</td><td>18.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>8.194</td><td>1.494</td><td>0.4</td><td>21.3</td><td>O K</td></tr><tr><td>180 min Summer</td><td>8.292</td><td>1.592</td><td>0.4</td><td>22.7</td><td>O K</td></tr><tr><td>240 min Summer</td><td>8.340</td><td>1.640</td><td>0.4</td><td>23.4</td><td>O K</td></tr><tr><td>360 min Summer</td><td>8.364</td><td>1.664</td><td>0.4</td><td>23.7</td><td>O K</td></tr><tr><td>480 min 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Summer</td><td>7.360</td><td>0.660</td><td>0.3</td><td>9.4</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>7.266</td><td>0.566</td><td>0.2</td><td>8.1</td><td>O K</td></tr><tr><td>15 min Winter</td><td>7.597</td><td>0.897</td><td>0.3</td><td>12.8</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>129.089</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>84.848</td><td>0.0</td><td>34</td></tr><tr><td>60 min Summer</td><td>53.188</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>32.259</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>23.779</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>19.047</td><td>0.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>13.827</td><td>0.0</td><td>360</td></tr><tr><td>480 min Summer</td><td>11.024</td><td>0.0</td><td>428</td></tr><tr><td>600 min Summer</td><td>9.241</td><td>0.0</td><td>488</td></tr><tr><td>720 min Summer</td><td>7.997</td><td>0.0</td><td>550</td></tr><tr><td>960 min Summer</td><td>6.361</td><td>0.0</td><td>682</td></tr><tr><td>1440 min Summer</td><td>4.600</td><td>0.0</td><td>954</td></tr><tr><td>2160 min Summer</td><td>3.321</td><td>0.0</td><td>1368</td></tr><tr><td>2880 min Summer</td><td>2.633</td><td>0.0</td><td>1784</td></tr><tr><td>4320 min Summer</td><td>1.896</td><td>0.0</td><td>2592</td></tr><tr><td>5760 min Summer</td><td>1.500</td><td>0.0</td><td>3344</td></tr><tr><td>7200 min Summer</td><td>1.251</td><td>0.0</td><td>4104</td></tr><tr><td>8640 min Summer</td><td>1.077</td><td>0.0</td><td>4840</td></tr><tr><td>10080 min Summer</td><td>0.949</td><td>0.0</td><td>5552</td></tr><tr><td>15 min Winter</td><td>129.089</td><td>0.0</td><td>19</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	7.500	0.800	0.3	11.4	O K	30 min Summer	7.741	1.041	0.3	14.8	O K	60 min Summer	7.979	1.279	0.4	18.2	O K	120 min Summer	8.194	1.494	0.4	21.3	O K	180 min Summer	8.292	1.592	0.4	22.7	O K	240 min Summer	8.340	1.640	0.4	23.4	O K	360 min Summer	8.364	1.664	0.4	23.7	O K	480 min Summer	8.356	1.656	0.4	23.6	O K	600 min Summer	8.344	1.644	0.4	23.4	O K	720 min Summer	8.328	1.628	0.4	23.2	O K	960 min Summer	8.289	1.589	0.4	22.6	O K	1440 min Summer	8.196	1.496	0.4	21.3	O K	2160 min Summer	8.063	1.363	0.4	19.4	O K	2880 min Summer	7.948	1.248	0.3	17.8	O K	4320 min Summer	7.757	1.057	0.3	15.1	O K	5760 min Summer	7.601	0.901	0.3	12.8	O K	7200 min Summer	7.470	0.770	0.3	11.0	O K	8640 min Summer	7.360	0.660	0.3	9.4	O K	10080 min Summer	7.266	0.566	0.2	8.1	O K	15 min Winter	7.597	0.897	0.3	12.8	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	129.089	0.0	19	30 min Summer	84.848	0.0	34	60 min Summer	53.188	0.0	64	120 min Summer	32.259	0.0	122	180 min Summer	23.779	0.0	182	240 min Summer	19.047	0.0	242	360 min Summer	13.827	0.0	360	480 min Summer	11.024	0.0	428	600 min Summer	9.241	0.0	488	720 min Summer	7.997	0.0	550	960 min Summer	6.361	0.0	682	1440 min Summer	4.600	0.0	954	2160 min Summer	3.321	0.0	1368	2880 min Summer	2.633	0.0	1784	4320 min Summer	1.896	0.0	2592	5760 min Summer	1.500	0.0	3344	7200 min Summer	1.251	0.0	4104	8640 min Summer	1.077	0.0	4840	10080 min Summer	0.949	0.0	5552	15 min Winter	129.089	0.0	19
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AEA - Ambiental				Page 2	
Science Park Square Brighton East Sussex		5038_Atlas_Mulberry_Reading Proposed Infiltration			
Date 20/12/2019 File proposed.SRCX		Designed by MN Checked by			
XP Solutions		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	7.869	1.169	0.3	16.7	O K
60 min Winter	8.138	1.438	0.4	20.5	O K
120 min Winter	8.385	1.685	0.4	24.0	O K
180 min Winter	8.502	1.802	0.4	25.7	O K
240 min Winter	8.562	1.862	0.4	26.5	O K
360 min Winter	8.602	1.902	0.5	27.1	O K
480 min Winter	8.602	1.902	0.5	27.1	O K
600 min Winter	8.580	1.880	0.5	26.8	O K
720 min Winter	8.561	1.861	0.4	26.5	O K
960 min Winter	8.514	1.814	0.4	25.8	O K
1440 min Winter	8.392	1.692	0.4	24.1	O K
2160 min Winter	8.201	1.501	0.4	21.4	O K
2880 min Winter	8.037	1.337	0.4	19.1	O K
4320 min Winter	7.770	1.070	0.3	15.2	O K
5760 min Winter	7.560	0.860	0.3	12.3	O K
7200 min Winter	7.391	0.691	0.3	9.9	O K
8640 min Winter	7.253	0.553	0.2	7.9	O K
10080 min Winter	7.139	0.439	0.2	6.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	84.848	0.0	33		
60 min Winter	53.188	0.0	62		
120 min Winter	32.259	0.0	120		
180 min Winter	23.779	0.0	178		
240 min Winter	19.047	0.0	236		
360 min Winter	13.827	0.0	348		
480 min Winter	11.024	0.0	454		
600 min Winter	9.241	0.0	548		
720 min Winter	7.997	0.0	570		
960 min Winter	6.361	0.0	722		
1440 min Winter	4.600	0.0	1028		
2160 min Winter	3.321	0.0	1472		
2880 min Winter	2.633	0.0	1904		
4320 min Winter	1.896	0.0	2724		
5760 min Winter	1.500	0.0	3520		
7200 min Winter	1.251	0.0	4320		
8640 min Winter	1.077	0.0	5024		
10080 min Winter	0.949	0.0	5760		
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XP Solutions	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.048

Time (mins)		Area
From:	To:	(ha)
0	4	0.048

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Model Details

Storage is Online Cover Level (m) 9.700

Cellular Storage Structure

Invert Level (m) 6.700 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.07200 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.07200

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	15.0	15.0	2.001	0.0	47.0
2.000	15.0	47.0			

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