

# FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Proposed Leisure Centre  
and Residential  
Development

Land West of Egley Road  
Woking  
GU22 0NJ

Prepared for:  
Woking Football Club

28<sup>th</sup> April 2020

Project Number:  
RMA-C1947



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**Document Production Record:**

Report Number: RMA-RC1947

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**Document Revision Record:**

Issue Number	Date	Revision Details
1	11 <sup>th</sup> September 2019	Client Issue (Draft)
2	22 <sup>nd</sup> October 2019	Revised Issue
3	8 <sup>th</sup> November 2019	Revised Issue
4	8 <sup>th</sup> November 2019	Revised Issue
5	20 <sup>th</sup> November 2019	Revised Issue
6	22 <sup>nd</sup> November 2019	Revised Issue
7	28 <sup>th</sup> April 2020	Revised Issue

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# 1 INTRODUCTION

## Background

- 1.1 RMA Environmental Limited has been commissioned by Woking Football Club to prepare a Flood Risk Assessment (FRA) to support a full planning application for a proposed leisure centre and residential development on land at to the west of Egley Road in Woking, GU22 0NJ.
- 1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), associated Planning Practice Guidance (PPG) and Environment Agency (EA) standing advice on flood risk for new development.

## Site Location and Land Use

- 1.3 The site is largely undeveloped land although, a small warehouse and parking area/access track are located in the north-eastern part of the site. The site extends to an area of approximately 4.1 hectares (ha) and is located at National Grid Reference SU 99410 56401 (refer to Figure 1.1).
- 1.4 The site is bordered by the following land uses:
  - Hoe Valley School which comprises of an athletics club and car park form the northern boundary of the site;
  - a railway forms the western site boundary;
  - a wooded area is located along the south-eastern boundary of the site and beyond this is further residential development and Hook Hill Lane;
  - a garden centre and industrial yard are located directly east of the site; and
  - the surrounding area is mostly urbanised with a mixture of commercial and residential buildings, with some areas of greenfield land.
- 1.5 Access to the site is currently via Egley Road to the east of the site. Further details on site topography, geology and hydrology are set out in Section 2.

## Proposed Development

- 1.6 The Proposed Development includes the redevelopment of the site, following the demolition of the existing building, to provide a health club building (Class D2) incorporating an external swimming pool and tennis/sports courts, the provision of 36 dwelling houses (Class C3) up to a maximum of 3 storeys in height, associated landscaping and car parking and new vehicular access from an existing road serving Hoe Valley School (refer to the proposed development layout at Appendix A).

## Requirements for a Flood Risk Assessment

- 1.7 The requirements for FRA are provided in the NPPF and associated PPG. Paragraph 163 of the NPPF (2018) requires that a site-specific FRA should be submitted with planning applications for all sites greater than 1 ha in Flood Zone 1; for sites of any size within Flood Zones 2 or 3; in an area within Flood Zone 1 which has critical drainage problems; in an area within Flood Zone 1 which is identified in a strategic flood risk assessment as being at increased flood risk in the future; or an area within Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.
- 1.8 Flood Zone 1 is defined as land with little or no flood risk (an annual exceedance probability [AEP] of flooding of less than 0.1%); Flood Zone 2 is defined as having a medium flood risk (an AEP of between 0.1% and 0.5% for tidal areas or 0.1% and 1.0% for rivers); and Flood Zone 3 is defined as high risk (with an AEP of greater than 0.5% for tidal areas or greater than 1.0% for rivers).
- 1.9 FRAs should describe and assess all flood risks (from rivers, the sea, surface water, reservoirs, sewers and groundwater) to and from the development and demonstrate how they will be managed, including an evaluation of climate change effects.

## Consultation

- 1.10 Consultation has been undertaken with the following consultees and further details of these consultations are included within Section 3 and 4 of this FRA:
- direct consultation in the form of a meeting and email correspondence has been undertaken with Katherine Waters at Woking Borough Council (who are acting at the Lead Local Flood Authority) to the scope of the surface water drainage strategy; and
  - a pre-development enquiry has been undertaken with Thames Water to determine the location of sewers within the site and surrounding area and if there is sufficient capacity within the local foul sewerage system to supply the development.

## 2 BASELINE ENVIRONMENTAL CONDITIONS

### Topography

- 2.1 A topographical survey is included within Appendix B of this report. This identifies that the site slopes in an easterly direction; the highest level is approximately 32.96 metres Above Ordnance Datum (mAOD) in the north-western corner of the site, falling to approximately 27.94 mAOD in the north-eastern corner of the site.

### Hydrology

- 2.2 There is one 'main river'<sup>1</sup> within a 500 m radius of the site. This is the Hoe Stream which is located approximately 250 m east of the site and flows in a north-easterly direction.
- 2.3 A further stream is located approximately 110 m north of the site along Egley Road. It was identified during the site visit that this stream is culverted beneath Egley Road and into the Hoe Stream to the north-east of the site.
- 2.4 There are no other significant watercourses or water bodies within the surrounding area.

### Geology and Hydrogeology

- 2.5 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer, the site is not underlain by any superficial geology; however, it is underlain by the bedrock geology of the Bagshot formation, comprising sand.
- 2.6 The EA classify the bedrock geology as a Secondary A Aquifer; these are defined as *"permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers."*
- 2.7 The site is not located within a groundwater Source Protection Zone (SPZ).
- 2.8 A Geo-Environmental and Geotechnical Assessment (Ground Investigation) Report has been prepared for the site and is submitted as a separate report for this application. This states that during return monitoring, groundwater was reported at depths of between 1.78 m and 3.94 m below ground level (bgl).

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<sup>1</sup> Main Rivers described by the EA as the following "usually larger rivers and streams"

### 3 EXTERNAL FLOOD RISK

#### Flooding Mechanisms

- 3.1 The EA's flood map for planning (refer to Figure 3.1) indicates that the site lies entirely within Flood Zone 1 (low risk). Land within Flood Zone 2 (medium risk) is located approximately 110 m east of the site at an elevation approximately 1.9 m lower than the site. Land within Flood Zone 3 (high risk) is located approximately 190 m east of the site at an elevation approximately 3 m lower than the site. It is therefore concluded that the site will remain within Flood Zone 1 for its operational lifetime, with the added effects of climate change.
- 3.2 The EA's surface water flood risk map identifies that the majority of the site has a very low risk of surface water flooding (each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)). There is a small area of low surface water flood risk located within the north of the site and an area of medium and high surface water flood risk located within the south-western part of the site. This is discussed further below.
- 3.3 When reviewing the Woking Borough Council Strategic Flood Risk Assessment (SFRA) Volume 2 Technical Report (Nov 2015), it identifies that the site is located within an area of "limited potential for groundwater flooding to occur". It is therefore considered that the site has a low risk of groundwater flooding and this is considered a risk to the proposed development.
- 3.4 Woking Borough Council's SFRA identifies that the site lies within a postcode area with six records of sewer flooding. No further details are given on the location of these records and, given the size and location of the site, it is not considered to be at significant risk of flooding from this source.
- 3.5 A review of the SFRA and EA flood maps, has identified that there are no other significant sources of flooding at the site, i.e. from reservoirs.

#### Historic Flooding

- 3.6 The Woking Borough Council SFRA has been reviewed to establish any records of flooding at or in close proximity to the application site. No records of flooding were found for the site or the immediate surrounding area.
- 3.7 The EA's historic flood map identifies no records of flooding for the site or its surroundings.

#### Surface Water Flooding

- 3.8 The EA's risk of flooding from surface water map shows that the majority of the site has a very low risk of surface water flooding. Very low surface water flood risk is defined where "each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)".

- 3.9 There is an area of medium and high surface water flood risk in the south-western part of the site (refer to Figure 3.2). Medium surface water flood risk is defined where “*each year, this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)*”. High surface water flood risk is defined where “*each year, this area has a chance of flooding of greater than 1 in 30 (3.3%)*”.
- 3.10 During the medium risk scenario, a small isolated area of surface water flooding is located in the south-west of the site which has an estimated depth of 150 to 600 mm.
- 3.11 During the high risk scenario, a very small isolated area of surface water flooding is located in the south-west of the site which has an estimated depth of 150 to 600 mm.
- 3.12 The EA’s flood mapping indicates that this area of medium to high surface water flood risk in the south-western part of the site is limited in size and does not form part of any surface water flow paths (i.e. it originates within the site boundary). The extents of medium/high surface water flood risk are located in an existing topographical depression on the site and is therefore ponded water. Post development, it is considered that any ponding of surface water in extreme events will be re-distributed to the new low points within the site (i.e. areas of open space and roads) and managed within the surface water drainage strategy.
- 3.13 The EA’s surface water flood risk mapping shows what “*happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.*” It is noted that this type of flooding is difficult to predict and was based on the best information available to the EA regarding ground levels and drainage.
- 3.14 The risk of surface water flooding originating within the site would be reduced (or eliminated) through the implementation of the proposed drainage strategy. Therefore, it is considered unlikely that surface water flooding would adversely affect the site.

### **Safe Access/Egress**

- 3.15 Access/egress to the site would not be affected by fluvial or tidal flooding; the site is located entirely within Flood Zone 1 (low risk) and safe access/egress via Egley Road along the north-eastern boundary of the site is readily achievable.
- 3.16 There are small areas of low surface water flood risk along Egley Road adjacent to the site; however, during a low risk (0.1% AEP) surface water event, the flood depth is estimated to be less than 300 mm. When the estimated flood depths are less than 300 mm, it is considered that safe access/egress from the site would still be possible. Should surface water flood depths exceed this level and it is not possible to exit the property safely, occupants would be advised to stay within the property and wait for surface water to recede.

### **Land Use Vulnerability**

- 3.17 Table 2 of the NPPF PPG sets out a schedule of land uses based on their vulnerability or sensitivity to flooding. As set out in Table 2, the proposed residential development is classified as ‘more vulnerable’ and the leisure centre development is classified as a land use that is ‘less vulnerable’ to flooding. Referring to Table 3 of the PPG, all land uses are considered appropriate within Flood Zone 1.

- 3.18 Therefore, on the basis of land use vulnerability, the development should be deemed appropriate in planning policy terms of its proposed location.

## 4 DRAINAGE ASSESSMENT

### Introduction

- 4.1 This drainage strategy has been prepared in accordance with Defra's "Non-statutory technical standards for sustainable drainage systems" (March 2015) to ensure that the proposed development does not increase flood risk to the site or elsewhere and, where practicable, reduces flood risk over the lifetime of the development.
- 4.2 Peak rainfall intensity is expected to increase as a result of climate change and, as such, storage calculations have included a 40% increase in rainfall depths in accordance with current climate change guidance.

### Summary

- 4.3 The site comprises of mostly green open space, a small warehouse is located in the north-eastern part of the site. There is limited information on the drainage arrangements for the existing site, however, the topographical survey (refer to Appendix B) shows a number of surface water sewers within the site and indicated that these are likely to be connected to the existing watercourse to the north-east of this development.
- 4.4 BRE365 compliant infiltration testing has been undertaken at the site and the results are included as Appendix C of this report. This testing confirmed that there is low potential for infiltration across most of the site. Therefore, it is proposed to maintain the existing connections and discharge to the public surface water sewer to the north of the site.
- 4.5 Table 4.1 provides an overview of the feasibility of a range of SuDS techniques which are considered in accordance with the SuDS hierarchy in order to identify the most appropriate for the proposed development.

**Table 4.1: Type and Feasibility of SuDS**

Technique	Comments	Feasibility		Utilised
Green roofs	Requires flat or minimal slope roofs. Limited value for runoff attenuation in comparison with other techniques.	Feasible	x	Not proposed due to commercial reasons.
Soakaways and infiltration trenches	Require infiltration rates of $1 \times 10^{-6}$ m/s or greater. Shallow soakaways or infiltration trenches would be required where groundwater is shallow (i.e. less than 2.0 mbgl).	Not Feasible	x	Soakaway tests have been completed and infiltration rates and groundwater depth are not suitable for soakaways.
Infiltration basins / swales	Are widely applicable for attenuation and treatment of surface runoff by infiltration into the ground. Require slope of no more than 4-10% and can act as a substitute for soakaways where groundwater is shallow.	Not Feasible	x	Soakaway tests have been completed and infiltration rates and groundwater depth are not suitable for soakaways.

Technique	Comments	Feasibility		Utilised
Bio-retention – landscaped infiltration areas	Primarily used to remove pollutants from runoff and due to their shallow nature are not as effective at runoff attenuation as other SUDS techniques.	Feasible	✓	Runoff from surfaces will be diverted to tree pits and rain gardens with excess runoff being diverted to the positive drainage system (where possible).
Permeable pavement	Ideally requires a level site and favourable underlying ground conditions. May be suitable in areas of relatively flat topography. Can be linked with geocellular storage or a porous sub-base.	Feasible	✓	Lined permeable paving will be used for non-adopted areas, with geocellular storage beneath, where necessary.
Non-infiltration swales	Used in the same way as carrier ditches or storage bunds. Shallow swales can be used for conveyance and/or storage.	Not Feasible	x	Insufficient space is available within the layout as a result of economic constraints (refer to Para 4.6)
Filter drains	These are normally used adjacent to areas of car parking or roads and convey runoff via flow through an engineered substrate.	Feasible	x	Not proposed.
Balancing ponds or attenuation basins	These are permanent ponds or basins that provide storage. These are appropriate for most sites but require suitable space.	Not Feasible	x	Insufficient space is available within the layout as a result of economic constraints (refer to Para 4.6)
Geo-cellular storage	Geo-cellular storage or similar sub-base medium beneath car parking areas and/or other areas of hardstanding and/or other forms of underground attenuation.	Feasible	✓	Geocellular storage is to be provided under car parking and roads.

- 4.6 The site at Egley Road has been designed to enable the relocation of the David Lloyd Leisure Centre from Kingfield Road. In order to enable the relocation of the leisure centre and make it financially sustainable, the site must incorporate a certain quantum of residential development. Given the economic and technical constraints on this site (approximately 25% of the site comprises of protected trees), insufficient space is available within the layout for above ground SuDS features, such as swales and ponds. Soakaway tests have been completed and infiltration rates and groundwater depths are not suitable for soakaways, however, lined permeable paving will be used for non-adopted areas.
- 4.7 The rate of discharge to the watercourse will be controlled by a hydro-brake. Refer to drawings SK100/A and SK101/A within Appendix C of this report.
- 4.8 The drainage arrangement for the proposed development will limit runoff for all events up to and including the 100 year plus 40% climate change to Qbar. .
- 4.9 Full details of the proposed surface water drainage strategy are provided in Appendix C.



## Designing for Exceedance Events

- 4.10 If the proposed drainage system were to become blocked or an event above the design event occur, then exceedance flows would be routed along the road network towards the north-eastern corner of the site and onto Egley Road and ultimately into the watercourse to the north of the site (refer to Figure 4.1). This would mimic what would occur on the site in its existing condition and would ensure that the proposed developments is safe during an exceedance event.

## Long Term Maintenance of SuDS

- 4.11 Where SuDS features serve more than one property, it would be the responsibility of the developer to either maintain the SuDS features themselves or to negotiate with and secure the agreement of a third party to maintain the sustainable drainage system.
- 4.12 The maintenance requirements of the proposed SuDS features for use in the drainage strategy are detailed in the SuDS Manual and would be carried out accordingly.

## Foul Drainage

- 4.13 Consultation with Thames Water (refer to Appendix D) identifies the location of sewers in the vicinity of the Site. This has identified that there are foul sewers along Egley Road and Egley Drive to the east and Chiltern Close and Hook Hill Lane to the south.
- 4.14 Consultation with Thames Water was undertaken to determine if there is sufficient capacity within the local foul sewerage system (refer to Appendix D). This states that the foul sewerage network does not currently have enough capacity to serve the development. Therefore, Thames Water are required to carry out detailed modelling work and potential off-site reinforcement to ensure the necessary improvement are in place prior to the development going ahead.
- 4.15 It should be noted that since the publication of the new connections and development charging rules in April 2018, drainage authorities in England are obligated to provide a point of connection and undertake any mitigation or improvement works and network reinforcements, where necessary. These will be programmed once planning consents are granted. Therefore, it is recommended that Thames Water should be consulted following planning consent so this detailed network modelling can be undertaken.

## 5 CONCLUSIONS

- 5.1 The requirements for Flood Risk Assessment are provided in the National Planning Policy Framework and its associated Planning Practice Guidance, together with the Environment Agency's Guidance Notes. This policy and associated guidance have been followed in the preparation of this FRA.
- 5.2 The EA's flood map for planning identifies that the entire site lies within Flood Zone 1 and, therefore, flood risk from rivers and the sea is considered to be low. The EA's surface water flood risk map identifies that the majority of the site has a very low risk of surface water flooding. There is a small area of medium to high surface water flood risk located in the south-western extent of the site. However, the EA's flood mapping indicates that this is limited in size and does not form part of surface water flow path (i.e. it is ultimately ponded water).
- 5.3 The SFRA indicates the site lies within a postcode area with six records of sewer flooding in the past ten years therefore the site has a low risk of sewer flooding.
- 5.4 A review of further EA maps and the SFRA have identified that there are no other significant sources of flooding at the site, i.e. from groundwater or reservoirs. The SFRA and the EA's historic flood map indicate that there are no historic flood records for the site or the surrounding area.
- 5.5 The site is located entirely within Flood Zone 1 (low risk) and therefore safe access/egress via Egley Road would not be affected by fluvial or tidal flooding. There are small areas of low surface water flood risk along Egley Road; however, the flood depth is estimated to be less than 300 mm and therefore safe access/egress from the site would still be possible.
- 5.6 The proposed drainage strategy comprises of lined permeable paving and geo-cellular storage and would ensure that surface water runoff rates for the proposed development would be limited to  $Q_{bar}$  which is a betterment on both the existing drainage arrangement and greenfield runoff rates. Surface water runoff would discharge into the watercourse to the north-east of the development. Attenuation would be provided for all return periods up to and including the 1 in 100 year event inclusive of a 40% allowance for climate change.
- 5.7 This FRA has therefore demonstrated that the proposed development will be safe and that it would not increase flood risk elsewhere. The proposed land use is classified as 'more vulnerable' for the residential element and 'less vulnerable' for the leisure centre and is considered appropriate in relation to the flood risk vulnerability classifications set out in Table 3 of the NPPF. The development should therefore be considered acceptable in planning policy terms.

## ***Figures***





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**Key**  
 Red Line Boundary

Figure 1.1: **Site Location Plan**

Client: **Woking Football Club**

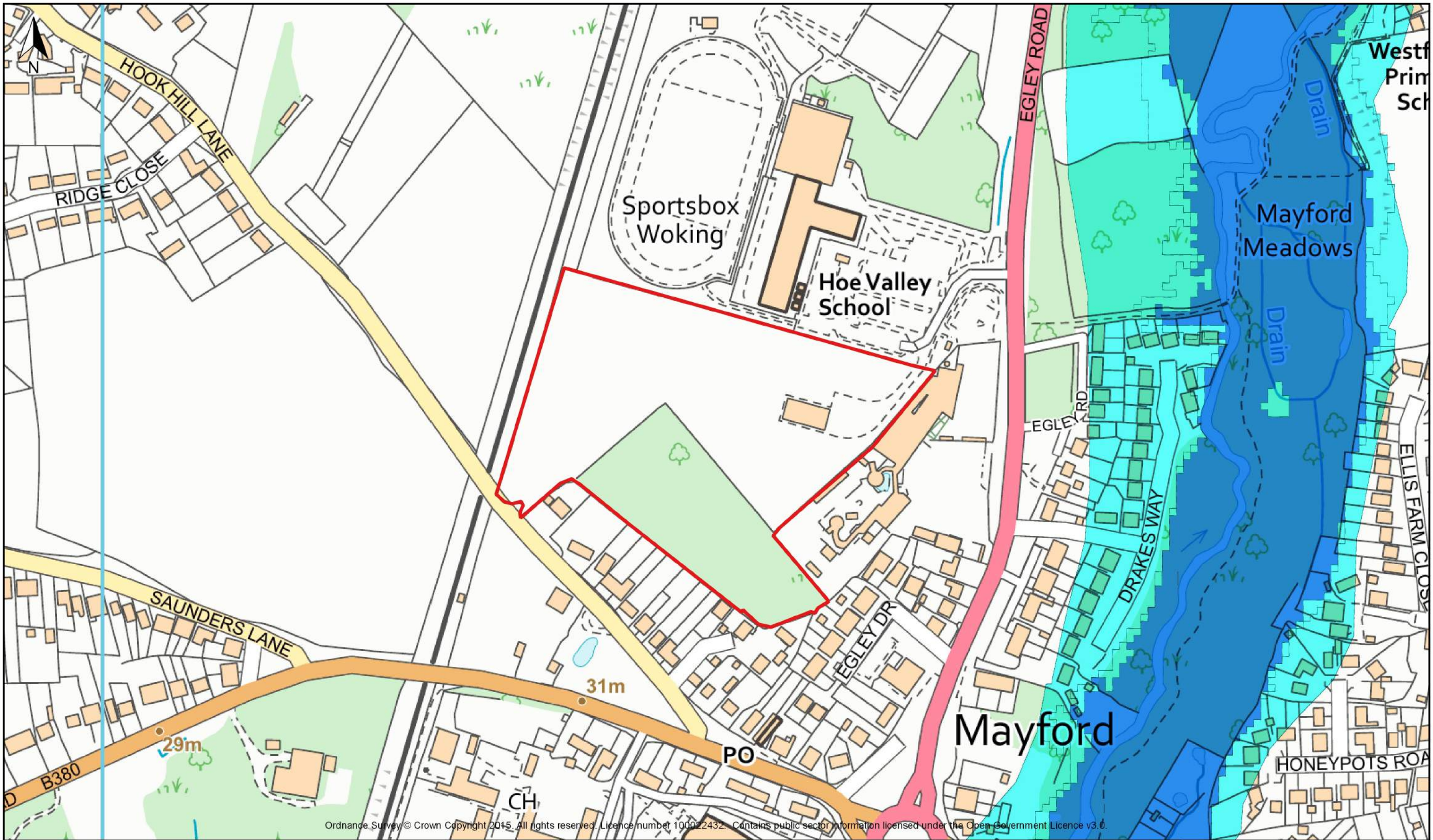
Project: **Egley Road Woking**

Project No.: **C1947**



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- Key**
- Red Line Boundary
  - EA Flood Zone 2
  - EA Flood Zone 3

Figure 3.1: **EA Flood Map for Planning**

Client: **Woking Football Club**

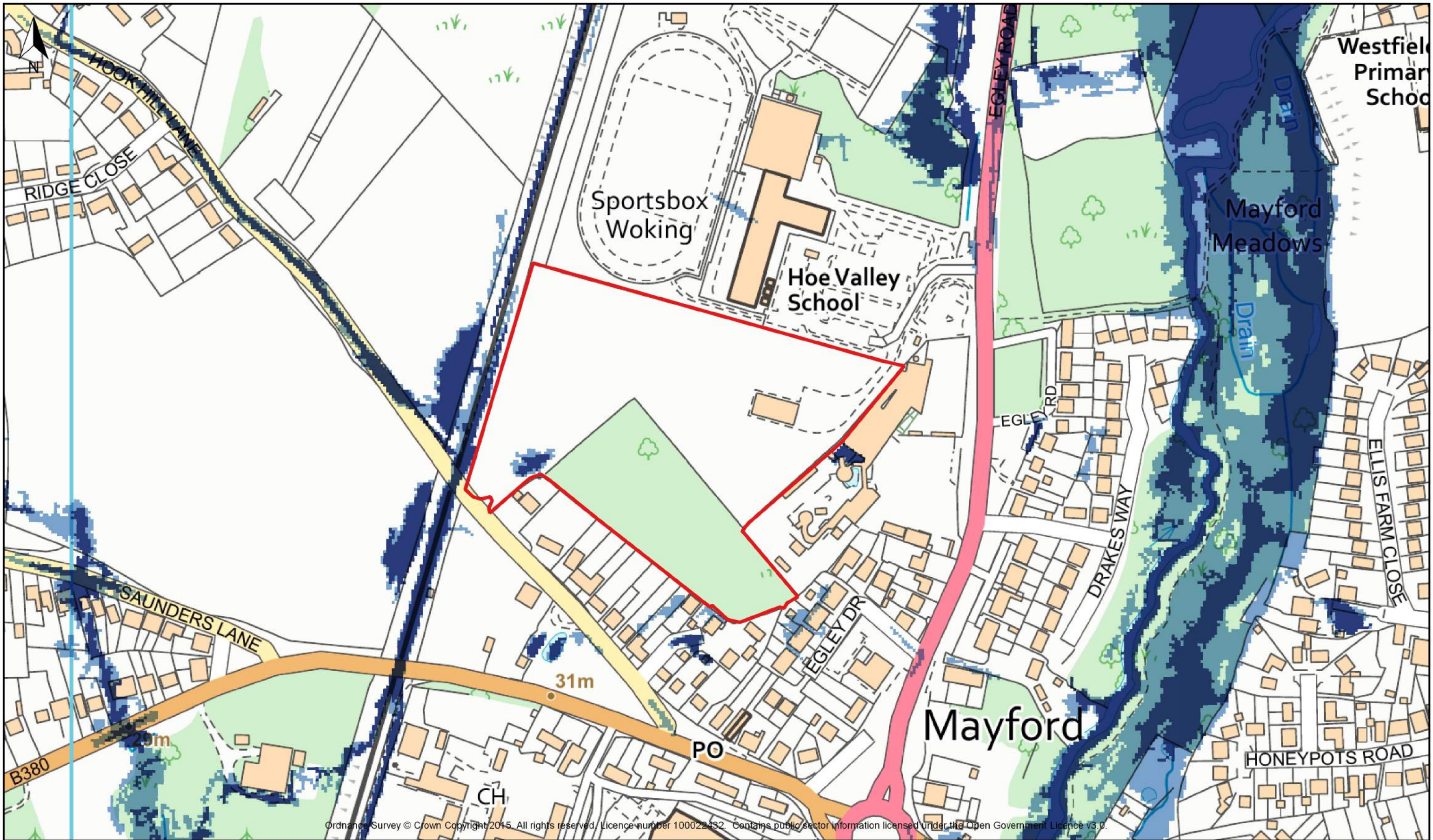
Project: **Egley Road Woking**

Project No.: **C1942**



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- Key**
- Red Line Boundary
  - EA Medium Surface Water Flood Risk
  - EA High Surface Water Flood Risk

Figure 3.2: EA Surface Water Flood Risk

Client: **Woking Football Club**

Project: **Egley Road Woking**

Project No.: **C1947**



Drawn: MS	Checked: RM	Date: 08/11/2019	Scale: 1:2,500@A3
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WORKING

# Hoe Valley School

**Key**

-  Red Line Boundary
-  Surface Water Flow Route

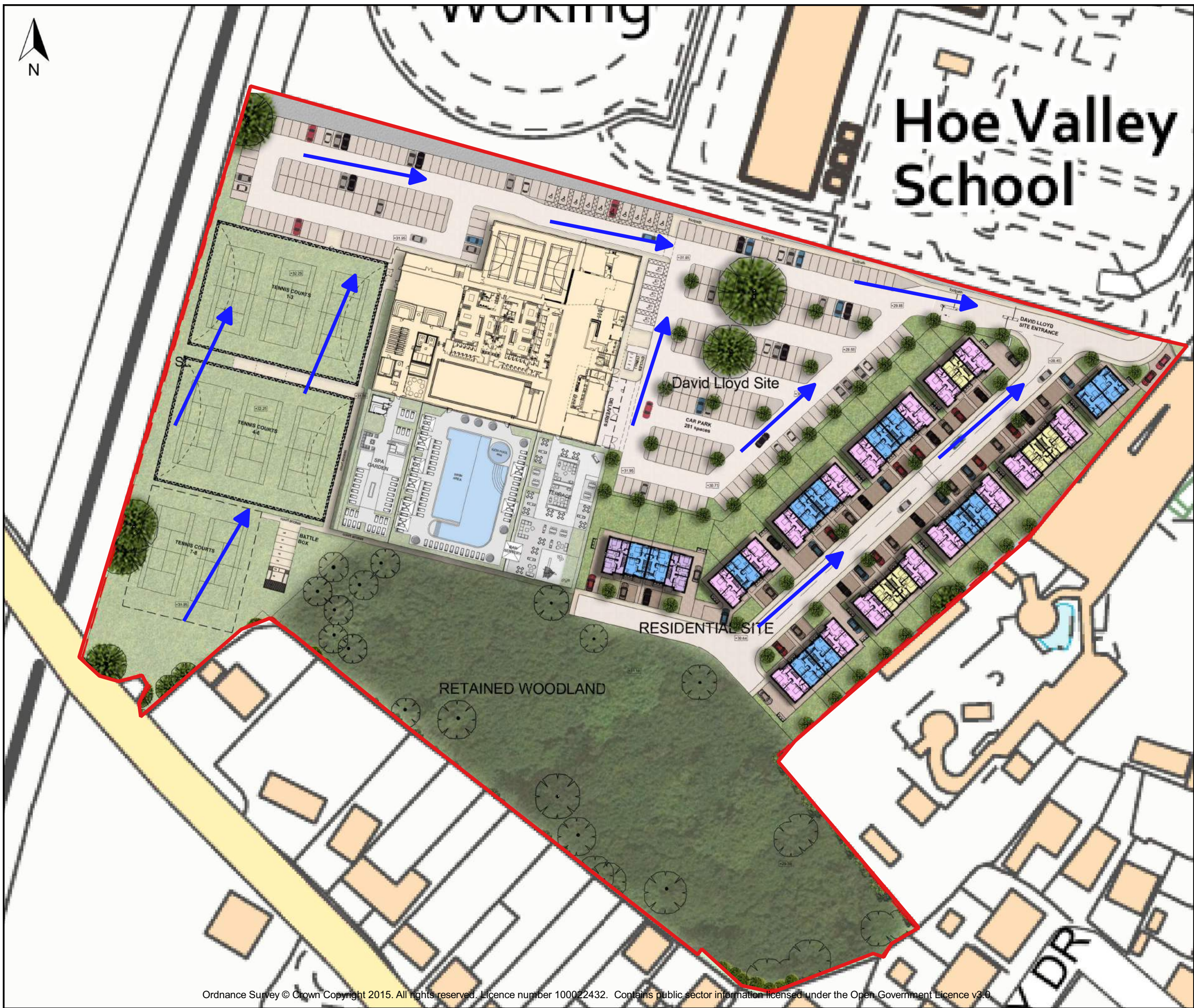


Figure 4.1: Surface Water Flow Paths in an Exceedance Event

Client: **Woking Football Club**

Project: **Egley Road Woking**

Project No.: **C1947**

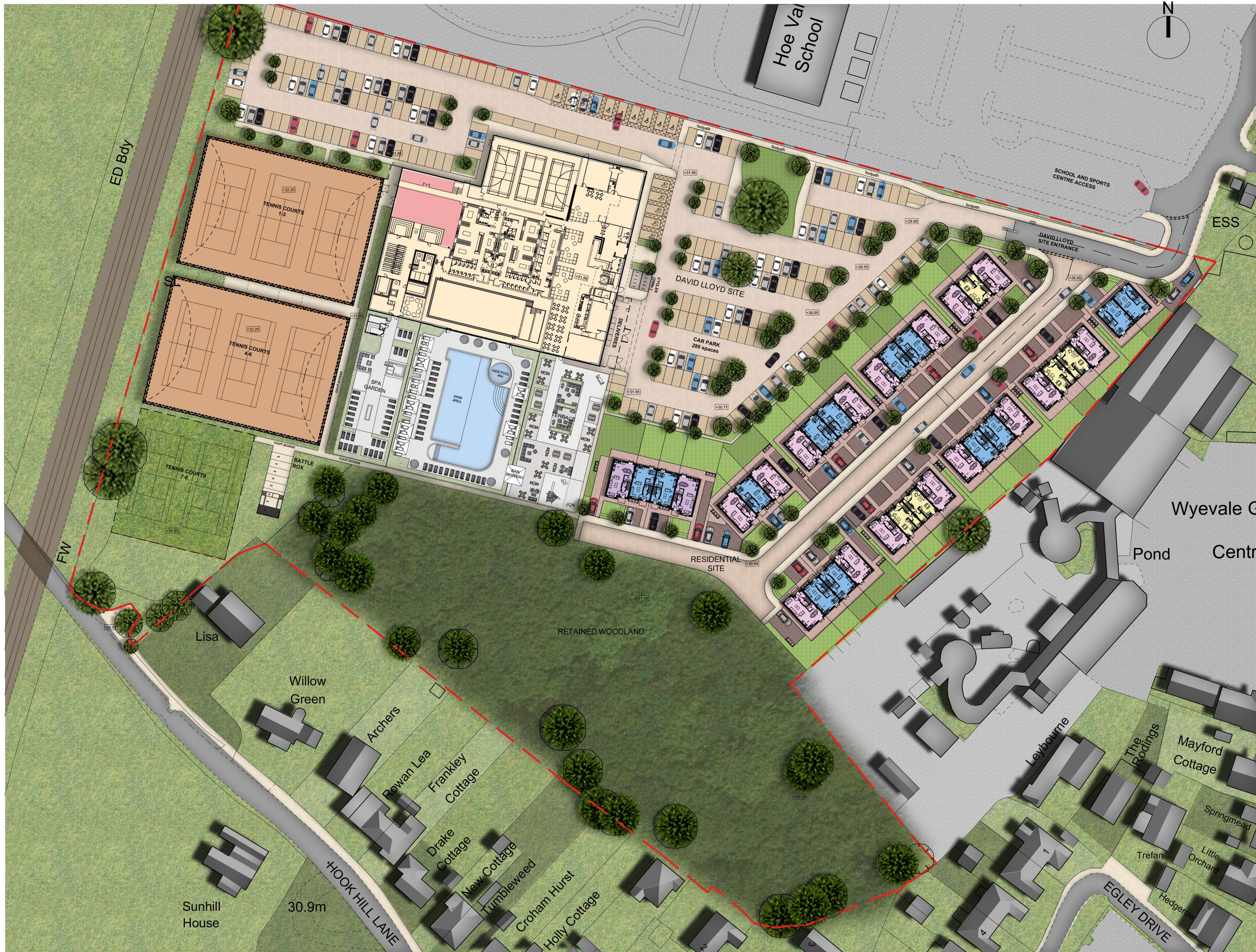


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# ***Appendix A: Proposed Development Layout***





**LEGEND**

**SITE BOUNDARY**

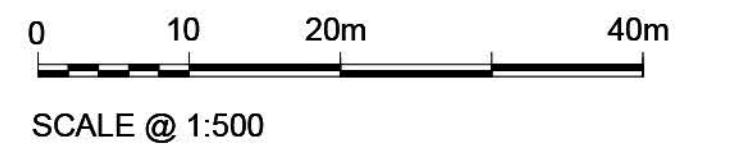
(Leisure Site Area: 22,303sqm)  
(Residential Site Area: 9,161sqm)

RESIDENTIAL:  
0.91 hectares  
36no. houses

- 05 x House Type 1
- 13 x House Type 2
- 16 x House Type 3
- 02 x House Type 4

Gross density:  
39 dwellings/ha  
58,366 sqft saleable area  
90 parking spaces provided

- House Type 1  
2/3 BEDROOM (4 PEOPLE)  
TOWNHOUSE  
(123.2sqm /1326sqft)
- House Type 2  
3 BEDROOM (6 PEOPLE)  
TOWNHOUSE  
(145sqm /1560sqft)
- House Type 3  
4 BEDROOM (8 PEOPLE)  
TOWNHOUSE  
(162.3sqm /1747sqft)
- House Type 4  
5 BEDROOM (9 PEOPLE)  
TOWNHOUSE  
(162.3sqm /1747sqft)





## ***Appendix B: Topographical Survey***



**KEY**

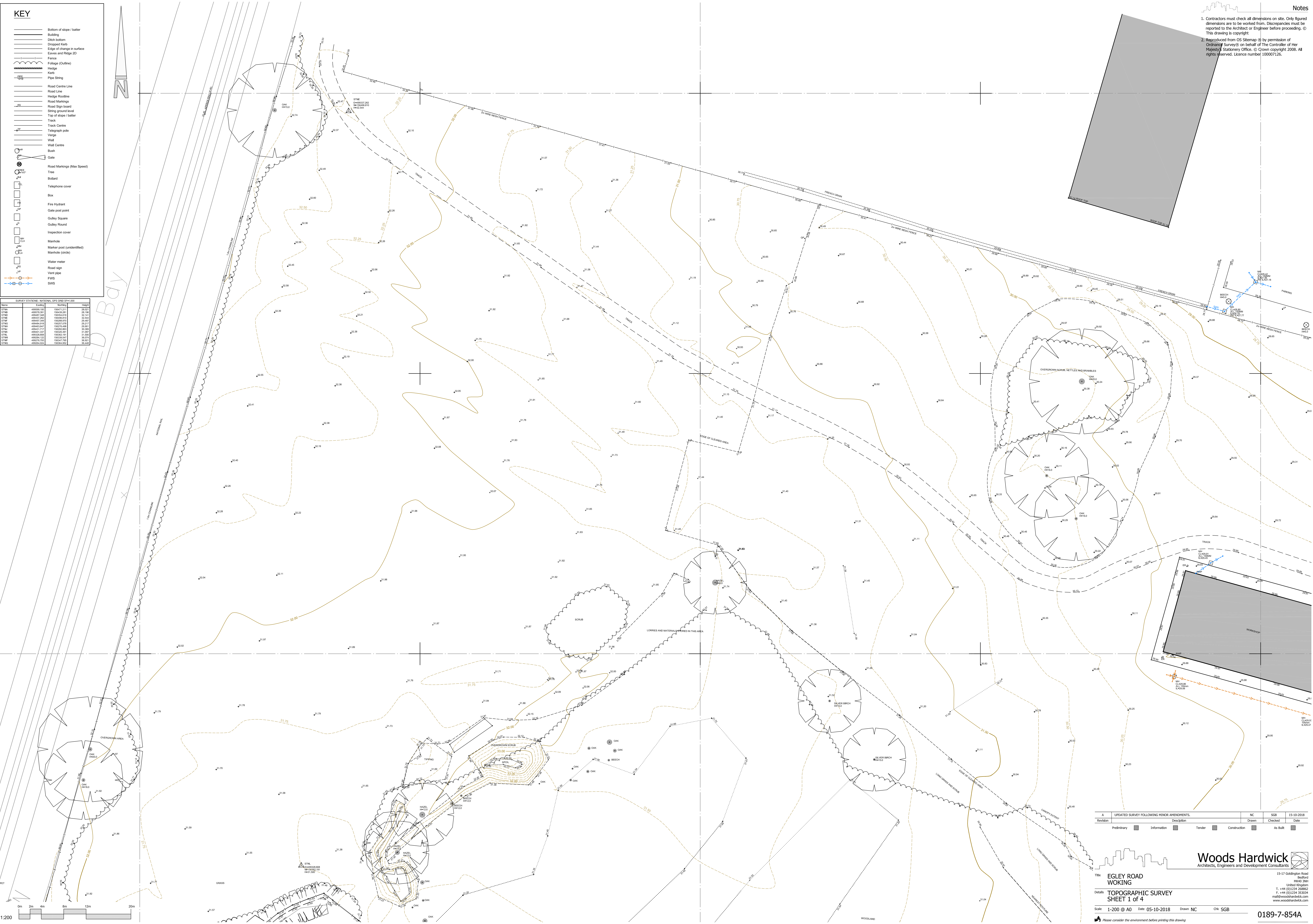
- Bottom of slope / batter
- Building
- Ditch bottom
- Dropped Kerb
- Edge of change in surface
- Edge and Ridge ID
- Fence
- Foliage (Outline)
- Grage
- Kerb
- Pipe String
- Road Centre Line
- Road Line
- Road Footline
- Road Markings
- Road Sign board
- String ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall
- Wall Centre
- Bush
- Gate
- Road Markings (Max Speed)
- Tree
- Bollard
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gully Square
- Gully Round
- Inspection cover
- Manhole
- Marker post (unidentified)
- Manhole (circle)
- Water meter
- Road sign
- Vent pipe
- FWS
- SWS

**SURVEY STATIONS: NATIONAL GPS GRID SP4-000**

Name	Country	Survey	Height
STN1	49939.100	10647.271	28.021
STN2	49939.021	10648.281	27.194
STN3	49940.348	10634.410	32.741
STN4	49937.282	10638.010	32.664
STN5	49939.128	10638.010	28.497
STN6	49944.819	10637.078	28.217
STN7	49941.717	10632.283	31.389
STN8	49941.127	10632.283	31.467
STN9	49938.888	10632.283	31.467
STN10	49934.122	10634.411	36.074
STN11	49937.712	10634.411	36.074
STN12	49934.024	10634.411	36.443

**Notes**

- Contractors must check all dimensions on site. Only figured dimensions are to be worked from. Discrepancies must be reported to the Architect or Engineer before proceeding. This drawing is copyright.
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Revision	Description	NC	SGB	15-10-2018
A	UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.	NC	SGB	15-10-2018
1	Preliminary	Information	Tender	Construction
2	Information	Tender	Construction	As Built

**Woods Hardwick**  
Architects, Engineers and Development Consultants

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T: +44 (0)1234 353034  
info@woods-hardwick.com  
www.woods-hardwick.com

**EGLEY ROAD WORKING**  
Details: **TOPOGRAPHIC SURVEY**  
SHEET 1 of 4

Scale: 1-200 @ A0 Date: 05-10-2018 Drawn: NC Chk: SGB

189-7-854A

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**KEY**

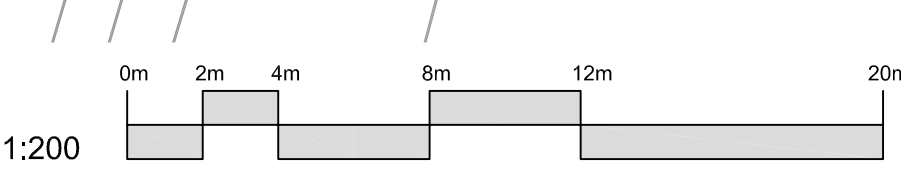
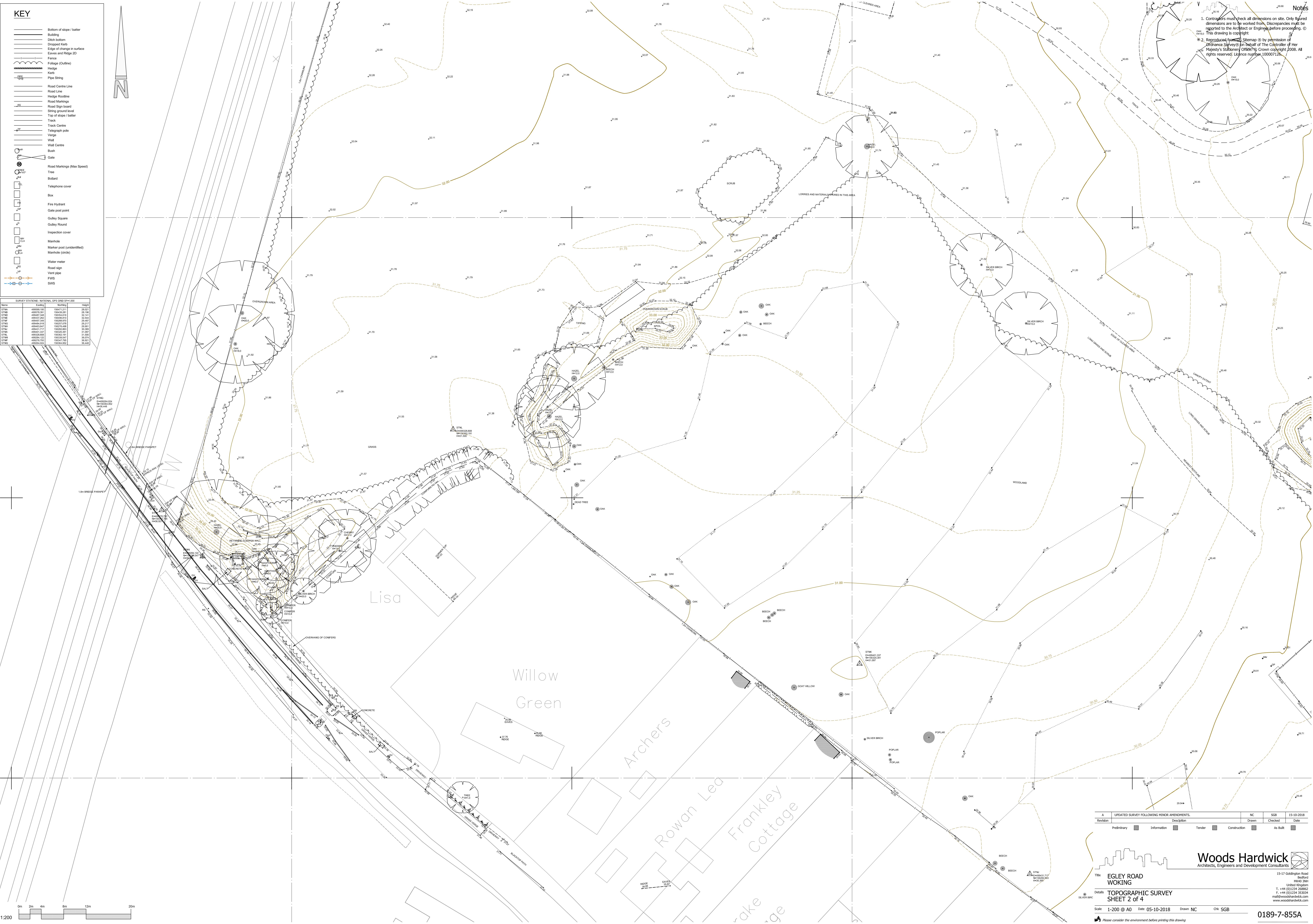
- Bottom of slope / batter
- Building
- Ditch bottom
- Dropped Kerb
- Edge of change in surface
- Eave and Ridge CD
- Fence
- Foliage (Outline)
- Hedge
- Kerb
- Pipe String
- Road Centre Line
- Road Line
- Hedge Footline
- Road Markings
- Road Sign board
- String ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall
- Wall Centre
- Bush
- Gate
- Road Markings (Max Speed)
- Tree
- Bollard
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gully Square
- Gully Round
- Inspection cover
- Manhole
- Marker post (unidentified)
- Manhole (creek)
- Water meter
- Road sign
- Vent pipe
- FWS
- SWS

**SURVEY STATIONS: NATIONAL GPS GRID 27+000**

Name	Country	Survey	Height
STNK	49939.100	10471.271	28.021
STND	49939.101	10471.271	28.194
STNE	49943.348	10454.410	32.741
STNF	49937.262	10454.410	32.644
STNG	49939.248	10454.410	28.497
STNH	49944.819	10432.078	28.207
STNI	49941.717	10432.078	31.389
STNJ	49943.327	10432.078	31.067
STNK	49938.808	10432.078	31.067
STNL	49934.122	10434.541	36.074
STNM	49933.721	10434.541	36.074
STNS	49933.024	10434.541	36.441

**Notes**

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Revision	Description	NC	SGR	Date
A	UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.			15-10-2018
1	Preliminary	Information	Tender	Construction
2				As Built

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**EGLEY ROAD WOKING**  
Details: **TOPOGRAPHIC SURVEY SHEET 2 of 4**

Scale: 1:200 @ A0 Date: 05-10-2018 Drawn: NC Checked: SGB

15189-7-855A

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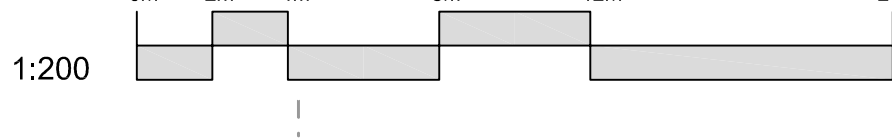


**KEY**

- Bottom of slope / batter
- Building
- Ditch bottom
- Dropped kerb
- Edge of change in surface
- Eaves and Ridge 2D
- Fence
- Foliage (Outline)
- Hedge
- Kerb
- Pipe String
- Road Centre Line
- Road Line
- Hedge Roadline
- Road Markings
- Road Sign board
- String ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall Centre
- Wall
- Wall Centre
- Bush
- Gate
- Road Markings (Max Speed)
- Tree
- Bollard
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gully Square
- Gully Round
- Inspection cover
- Manhole
- Marker post (unidentifed)
- Manhole (cable)
- Water meter
- Road sign
- Vent pipe
- FWS
- SWS

**SURVEY STATINGS: NATIONAL GRID SP41000**

Point	Easting	Northing	Height
STW1	492075.201	100412.111	28.027
STW2	492075.201	100409.241	28.198
STW3	492075.201	100406.371	28.369
STW4	492075.201	100403.501	28.540
STW5	492075.201	100400.631	28.711
STW6	492075.201	100397.761	28.882
STW7	492075.201	100394.891	29.053
STW8	492075.201	100392.021	29.224
STW9	492075.201	100389.151	29.395
STW10	492075.201	100386.281	29.566
STW11	492075.201	100383.411	29.737
STW12	492075.201	100380.541	29.908
STW13	492075.201	100377.671	30.079
STW14	492075.201	100374.801	30.250
STW15	492075.201	100371.931	30.421
STW16	492075.201	100369.061	30.592
STW17	492075.201	100366.191	30.763
STW18	492075.201	100363.321	30.934



Revision	Description	NC	SCB	15-10-2018
A	UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.			
		Drawn	Checked	Date

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Scale: 1:200 @ A0 Date: 05-10-2018 Drawn: NC Chk: SGB

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**KEY**

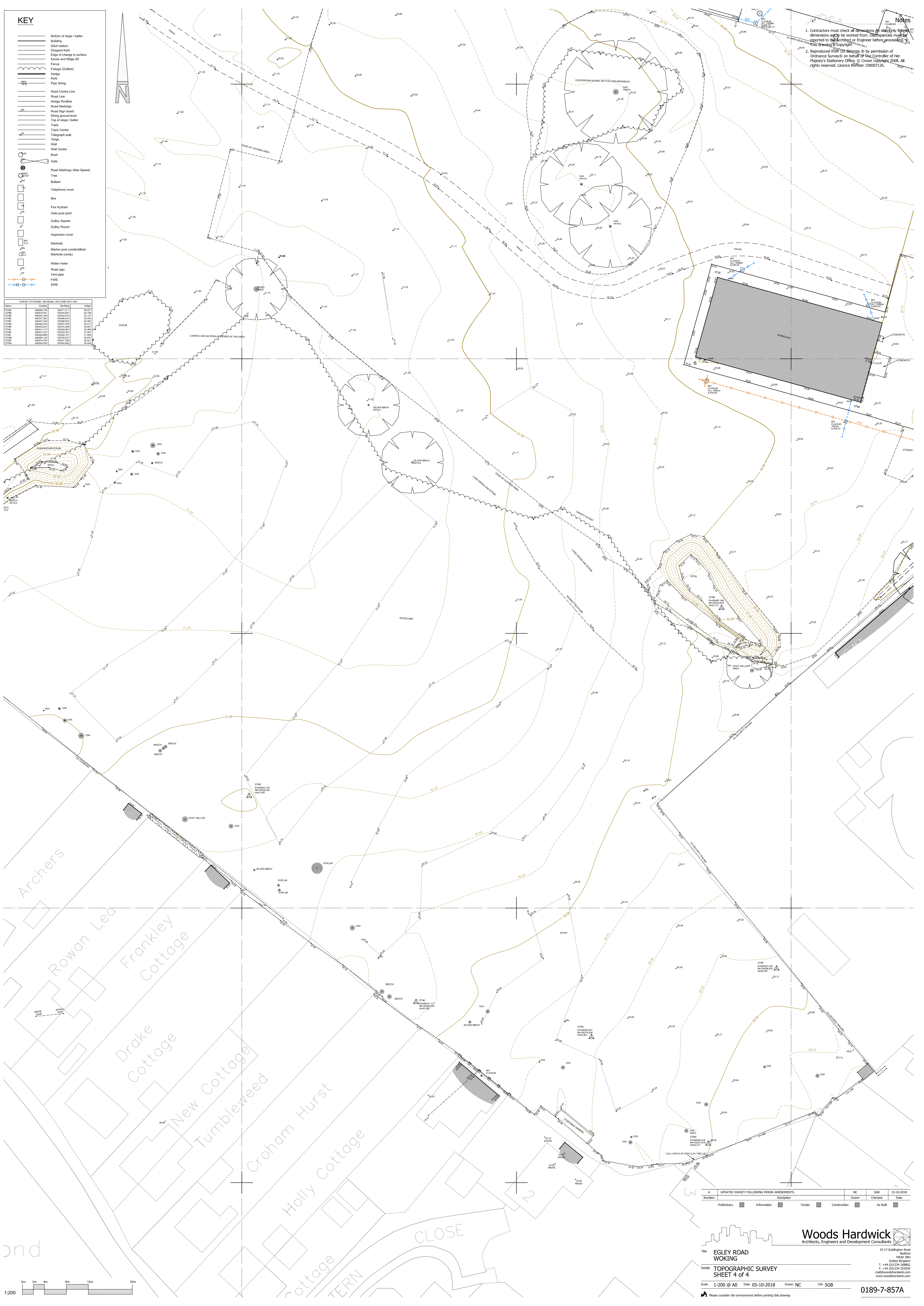
- Bottom of slope / batter
- Building
- Ditch bottom
- Dropped kerb
- Edge of change in surface
- Eaves and Ridge 2D
- Fence
- Foliage (Outline)
- Hedge
- Kerb
- Pipe String
- Road Centre Line
- Road Line
- Road Profile
- Road Markings
- Road Sign board
- String ground level
- Top of slope / batter
- Track
- Track Centre
- Telegraph pole
- Verge
- Wall
- Wall Centre
- Well
- Gate
- Road Markings (Max Speed)
- Tie
- Bobbed
- Telephone cover
- Box
- Fire Hydrant
- Gate post point
- Gully Square
- Gully Round
- Inspection cover
- Manhole
- Marker post (unidentified)
- Manhole (circle)
- Water meter
- Road sign
- Vault pipe
- FWS
- SWS

**Notes**

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**SURVEY STATIONS NATIONAL GRID COORDINATES**

Name	Easting	Northing	Height
STNK	48895.00	10421.71	18.02
STNK	48895.30	10421.20	18.70
STNK	48895.34	10420.94	18.14
STNK	48895.36	10420.80	18.64
STNK	48895.38	10420.79	18.67
STNK	48895.47	10420.78	18.71
STNK	48895.57	10420.68	18.91
STNK	48895.77	10420.54	19.09
STNK	48895.37	10420.39	18.00
STNK	48895.80	10420.39	18.00
STNK	48895.92	10420.37	18.00
STNK	48895.76	10420.34	18.01
STNK	48895.04	10420.52	18.48



Revision	Description	NC	SGB	15-10-2018
A	UPDATED SURVEY FOLLOWING MINOR AMENDMENTS.			
		Drawn	Checked	Date
		Preliminary	Information	Tender
		Construction	As Built	

**Woods Hardwick**  
Architects, Engineers and Development Consultants

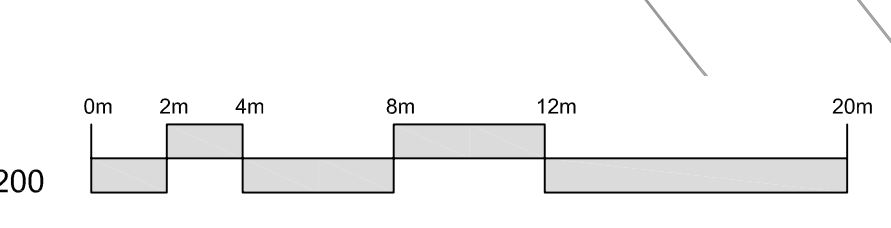
**EGLEY ROAD WOKING**

Details: **TOPOGRAPHIC SURVEY SHEET 4 of 4**

Scale: 1-200 @ A0 Date: 05-10-2018 Drawn: NC Chk: SGB

15-17 Goldsmith Road, Woking, Surrey, GU24 0JH, United Kingdom. T: +44 (0)1253 350000, F: +44 (0)1253 253024, mail@woods-hardwick.com, www.woods-hardwick.com

1899-7-857A





## **Appendix C: Drainage Strategy**

## **PURPOSE**

The purpose of this Design Statement is to describe how the surface water drainage strategy for the proposed redevelopment of the Egley Road site will manage runoff in a manner that will mitigate the risk of flooding and pollution to the environment.

## **SCOPE**

This design addresses runoff from areas within the red line boundary for the planning application.

## **DESIGN CONSTRAINTS**

A ground investigation has been carried out. A combination of high groundwater levels and low percolation rates indicates that infiltration will not be feasible. Refer to the main body of the report for a description of the ground investigations carried out at the site.

There is limited information on the drainage arrangements for the existing site. However, the topographic survey shows a number of surface water sewers within the site and indicates that these are likely to be connected to the existing public surface water sewer in the adjacent access road to Hoe Valley School.

In pre-application discussions with the Lead Local Flood Authority it has been stipulated that runoff from the site should be limited as close as practicable to greenfield conditions.

The proposed site will have two distinct functions; the main area of the site will be developed with a new health club, while the remainder is to be used for residential development. It is a requirement that the drainage system for the health club be separate from that of the residential development.

## **DESIGN STANDARDS**

The proposed surface water drainage system is to be designed to ensure that all runoff from the 100year rainfall event plus a 40% increase in rainfall intensity is managed in accordance with DEFRA's Technical Standards for Sustainable Drainage Systems.

## **DESIGN - STRATEGY**

It is proposed to attenuate runoff prior to discharge to the public surface water sewer. Attenuation will be provided in:

- the granular material beneath permeable paving;
- lined geocellular tanks.

The rate of discharge from the site will be controlled by means of a Hydro-Brake.

The proposed drainage layout is shown on drawing SK100 in Appendix B.



## DESIGN - DETAIL

### Volumetric Control

The MicroDrainage software suite has been used to model the performance of the proposed drainage system. The model and simulation results are included in Appendix A.

### Treatment Design

The pollution treatment requirements for the site have been established using the Simple Index Approach set out in Table 26.1 of the SUDS Manual.

Pollution hazard levels have been derived From Table 26.2 and are shown in the following table.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Roads with more than 300 vehicle movements/day	Medium	0.7	0.6	0.7
Residential roofs	Very low	0.2	0.2	0.05

**Table 1 – Pollution Hazard Indices**

The following table shows how runoff from the above areas will be treated. The figure in brackets is the target level of treatment.

Land Use	Treatment	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Roads with more than 300 vehicle movements/day	Permeable paving	0.7 (0.7) OK	0.6 (0.6) OK	0.7 (0.7) OK
Residential roofs	Bioretention areas (i.e. rain gardens and tree pits)	0.2 (0.8) OK	0.2 (0.8) OK	0.05 (0.8) OK

**Table 2 – Proposed SuDS Mitigation Indices**

Comparing the pollution hazard indices in Table 1 with the mitigation indices in Table 2 indicates that the proposed treatment measures are appropriate for the site use.

### Compliance with Technical Standards for Sustainable Drainage Systems

The following sections describe how the proposed surface water drainage system meets the requirements of the DEFRA document Non-Statutory Technical Standards for Sustainable Drainage Systems.

**S2** For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

Not applicable – brownfield site.

**S3** For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

The proposed development flows will be restricted to QBAR (refer to Appendix 1)

**S4** Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.

Not applicable – brownfield site.

**S5** Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

Not practicable due to significant increase in impermeable areas, and ground conditions are not conducive to the use of concentrated infiltration techniques.

**S6** Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S4** or **S5** above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

Flows will be restricted to QBAR (11.5l/s)

**S7** The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

The drainage system has been designed such that runoff from all events up to the 100year +40% will be stored below ground level. Refer to the MicroDrainage outputs in Appendix A.

**S8** *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*

See S7 above.

**S9** *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

Refer to Section 4.10 in the main body of the report.

**S10** *Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.*

Where practicable the drainage system will be located beyond the zone of influence of adjacent foundations. Where this is not practicable, foundations will be designed to allow for the replacement of the drainage system without the need for special support.

**S11** *The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.*

The surface water system will be designed in accordance with the SuDS Manual. The design will allow for replacement of component parts without long-term detriment to the performance of the system.

**S12** *Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.*

Runoff will generally be disposed of by means of gravity.

**S13** *The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.*

Connections to the existing watercourse will be made only by appropriately qualified and licensed contractors.


**S14** *Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.*

See S13 above.

**APPENDIX A**  
**CALCULATIONS**

1. Qbar Calculations
2. MicroDrainage printout for proposed drainage system - 100year +40% rainfall event

## 1. QBar Calculations

Tier Consult		Page 1
10 Broomhall Street Unit 18 West One Sheffield, S3 7SZ		
Date 27/04/2020 10:48 File	Designed by JonHale Checked by	
Innovyze	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	2.610	Urban	0.000
SAAR (mm)	700	Region Number	Region 6


**Results 1/s**

QBAR Rural 11.5  
QBAR Urban 11.5

Q2 years 10.1

Q1 year 9.7  
Q30 years 26.0  
Q100 years 36.6

2. MicroDrainage printout for proposed drainage system 100year +40% rainfall event

Tier Consult		Page 1
10 Broomhall Street Unit 18 West One Sheffield, S3 7SZ	One Network Egley Road Woking	
Date 21/04/2020 13:08 File WHOLE SITE.MDX	Designed by JHale Checked by	
Innovyze	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.450	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	150	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm










Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.046	4-8	1.523	8-12	1.034	12-16	0.012

Total Area Contributing (ha) = 2.615

Total Pipe Volume (m³) = 326.339

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	41.908	0.170	246.5	0.231	4.00	0.0	0.600		o	450	Pipe/Conduit	
S1.001	65.991	0.230	286.9	0.371	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.002	75.906	0.350	216.9	0.592	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.003	34.223	0.099	345.0	0.150	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.004	28.017	0.082	341.7	0.113	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.005	16.230	0.430	37.7	0.029	0.00	0.0	0.600		o	450	Pipe/Conduit	
S2.000	31.947	0.130	245.7	0.030	4.00	0.0	0.600		o	450	Pipe/Conduit	
S2.001	28.000	0.114	245.6	0.090	0.00	0.0		0.050	→ *		Bio-Retention Area	
S2.002	10.436	0.043	242.7	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	150.00	4.54	30.250	0.231	0.0	0.0	0.0	1.29	205.2	93.8
S1.001	150.00	5.46	30.080	0.602	0.0	0.0	0.0	1.20	190.1«	244.6
S1.002	150.00	6.38	29.000	1.194	0.0	0.0	0.0	1.38	218.9«	485.0
S1.003	150.00	6.90	28.650	1.344	0.0	0.0	0.0	1.09	173.2«	546.0
S1.004	149.94	7.33	28.551	1.457	0.0	0.0	0.0	1.09	174.0«	591.6
S1.005	149.21	7.41	28.469	1.486	0.0	0.0	0.0	3.32	527.6«	600.5
S2.000	150.00	4.41	28.321	0.030	0.0	0.0	0.0	1.29	205.5	12.2
S2.001	150.00	4.98	28.191	0.120	0.0	0.0	0.0	0.83	2992.3	48.7
S2.002	150.00	5.11	28.077	0.120	0.0	0.0	0.0	1.30	206.8	48.7



10 Broomhall Street  
Unit 18 West One  
Sheffield, S3 7SZ

One Network  
Egley Road  
Woking

Date 21/04/2020 13:08  
File WHOLE SITE.MDX

Designed by JHale  
Checked by



Innovyze

Network 2019.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.006	17.436	0.050	348.7	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
S3.000	46.085	0.196	235.1	0.155	4.00	0.0	0.600		o	450	Pipe/Conduit	
S3.001	13.744	0.058	237.0	0.121	0.00	0.0	0.600		o	450	Pipe/Conduit	
S3.002	28.313	0.120	235.9	0.094	0.00	0.0	0.600		o	450	Pipe/Conduit	
S3.003	16.966	0.072	235.6	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
S3.004	18.721	0.570	32.8	0.048	0.00	0.0	0.600		o	450	Pipe/Conduit	
S1.007	21.847	0.129	169.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.008	20.847	0.123	169.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.009	26.399	0.263	100.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.000	45.416	0.267	170.0	0.031	4.00	0.0	0.600		o	225	Pipe/Conduit	
S4.001	70.650	0.416	169.8	0.062	0.00	0.0		0.050 →[↓]			Cellular Storage	
S4.002	37.850	0.076	498.0	0.211	0.00	0.0		0.050 →[↓]			Cellular Storage	
S4.003	22.910	0.040	572.8	0.191	0.00	0.0		0.050 →[↓]			Cellular Storage	
S1.010	18.771	0.110	170.6	0.041	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.011	16.243	0.406	40.0	0.055	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.012	10.174	0.060	170.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.013	41.415	0.244	170.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.014	14.464	0.500	28.9	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.015	40.191	0.236	170.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.016	24.838	0.146	170.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.006	146.87	7.68	28.034	1.606	0.0	0.0	0.0	1.08	172.2<<	638.8
S3.000	150.00	4.58	29.000	0.155	0.0	0.0	0.0	1.32	210.2	63.0
S3.001	150.00	4.76	28.804	0.276	0.0	0.0	0.0	1.32	209.4	112.1
S3.002	150.00	5.11	28.746	0.370	0.0	0.0	0.0	1.32	209.8	150.3
S3.003	150.00	5.33	28.626	0.370	0.0	0.0	0.0	1.32	209.9	150.3
S3.004	150.00	5.41	28.550	0.418	0.0	0.0	0.0	3.56	565.8	169.8
S1.007	143.79	8.04	27.984	2.024	0.0	0.0	0.0	1.00	39.8<<	788.2
S1.008	140.86	8.39	27.755	2.024	0.0	0.0	0.0	1.00	39.8<<	788.2
S1.009	138.15	8.73	27.579	2.024	0.0	0.0	0.0	1.30	51.9<<	788.2
S4.000	150.00	4.76	29.500	0.031	0.0	0.0	0.0	1.00	39.8	12.6
S4.001	150.00	6.79	27.771	0.093	0.0	0.0	0.0	0.58	525.4	37.8
S4.002	140.93	8.38	27.571	0.304	0.0	0.0	0.0	0.40	671.9	116.0
S4.003	125.32	10.55	27.496	0.495	0.0	0.0	0.0	0.18	82.5<<	168.0
S1.010	123.37	10.86	27.316	2.560	0.0	0.0	0.0	1.00	39.7<<	855.3
S1.011	122.58	10.99	27.206	2.615	0.0	0.0	0.0	2.07	82.5<<	868.1
S1.012	121.57	11.16	26.800	2.615	0.0	0.0	0.0	1.00	39.8<<	868.1
S1.013	117.64	11.85	26.740	2.615	0.0	0.0	0.0	1.00	39.8<<	868.1
S1.014	117.10	11.95	26.496	2.615	0.0	0.0	0.0	2.44	97.1<<	868.1
S1.015	113.59	12.62	25.900	2.615	0.0	0.0	0.0	1.00	39.7<<	868.1
S1.016	111.54	13.03	25.664	2.615	0.0	0.0	0.0	1.00	39.7<<	868.1

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Sheffield, S3 7SZ

One Network  
Egley Road  
Woking

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o		S1	32.250	30.250	1.550	Open Manhole	1500
S1.001	o	450	S2	32.250	30.080	1.720	Open Manhole	1500
S1.002	o	450	S2	31.950	29.000	2.500	Open Manhole	1800
S1.003	o	450	S6	31.950	28.650	2.850	Open Manhole	1500
S1.004	o	450	S6	31.800	28.551	2.799	Open Manhole	1500
S1.005	o	450	S6	31.200	28.469	2.281	Open Manhole	1500
S2.000	o	450	S7	30.000	28.321	1.229	Open Manhole	1350
S2.001	→ *		S7	31.000	28.191	0.000	Open Manhole	1500
S2.002	o	450	S7	31.000	28.077	2.473	Open Manhole	1500
S1.006	o	450	S7	30.600	28.034	2.116	Open Manhole	1350
S3.000	o	450	S3	31.950	29.000	2.500	Open Manhole	1500
S3.001	o	450	S4	31.950	28.804	2.696	Open Manhole	1500
S3.002	o	450	S9	30.550	28.746	1.354	Open Manhole	1500
S3.003	o	450	S9	30.100	28.626	1.024	Open Manhole	1500
S3.004	o	450	S10	30.100	28.550	1.100	Open Manhole	1800
S1.007	o	225	S8	30.000	27.984	1.791	Open Manhole	1800
S1.008	o	225	S9	29.600	27.755	1.620	Open Manhole	1200
S1.009	o	225	S17	28.800	27.579	0.996	Open Manhole	1200
S4.000	o	225	S19	31.000	29.500	1.275	Open Manhole	1200
S4.001	→[↓]		S20	30.740	27.771	2.068	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	41.908	246.5	S2	32.250	30.080	1.720	Open Manhole	1500
S1.001	65.991	286.9	S2	31.950	29.850	1.650	Open Manhole	1800
S1.002	75.906	216.9	S6	31.950	28.650	2.850	Open Manhole	1500
S1.003	34.223	345.0	S6	31.800	28.551	2.799	Open Manhole	1500
S1.004	28.017	341.7	S6	31.200	28.469	2.281	Open Manhole	1500
S1.005	16.230	37.7	S7	30.600	28.039	2.111	Open Manhole	1350
S2.000	31.947	245.7	S7	31.000	28.191	2.359	Open Manhole	1500
S2.001	28.000	245.6	S7	31.000	28.077	0.114	Open Manhole	1500
S2.002	10.436	242.7	S7	30.600	28.034	2.116	Open Manhole	1350
S1.006	17.436	348.7	S8	30.000	27.984	1.566	Open Manhole	1800
S3.000	46.085	235.1	S4	31.950	28.804	2.696	Open Manhole	1500
S3.001	13.744	237.0	S9	30.550	28.746	1.354	Open Manhole	1500
S3.002	28.313	235.9	S9	30.100	28.626	1.024	Open Manhole	1500
S3.003	16.966	235.6	S10	30.100	28.554	1.096	Open Manhole	1800
S3.004	18.721	32.8	S8	30.000	27.980	1.570	Open Manhole	1800
S1.007	21.847	169.4	S9	29.600	27.855	1.520	Open Manhole	1200
S1.008	20.847	169.5	S17	28.800	27.632	0.943	Open Manhole	1200
S1.009	26.399	100.4	S24	28.450	27.316	0.909	Open Manhole	1500
S4.000	45.416	170.0	S20	30.740	29.233	1.282	Open Manhole	1500
S4.001	70.650	169.8	S21	30.000	27.355	1.744	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S4.002	→[↓]		S21	30.000	27.571	1.528	Open Manhole	1500
S4.003	→[↓]		S22	29.340	27.496	1.618	Open Manhole	1500
S1.010	o	225	S24	28.450	27.316	0.909	Open Manhole	1500
S1.011	o	225	S25	28.200	27.206	0.769	Open Manhole	1800
S1.012	o	225	S25	27.950	26.800	0.925	Open Manhole	1200
S1.013	o	225	S26	27.800	26.740	0.835	Open Manhole	1200
S1.014	o	225	S27	27.630	26.496	0.909	Open Manhole	1200
S1.015	o	225	S28	27.013	25.900	0.888	Open Manhole	1200
S1.016	o	225	S29	26.928	25.664	1.039	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S4.002	37.850	498.0	S22	29.340	27.495	0.944	Open Manhole	1500
S4.003	22.910	572.8	S24	28.450	27.456	0.768	Open Manhole	1500
S1.010	18.771	170.6	S25	28.200	27.206	0.769	Open Manhole	1800
S1.011	16.243	40.0	S25	27.950	26.800	0.925	Open Manhole	1200
S1.012	10.174	170.0	S26	27.800	26.740	0.835	Open Manhole	1200
S1.013	41.415	170.0	S27	27.630	26.496	0.909	Open Manhole	1200
S1.014	14.464	28.9	S28	27.013	25.996	0.792	Open Manhole	1200
S1.015	40.191	170.3	S29	26.928	25.664	1.039	Open Manhole	1200
S1.016	24.838	170.1	S	26.925	25.518	1.182	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.231	0.231	0.231
1.001	-	-	100	0.371	0.371	0.371
1.002	-	-	100	0.592	0.592	0.592
1.003	-	-	100	0.150	0.150	0.150
1.004	-	-	100	0.113	0.113	0.113
1.005	-	-	100	0.029	0.029	0.029
2.000	-	-	100	0.030	0.030	0.030
2.001	-	-	100	0.090	0.090	0.090
2.002	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.155	0.155	0.155
3.001	-	-	100	0.121	0.121	0.121
3.002	-	-	100	0.094	0.094	0.094
3.003	-	-	100	0.000	0.000	0.000
3.004	-	-	100	0.048	0.048	0.048
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.031	0.031	0.031
4.001	-	-	100	0.062	0.062	0.062
4.002	-	-	100	0.211	0.211	0.211
4.003	-	-	100	0.191	0.191	0.191
1.010	-	-	100	0.041	0.041	0.041
1.011	-	-	100	0.055	0.055	0.055
1.012	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.615	2.615	2.615

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.016	S	26.925	25.518	25.500	0	0


Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	20000
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 5    Number of Storage Structures 11    Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000
Return Period (years)	100	Ratio R	0.450
Region England and Wales		Profile Type	Summer

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Synthetic Rainfall Details

Cv (Summer) 0.750 Storm Duration (mins) 360  
Cv (Winter) 0.840

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S2, DS/PN: S1.002, Volume (m³): 17.7

Unit Reference MD-SHE-0107-5000-0900-5000  
Design Head (m) 0.900  
Design Flow (l/s) 5.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 107  
Invert Level (m) 29.000  
Minimum Outlet Pipe Diameter (mm) 150  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	5.0	Kick-Flo®	0.590	4.1
Flush-Flo™	0.271	5.0	Mean Flow over Head Range	-	4.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	0.800	4.7	2.000	7.2	4.000	10.1	7.000	13.1
0.200	4.9	1.000	5.2	2.200	7.6	4.500	10.6	7.500	13.6
0.300	5.0	1.200	5.7	2.400	7.9	5.000	11.2	8.000	14.0
0.400	4.9	1.400	6.1	2.600	8.2	5.500	11.7	8.500	14.4
0.500	4.6	1.600	6.5	3.000	8.8	6.000	12.2	9.000	14.8
0.600	4.1	1.800	6.9	3.500	9.4	6.500	12.7	9.500	15.2


Hydro-Brake® Optimum Manhole: S10, DS/PN: S3.004, Volume (m³): 6.4

Unit Reference MD-SHE-0061-2000-1500-2000  
Design Head (m) 1.500  
Design Flow (l/s) 2.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 61  
Invert Level (m) 28.550  
Minimum Outlet Pipe Diameter (mm) 75  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	2.0	Kick-Flo®	0.545	1.3
Flush-Flo™	0.269	1.6	Mean Flow over Head Range	-	1.5

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.3	0.400	1.5	0.800	1.5	1.400	1.9	2.000	2.3
0.200	1.5	0.500	1.4	1.000	1.7	1.600	2.1	2.200	2.4
0.300	1.6	0.600	1.3	1.200	1.8	1.800	2.2	2.400	2.5

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Hydro-Brake® Optimum Manhole: S10, DS/PN: S3.004, Volume (m<sup>3</sup>): 6.4

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.600	2.6	4.000	3.1	5.500	3.6	7.000	4.1	8.500	4.5
3.000	2.7	4.500	3.3	6.000	3.8	7.500	4.2	9.000	4.6
3.500	3.0	5.000	3.5	6.500	3.9	8.000	4.3	9.500	4.7

Hydro-Brake® Optimum Manhole: S8, DS/PN: S1.007, Volume (m<sup>3</sup>): 10.3

Unit Reference MD-SHE-0127-9500-2000-9500  
Design Head (m) 2.000  
Design Flow (l/s) 9.5  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 128  
Invert Level (m) 27.984  
Minimum Outlet Pipe Diameter (mm) 150  
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	9.5	Kick-Flo®	1.140	7.3
Flush-Flo™	0.559	9.2	Mean Flow over Head Range	-	8.2

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


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.6	0.800	8.9	2.000	9.5	4.000	13.2	7.000	17.2
0.200	7.8	1.000	8.3	2.200	9.9	4.500	13.9	7.500	17.8
0.300	8.6	1.200	7.5	2.400	10.3	5.000	14.7	8.000	18.4
0.400	9.0	1.400	8.0	2.600	10.7	5.500	15.3	8.500	18.9
0.500	9.2	1.600	8.5	3.000	11.5	6.000	16.0	9.000	19.4
0.600	9.2	1.800	9.0	3.500	12.4	6.500	16.6	9.500	19.9

Hydro-Brake® Optimum Manhole: S22, DS/PN: S4.003, Volume (m<sup>3</sup>): 64.9

Unit Reference MD-SHE-0041-1000-1800-1000  
Design Head (m) 1.800  
Design Flow (l/s) 1.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 41  
Invert Level (m) 27.496  
Minimum Outlet Pipe Diameter (mm) 75  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	1.0	Kick-Flo®	0.362	0.5
Flush-Flo™	0.178	0.6	Mean Flow over Head Range	-	0.7

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

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Hydro-Brake® Optimum Manhole: S22, DS/PN: S4.003, Volume (m³): 64.9

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.6	0.800	0.7	2.000	1.0	4.000	1.4	7.000	1.9
0.200	0.6	1.000	0.8	2.200	1.1	4.500	1.5	7.500	1.9
0.300	0.6	1.200	0.8	2.400	1.1	5.000	1.6	8.000	2.0
0.400	0.5	1.400	0.9	2.600	1.2	5.500	1.7	8.500	2.0
0.500	0.6	1.600	0.9	3.000	1.3	6.000	1.7	9.000	2.1
0.600	0.6	1.800	1.0	3.500	1.3	6.500	1.8	9.500	2.1

Hydro-Brake® Optimum Manhole: S25, DS/PN: S1.011, Volume (m³): 3.2


Unit Reference MD-SHE-0155-1150-1000-1150  
Design Head (m) 1.000  
Design Flow (l/s) 11.5  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 155  
Invert Level (m) 27.206  
Minimum Outlet Pipe Diameter (mm) 225  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	11.5	Kick-Flo®	0.686	9.6
Flush-Flo™	0.311	11.5	Mean Flow over Head Range	-	9.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.6	0.800	10.3	2.000	15.9	4.000	22.2	7.000	29.1
0.200	11.1	1.000	11.5	2.200	16.7	4.500	23.5	7.500	30.0
0.300	11.5	1.200	12.5	2.400	17.4	5.000	24.7	8.000	31.0
0.400	11.4	1.400	13.5	2.600	18.1	5.500	25.9	8.500	31.9
0.500	11.1	1.600	14.3	3.000	19.3	6.000	27.0	9.000	32.8
0.600	10.6	1.800	15.2	3.500	20.8	6.500	28.0	9.500	33.7



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Storage Structures for Storm

Cellular Storage Manhole: S2, DS/PN: S1.002

Invert Level (m) 29.850 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	750.0	0.0	0.900	750.0	0.0	0.901	0.0	0.0

Porous Car Park Manhole: S6, DS/PN: S1.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 15.0  
 Membrane Percolation (mm/hr) 1000 Length (m) 191.0  
 Max Percolation (l/s) 795.8 Slope (1:X) 100.0  
 Safety Factor 2.0 Depression Storage (mm) 5  
 Porosity 0.30 Evaporation (mm/day) 3  
 Invert Level (m) 31.150 Membrane Depth (mm) 400

Porous Car Park Manhole: S7, DS/PN: S2.000

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 15.0  
 Membrane Percolation (mm/hr) 1000 Length (m) 82.0  
 Max Percolation (l/s) 341.7 Slope (1:X) 60.0  
 Safety Factor 2.0 Depression Storage (mm) 5  
 Porosity 0.30 Evaporation (mm/day) 3  
 Invert Level (m) 29.200 Membrane Depth (mm) 400

Bio-Retention Area Pipe: S2.001

Manning's N 0.050 Infiltration Coefficient Base (m/hr) 0.00000  
 Invert Level (m) 28.191 Infiltration Coefficient Side (m/hr) 0.00000  
 Porosity 1.00 Safety Factor 2.0

Under Drain Details

Base Area (m<sup>2</sup>) 36.0 Depth above Invert Level (m) 0.000 Manning's N 0.075  
 Base Perimeter (m) 26.500 Diameter (m) 0.450  
 Top Area (m<sup>2</sup>) 36.0 Number of Pipes 1


Porous Car Park Manhole: S9, DS/PN: S3.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 15.0  
 Membrane Percolation (mm/hr) 1000 Length (m) 75.4  
 Max Percolation (l/s) 314.2 Slope (1:X) 80.0  
 Safety Factor 2.0 Depression Storage (mm) 5  
 Porosity 0.30 Evaporation (mm/day) 3  
 Invert Level (m) 29.300 Membrane Depth (mm) 400

Cellular Storage Manhole: S10, DS/PN: S3.004

Invert Level (m) 28.554 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	0.0	0.600	300.0	0.0	0.601	0.0	0.0

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Cellular Storage Manhole: S8, DS/PN: S1.007

Invert Level (m) 27.984 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	35.0	0.0	1.200	35.0	0.0	1.201	0.0	0.0

Cellular Storage Pipe: S4.001

Manning's N 0.050 Infiltration Coefficient Side (m/hr) 0.00000  
 Invert Level (m) 27.771 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	75.0	0.0	0.900	75.0	0.0	0.901	0.0	0.0

Cellular Storage Pipe: S4.002

Manning's N 0.050 Infiltration Coefficient Side (m/hr) 0.00000  
 Invert Level (m) 27.571 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	75.0	0.0	0.900	75.0	0.0	0.901	0.0	0.0


Cellular Storage Pipe: S4.003

Manning's N 0.050 Infiltration Coefficient Side (m/hr) 0.00000  
 Invert Level (m) 27.496 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	50.0	0.0	0.225	50.0	0.0	0.226	0.0	0.0

Porous Car Park Manhole: S24, DS/PN: S1.010

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 9.5  
 Membrane Percolation (mm/hr) 1000 Length (m) 222.0  
 Max Percolation (l/s) 585.8 Slope (1:X) 150.0  
 Safety Factor 2.0 Depression Storage (mm) 5  
 Porosity 0.30 Evaporation (mm/day) 3  
 Invert Level (m) 27.650 Membrane Depth (mm) 400

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0 MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0 Inlet Coefficient 0.800  
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0  
Number of Online Controls 5 Number of Storage Structures 11 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750  
Region England and Wales Ratio R 0.450 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status ON  
DVD Status ON  
Inertia Status ON

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440  
Return Period(s) (years) 1, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	1	+0%	100/15 Summer				30.381	-0.319
S1.001	S2	15 Winter	1	+0%	30/15 Summer				30.286	-0.244
S1.002	S2	180 Winter	1	+0%	1/15 Summer				29.996	0.546
S1.003	S6	120 Winter	1	+0%	100/30 Winter				28.720	-0.380
S1.004	S6	15 Winter	1	+0%	100/30 Summer				28.655	-0.346
S1.005	S6	15 Winter	1	+0%	30/180 Winter				28.538	-0.381
S2.000	S7	240 Winter	1	+0%	30/60 Winter				28.343	-0.428
S2.001	S7	240 Winter	1	+0%					28.343	-2.657
S2.002	S7	240 Winter	1	+0%	30/30 Summer				28.343	-0.184
S1.006	S7	240 Winter	1	+0%	30/15 Winter				28.344	-0.140
S3.000	S3	15 Winter	1	+0%	100/15 Summer				29.103	-0.347
S3.001	S4	15 Winter	1	+0%	100/15 Summer				28.951	-0.303
S3.002	S9	15 Winter	1	+0%	100/15 Summer				28.902	-0.294
S3.003	S9	15 Winter	1	+0%	100/15 Summer				28.788	-0.288
S3.004	S10	360 Winter	1	+0%	30/360 Winter				28.720	-0.280
S1.007	S8	240 Winter	1	+0%	1/15 Winter				28.340	0.131
S1.008	S9	240 Winter	1	+0%					27.830	-0.150
S1.009	S17	240 Winter	1	+0%	100/120 Winter				27.644	-0.160
S4.000	S19	15 Winter	1	+0%					29.552	-0.173
S4.001	S20	15 Winter	1	+0%	100/1440 Winter				27.785	-0.887
S4.002	S21	960 Winter	1	+0%	100/960 Winter				27.746	-0.726
S4.003	S22	960 Winter	1	+0%	1/360 Winter				27.746	0.024
S1.010	S24	60 Winter	1	+0%	30/60 Winter				27.417	-0.124
S1.011	S25	60 Winter	1	+0%	30/15 Summer				27.400	-0.031
S1.012	S25	60 Winter	1	+0%					26.889	-0.136
S1.013	S26	60 Winter	1	+0%					26.823	-0.142
S1.014	S27	60 Winter	1	+0%					26.550	-0.171
S1.015	S28	60 Winter	1	+0%					25.983	-0.142
S1.016	S29	60 Winter	1	+0%					25.748	-0.141

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Flow (l/s)			
S1.000	S1	0.000	0.18	33.1		OK	
S1.001	S2	0.000	0.42	74.3		OK	
S1.002	S2	0.000	0.03	5.2		SURCHARGED	
S1.003	S6	0.000	0.06	8.6		OK	
S1.004	S6	0.000	0.12	17.8		OK	
S1.005	S6	0.000	0.06	21.1		OK	
S2.000	S7	0.000	0.00	0.1		OK	
S2.001	S7	0.000	0.00	2.1		OK	
S2.002	S7	0.000	0.01	1.1		OK	
S1.006	S7	0.000	0.07	10.0		OK	
S3.000	S3	0.000	0.12	22.3		OK	
S3.001	S4	0.000	0.23	36.2		OK	
S3.002	S9	0.000	0.26	46.4		OK	
S3.003	S9	0.000	0.28	46.3		OK	
S3.004	S10	0.000	0.00	1.5		OK	
S1.007	S8	0.000	0.24	8.9		SURCHARGED	
S1.008	S9	0.000	0.25	8.9		OK	
S1.009	S17	0.000	0.18	8.9		OK	
S4.000	S19	0.000	0.12	4.5		OK	
S4.001	S20	0.000	0.01	5.1		OK	
S4.002	S21	0.000	0.00	1.6		OK	
S4.003	S22	0.000	0.01	0.6		SURCHARGED	
S1.010	S24	0.000	0.26	9.2		OK	
S1.011	S25	0.000	0.15	11.0		OK	
S1.012	S25	0.000	0.33	11.0		OK	
S1.013	S26	0.000	0.29	11.0		OK	
S1.014	S27	0.000	0.13	11.0		OK	
S1.015	S28	0.000	0.29	11.0		OK	
S1.016	S29	0.000	0.30	11.0		OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coefficient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 5    Number of Storage Structures 11    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model    FSR M5-60 (mm) 19.000 Cv (Summer) 0.750  
Region England and Wales    Ratio R 0.450 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)    300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status    ON  
DVD Status    ON  
Inertia Status    ON

Profile(s)    Summer and Winter  
Duration(s) (mins)    15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	30	+0%	100/15 Summer				30.647	-0.053
S1.001	S2	15 Winter	30	+0%	30/15 Summer				30.570	0.040
S1.002	S2	240 Winter	30	+0%	1/15 Summer				30.287	0.837
S1.003	S6	360 Winter	30	+0%	100/30 Winter				28.996	-0.104
S1.004	S6	360 Winter	30	+0%	100/30 Summer				28.992	-0.009
S1.005	S6	360 Winter	30	+0%	30/180 Winter				28.969	0.050
S2.000	S7	360 Winter	30	+0%	30/60 Winter				28.965	0.194
S2.001	S7	360 Winter	30	+0%					28.965	-2.035
S2.002	S7	360 Winter	30	+0%	30/30 Summer				28.965	0.438
S1.006	S7	360 Winter	30	+0%	30/15 Winter				28.971	0.487
S3.000	S3	15 Winter	30	+0%	100/15 Summer				29.168	-0.282
S3.001	S4	15 Winter	30	+0%	100/15 Summer				29.070	-0.184
S3.002	S9	15 Winter	30	+0%	100/15 Summer				29.030	-0.166
S3.003	S9	480 Winter	30	+0%	100/15 Summer				29.010	-0.066
S3.004	S10	480 Winter	30	+0%	30/360 Winter				29.009	0.009
S1.007	S8	360 Winter	30	+0%	1/15 Winter				28.962	0.753
S1.008	S9	360 Summer	30	+0%					27.831	-0.149
S1.009	S17	720 Winter	30	+0%	100/120 Winter				27.645	-0.159
S4.000	S19	15 Winter	30	+0%					29.583	-0.142
S4.001	S20	1440 Winter	30	+0%	100/1440 Winter				28.030	-0.642
S4.002	S21	1440 Winter	30	+0%	100/960 Winter				28.031	-0.441
S4.003	S22	1440 Winter	30	+0%	1/360 Winter				28.031	0.309
S1.010	S24	60 Winter	30	+0%	30/60 Winter				27.543	0.002
S1.011	S25	30 Summer	30	+0%	30/15 Summer				27.547	0.116
S1.012	S25	600 Winter	30	+0%					26.890	-0.135
S1.013	S26	600 Winter	30	+0%					26.824	-0.141
S1.014	S27	600 Winter	30	+0%					26.550	-0.171
S1.015	S28	600 Winter	30	+0%					25.984	-0.141
S1.016	S29	600 Winter	30	+0%					25.749	-0.140

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Flow (l/s)			
S1.000	S1	0.000	0.41		74.7	OK	
S1.001	S2	0.000	1.06		187.1	SURCHARGED	
S1.002	S2	0.000	0.03		5.9	SURCHARGED	
S1.003	S6	0.000	0.08		11.9	OK	
S1.004	S6	0.000	0.11		16.7	OK	
S1.005	S6	0.000	0.05		17.7	SURCHARGED	
S2.000	S7	0.000	0.01		1.0	SURCHARGED	
S2.001	S7	0.000	0.00		3.6	OK	
S2.002	S7	0.000	0.03		3.9	SURCHARGED	
S1.006	S7	0.000	0.14		19.5	SURCHARGED	
S3.000	S3	0.000	0.29		54.8	OK	
S3.001	S4	0.000	0.60		94.4	OK	
S3.002	S9	0.000	0.70		125.9	OK	
S3.003	S9	0.000	0.07		12.1	OK	
S3.004	S10	0.000	0.00		1.6	SURCHARGED	
S1.007	S8	0.000	0.25		9.2	SURCHARGED	
S1.008	S9	0.000	0.25		9.2	OK	
S1.009	S17	0.000	0.19		9.2	OK	
S4.000	S19	0.000	0.29		11.2	OK	
S4.001	S20	0.000	0.00		2.4	OK	
S4.002	S21	0.000	0.00		1.9	OK	
S4.003	S22	0.000	0.01		0.7	SURCHARGED	
S1.010	S24	0.000	0.31		11.0	SURCHARGED	
S1.011	S25	0.000	0.15		11.2	SURCHARGED	
S1.012	S25	0.000	0.34		11.3	OK	
S1.013	S26	0.000	0.30		11.3	OK	
S1.014	S27	0.000	0.13		11.3	OK	
S1.015	S28	0.000	0.30		11.3	OK	
S1.016	S29	0.000	0.31		11.3	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coefficient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 5    Number of Storage Structures 11    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model    FSR M5-60 (mm) 19.000 Cv (Summer) 0.750  
Region England and Wales    Ratio R 0.450 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)    300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status    ON  
DVD Status    ON  
Inertia Status    ON

Profile(s)    Summer and Winter  
Duration(s) (mins)    15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	480 Winter	100	+40%	100/15 Summer				31.826	1.126
S1.001	S2	480 Winter	100	+40%	30/15 Summer				31.826	1.296
S1.002	S2	480 Winter	100	+40%	1/15 Summer				31.824	2.374
S1.003	S6	600 Winter	100	+40%	100/30 Winter				29.923	0.823
S1.004	S6	600 Winter	100	+40%	100/30 Summer				29.917	0.916
S1.005	S6	600 Winter	100	+40%	30/180 Winter				29.916	0.997
S2.000	S7	600 Winter	100	+40%	30/60 Winter				29.879	1.108
S2.001	S7	600 Winter	100	+40%					29.888	-1.112
S2.002	S7	600 Winter	100	+40%	30/30 Summer				29.888	1.361
S1.006	S7	600 Winter	100	+40%	30/15 Winter				29.915	1.431
S3.000	S3	960 Winter	100	+40%	100/15 Summer				30.055	0.605
S3.001	S4	960 Winter	100	+40%	100/15 Summer				30.055	0.801
S3.002	S9	960 Winter	100	+40%	100/15 Summer				30.055	0.859
S3.003	S9	960 Winter	100	+40%	100/15 Summer				30.054	0.978
S3.004	S10	720 Winter	100	+40%	30/360 Winter				30.096	1.096
S1.007	S8	600 Winter	100	+40%	1/15 Winter				29.931	1.722
S1.008	S9	180 Winter	100	+40%					27.845	-0.135
S1.009	S17	180 Winter	100	+40%	100/120 Winter				27.820	0.016
S4.000	S19	15 Winter	100	+40%					29.617	-0.108
S4.001	S20	1440 Winter	100	+40%	100/1440 Winter				28.804	0.132
S4.002	S21	1440 Winter	100	+40%	100/960 Winter				28.808	0.336
S4.003	S22	1440 Winter	100	+40%	1/360 Winter				28.812	1.090
S1.010	S24	180 Winter	100	+40%	30/60 Winter				27.799	0.258
S1.011	S25	180 Winter	100	+40%	30/15 Summer				27.779	0.348
S1.012	S25	1440 Winter	100	+40%					26.890	-0.135
S1.013	S26	1440 Winter	100	+40%					26.824	-0.141
S1.014	S27	1440 Winter	100	+40%					26.550	-0.171
S1.015	S28	1440 Winter	100	+40%					25.984	-0.141
S1.016	S29	1440 Winter	100	+40%					25.749	-0.140

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Flow (l/s)			
S1.000	S1	0.000	0.08	14.1		SURCHARGED	
S1.001	S2	0.000	0.20	34.7		SURCHARGED	
S1.002	S2	0.000	0.03	7.2		FLOOD RISK	
S1.003	S6	0.000	0.09	14.3		SURCHARGED	
S1.004	S6	0.000	0.12	18.4		SURCHARGED	
S1.005	S6	0.000	0.06	20.5		SURCHARGED	
S2.000	S7	0.000	0.02	3.0		FLOOD RISK	
S2.001	S7	0.000	0.00	5.5		OK	
S2.002	S7	0.000	0.06	8.8		SURCHARGED	
S1.006	S7	0.000	0.13	17.7		SURCHARGED	
S3.000	S3	0.000	0.03	5.4		SURCHARGED	
S3.001	S4	0.000	0.06	9.4		SURCHARGED	
S3.002	S9	0.000	0.07	12.6		SURCHARGED	
S3.003	S9	0.000	0.08	12.6		FLOOD RISK	
S3.004	S10	0.000	0.00	1.6		FLOOD RISK	
S1.007	S8	0.000	0.25	9.3		FLOOD RISK	
S1.008	S9	0.000	0.25	9.2		OK	
S1.009	S17	0.000	0.19	9.2		SURCHARGED	
S4.000	S19	0.000	0.53	20.3		OK	
S4.001	S20	0.000	0.09	49.4		SURCHARGED	
S4.002	S21	0.000	0.02	15.6		SURCHARGED	
S4.003	S22	0.000	0.01	1.0		SURCHARGED	
S1.010	S24	0.000	0.31	10.9		SURCHARGED	
S1.011	S25	0.000	0.15	11.3		SURCHARGED	
S1.012	S25	0.000	0.34	11.3		OK	
S1.013	S26	0.000	0.30	11.3		OK	
S1.014	S27	0.000	0.13	11.3		OK	
S1.015	S28	0.000	0.30	11.3		OK	
S1.016	S29	0.000	0.31	11.3		OK	



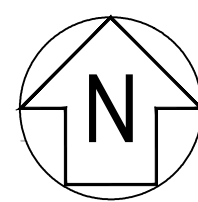
**APPENDIX B**  
**DRAWINGS**

T20\_2275\_55\_01 – Rev P3 Proposed Drainage Layout

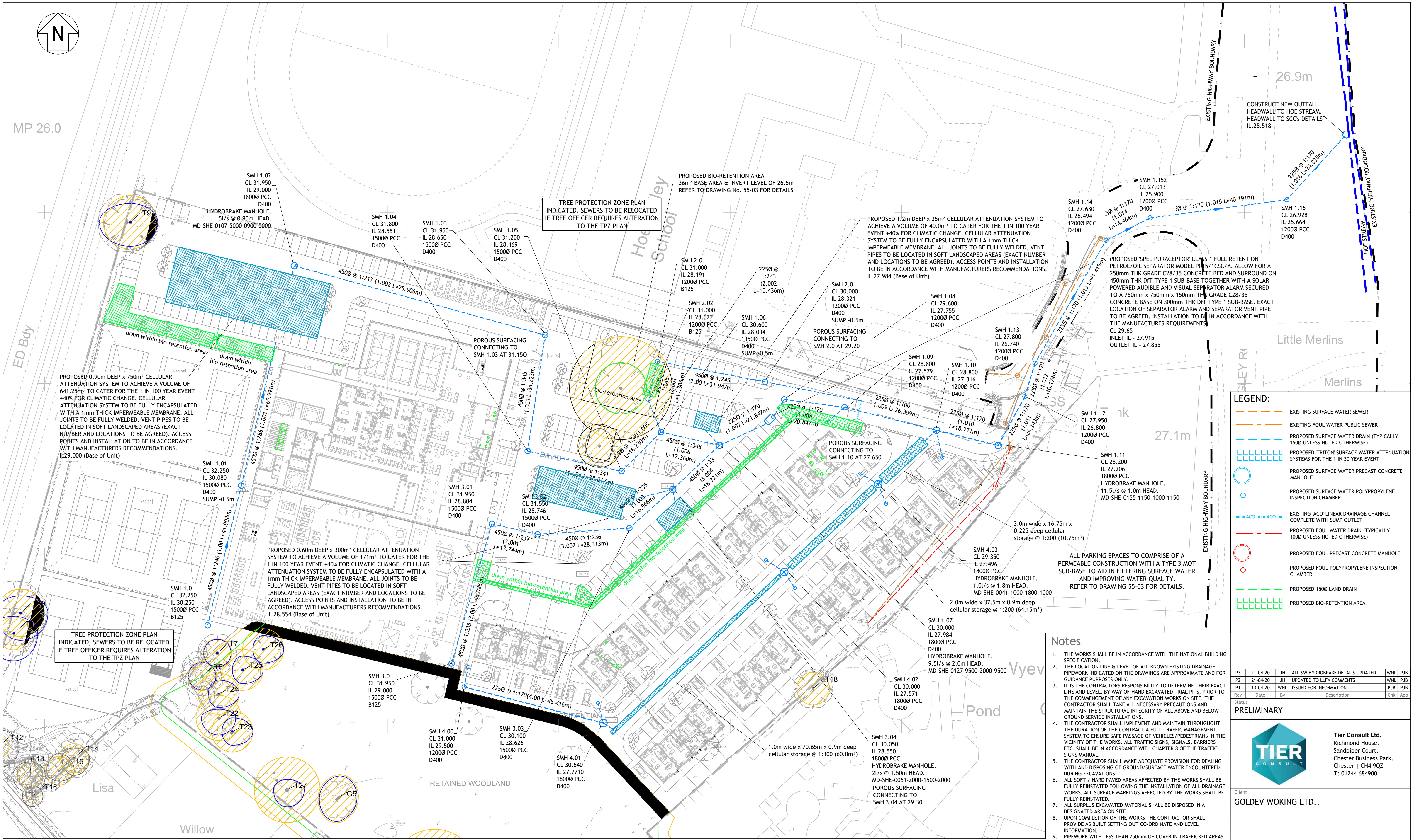
T20\_2275\_55\_02 – Rev P2 Proposed Impermeable Area

T20\_2275\_55\_03 – Rev P2 SUDS Construction Detail





MP 26.0



TREE PROTECTION ZONE PLAN INDICATED, SEWERS TO BE RELOCATED IF TREE OFFICER REQUIRES ALTERATION TO THE TPZ PLAN

PROPOSED BIO-RETENTION AREA 36m² BASE AREA & INVERT LEVEL OF 26.5m REFER TO DRAWING No. 55-03 FOR DETAILS

PROPOSED 1.2m DEEP x 35m² CELLULAR ATTENUATION SYSTEM TO ACHIEVE A VOLUME OF 40.0m³ TO CATER FOR THE 1 IN 100 YEAR EVENT +40% FOR CLIMATIC CHANGE. CELLULAR ATTENUATION SYSTEM TO BE FULLY ENCAPSULATED WITH A 1mm THICK IMPERMEABLE MEMBRANE. ALL JOINTS TO BE FULLY WELDED. VENT PIPES TO BE LOCATED IN SOFT LANDSCAPED AREAS (EXACT NUMBER AND LOCATIONS TO BE AGREED). ACCESS POINTS AND INSTALLATION TO BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. IL 27.984 (Base of Unit)

PROPOSED 'SPEL PURACEPTOR' CLASS 1 FULL RETENTION PETROL/OIL SEPARATOR MODEL P05/1CSC/A. ALLOW FOR A 250mm THK GRADE C28/35 CONCRETE BED AND SURROUND ON 450mm THK DIT TYPE 1 SUB-BASE TOGETHER WITH A SOLAR POWERED AUDIBLE AND VISUAL SEPARATOR ALARM SECURED TO A 750mm x 750mm THK GRADE C28/35 CONCRETE BASE ON 300mm THK DIT TYPE 1 SUB-BASE. EXACT LOCATION OF SEPARATOR ALARM AND SEPARATOR VENT PIPE TO BE AGREED. INSTALLATION TO BE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS. CL 29.65 INLET IL - 27.915 OUTLET IL - 27.855

PROPOSED 0.90m DEEP x 750m² CELLULAR ATTENUATION SYSTEM TO ACHIEVE A VOLUME OF 641.25m³ TO CATER FOR THE 1 IN 100 YEAR EVENT +40% FOR CLIMATIC CHANGE. CELLULAR ATTENUATION SYSTEM TO BE FULLY ENCAPSULATED WITH A 1mm THICK IMPERMEABLE MEMBRANE. ALL JOINTS TO BE FULLY WELDED. VENT PIPES TO BE LOCATED IN SOFT LANDSCAPED AREAS (EXACT NUMBER AND LOCATIONS TO BE AGREED). ACCESS POINTS AND INSTALLATION TO BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. IL29.000 (Base of Unit)

PROPOSED 0.60m DEEP x 300m² CELLULAR ATTENUATION SYSTEM TO ACHIEVE A VOLUME OF 171m³ TO CATER FOR THE 1 IN 100 YEAR EVENT +40% FOR CLIMATIC CHANGE. CELLULAR ATTENUATION SYSTEM TO BE FULLY ENCAPSULATED WITH A 1mm THICK IMPERMEABLE MEMBRANE. ALL JOINTS TO BE FULLY WELDED. VENT PIPES TO BE LOCATED IN SOFT LANDSCAPED AREAS (EXACT NUMBER AND LOCATIONS TO BE AGREED). ACCESS POINTS AND INSTALLATION TO BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. IL 28.554 (Base of Unit)

ALL PARKING SPACES TO COMPRISE OF A PERMEABLE CONSTRUCTION WITH A TYPE 3 MOT SUB-BASE TO AID IN FILTERING SURFACE WATER AND IMPROVING WATER QUALITY. REFER TO DRAWING 55-03 FOR DETAILS.

**LEGEND:**

- EXISTING SURFACE WATER SEWER
- EXISTING FOUL WATER PUBLIC SEWER
- PROPOSED SURFACE WATER DRAIN (TYPICALLY 1500 UNLESS NOTED OTHERWISE)
- PROPOSED 'TRITON' SURFACE WATER ATTENUATION SYSTEMS FOR THE 1 IN 30 YEAR EVENT
- PROPOSED SURFACE WATER PRECAST CONCRETE MANHOLE
- PROPOSED SURFACE WATER POLYPROPYLENE INSPECTION CHAMBER
- EXISTING 'ACO' LINEAR DRAINAGE CHANNEL COMPLETE WITH SUMP OUTLET
- PROPOSED FOUL WATER DRAIN (TYPICALLY 1000 UNLESS NOTED OTHERWISE)
- PROPOSED FOUL PRECAST CONCRETE MANHOLE
- PROPOSED FOUL POLYPROPYLENE INSPECTION CHAMBER
- PROPOSED 1500 LAND DRAIN
- PROPOSED BIO-RETENTION AREA

- Notes**
- THE WORKS SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING SPECIFICATION.
  - THE LOCATION LINE & LEVEL OF ALL KNOWN EXISTING DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY.
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  - ALL SURPLUS EXCAVATED MATERIAL SHALL BE DISPOSED IN A DESIGNATED AREA ON SITE.
  - UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL PROVIDE AS BUILT SETTING OUT CO-ORDINATE AND LEVEL INFORMATION.
  - PIPEWORK WITH LESS THAN 750mm OF COVER IN TRAFFICKED AREAS TO BE CONCRETE ENCASED. (BEDDING CLASS 2)
  - PIPEWORK WITH MORE THAN 750mm OF COVER TO HAVE CLASS S GRANULAR BED AND SUBGROUND.
  - THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATION.
  - IT IS THE CONTRACTORS RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.
  - THIS DRAWING IS THE COPYRIGHT OF TIER CONSULT LTD AND CANNOT BE REPRODUCED IN ANY FORM WITHOUT WRITTEN CONSENT FROM THE COMPANY.
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  - ALL LEVELS ARE IN METRES UNO & TO OS DATUM.

P3	21-04-20	JH	ALL SW HYDROBRAKE DETAILS UPDATED	WNL	PJB
P2	21-04-20	JH	UPDATED TO LFLA COMMENTS	WNL	PJB
P1	13-04-20	WNL	ISSUED FOR INFORMATION	PJB	PJB

**PRELIMINARY**

**Tier Consult Ltd.**  
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Chester | CH4 9QZ  
T: 01244 684900

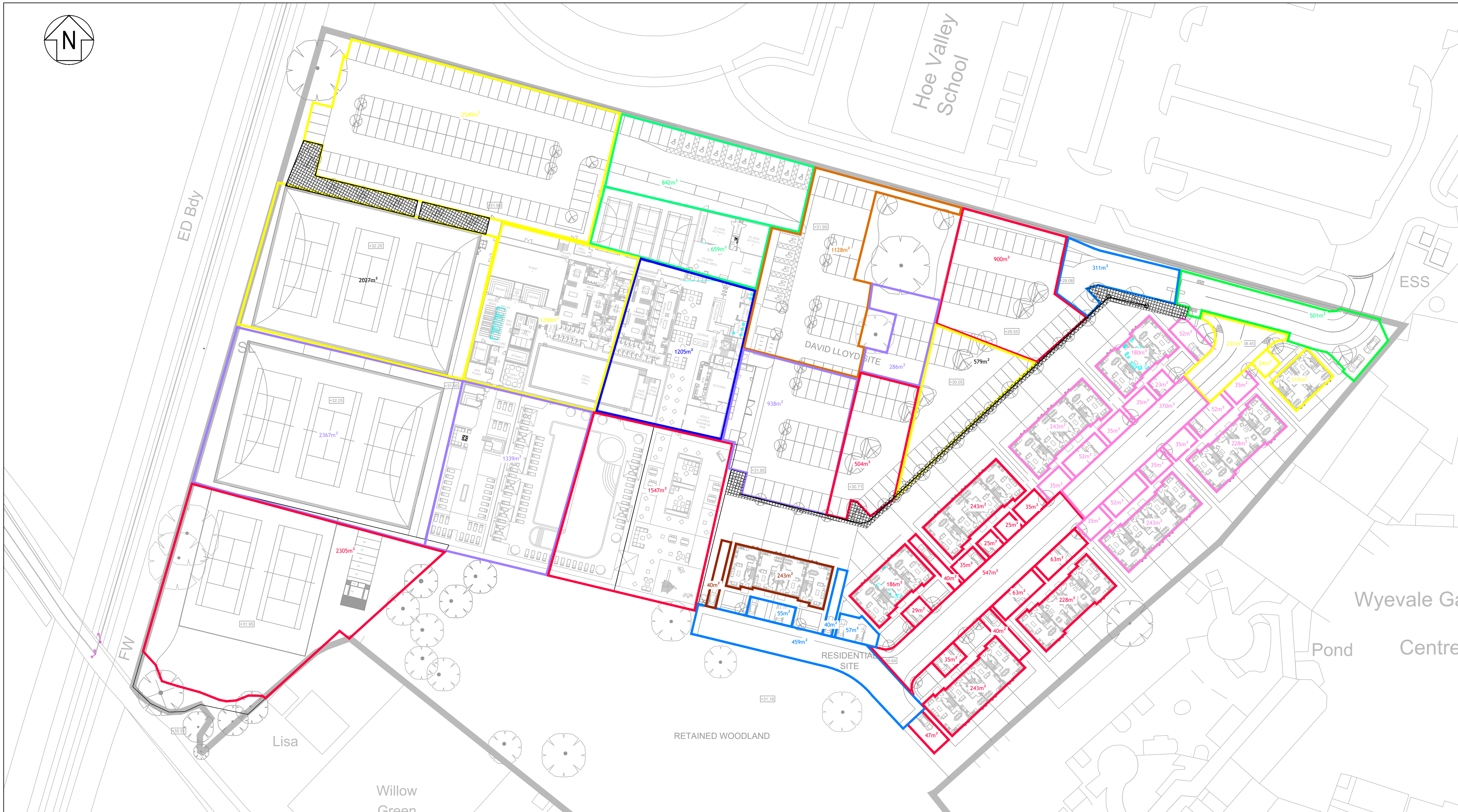
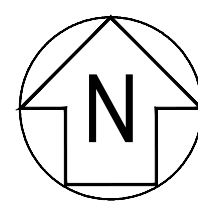
Client: **GOLDEV WOKING LTD.,**

Project: **EGLEY ROAD, WOKING**

Title: **PROPOSED DRAINAGE STRATEGY**

Scale: 1:500@A1	Drawn: WNL	Revision: P3
Date: APRIL 2020	Checked: DRL	
Drawing No: T_18_2275 55-01		





**Notes**

1. THE WORKS SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING SPECIFICATION.
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10. PIPEWORK WITH MORE THAN 750mm OF COVER TO HAVE CLASS 5 GRANULAR BED AND SURROUND.
11. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.
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15. ALL LEVELS ARE IN METRES UNO & TO OS DATUM.

P2	20-04-20	JH	LLFA COMMENTS INCORPORATED	WNL	PJB
P1	13-04-20	WNL	ISSUED FOR INFORMATION	PJB	PJB
Rev	Date	By	Description	Clk	App

PRELIMINARY



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 Sandpiper Court,  
 Chester Business Park,  
 Chester | CH4 9QZ  
 T: 01244 684900

Client  
**GOLDEV DEVELOPMENTS**

Project  
**EGLEY ROAD,  
 WOKING**

Title  
**PROPOSED IMPERMEABLE AREAS PLAN**

Scale  
**1:500@A1**

Drawn  
**WNL**

Date  
**APRIL 2020**

Checked  
**DRL**

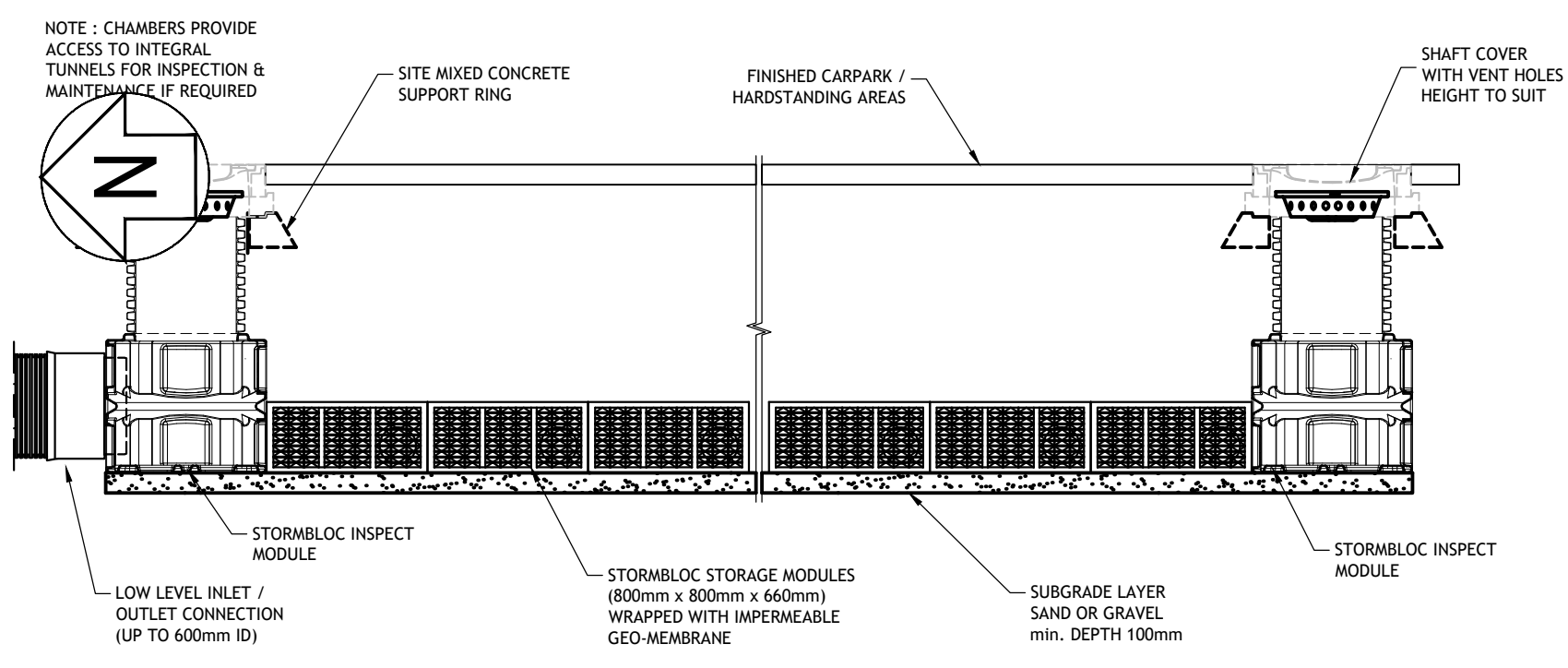
Revision  
**P2**

Drawing No :  
**T\_18\_2275 55-02**

PIPE REF:	LIS MH REF:	IMPERMEABLE AREA
1.000	SMH 1.0	2305
1.001	SM 1.01	3706
1.002	SMH 1.02	5917
1.003	SMH 1.03	1501
1.004	SMH 1.04	1128
1.005	SMH 1.05	286
2.000	SMH 2.0	311
2.001	SMH 2.01	900
2.002	SMH 2.02	-
1.006	SMH 1.06	-
3.000	SH 3.0	1547
3.001	SMH 3.01	1205
3.002	SMH 3.02	938
3.003	SMH 3.03	-
3.004	SMH 3.04	480
1.007	SMH 1.07	-
1.008	SMH 1.08	-
1.009	SMH 1.09	-
4.000	SMH 4.0	283
4.001	SMH 4.01	621
4.002	SMH 4.02	1919
4.003	SMH 4.03	1740
4.004	SMH 4.04	372
1.010	SMH 1.10	501
1.011	SMH 1.11	-
1.012	SMH 1.12	-
1.013	SMH 1.13	-
1.014	SMH 1.14	-
1.015	SMH 1.15	-
<b>TOTAL AREA</b>		<b>= 29684m²</b>

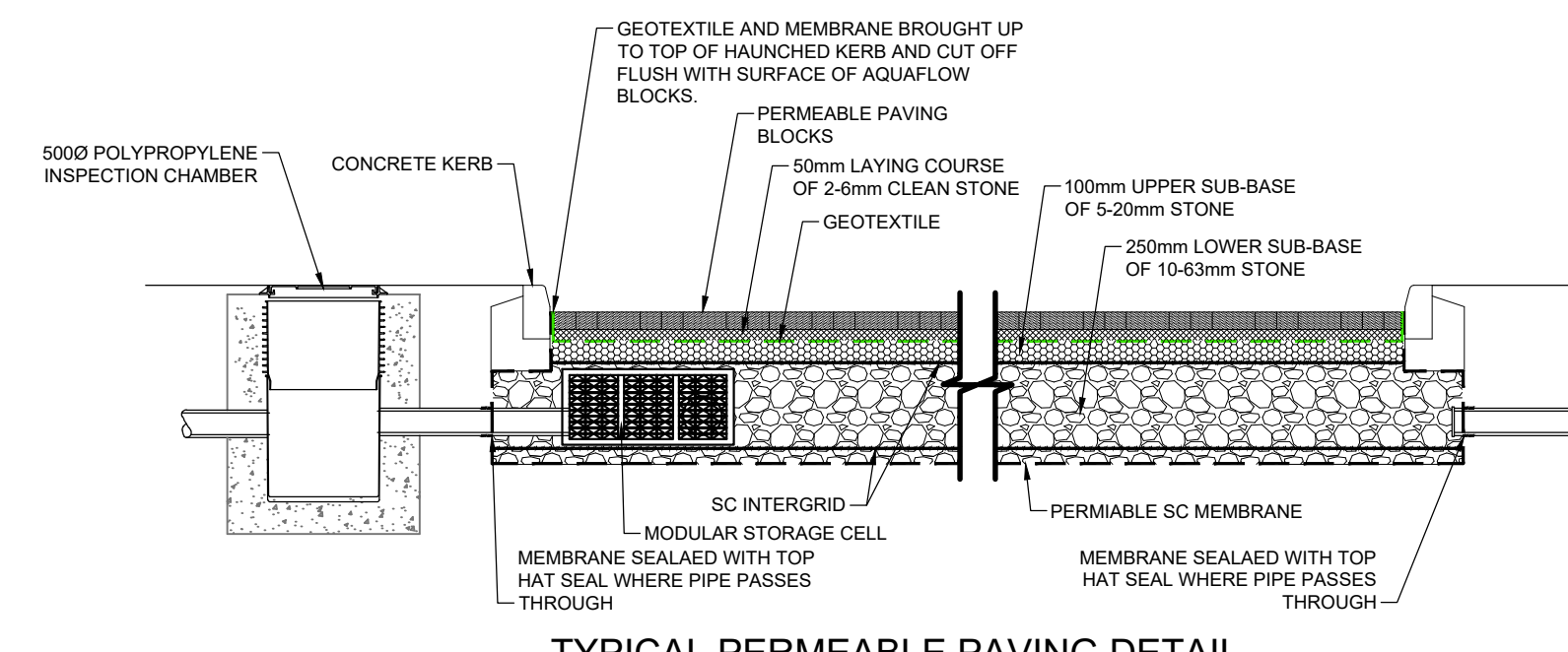
10% ADDED TO IMPERMEABLE AREAS OF RESIDENTIAL DEMISE IN MICRODRAINAGE CALCULATIONS FOR URBAN CREEP





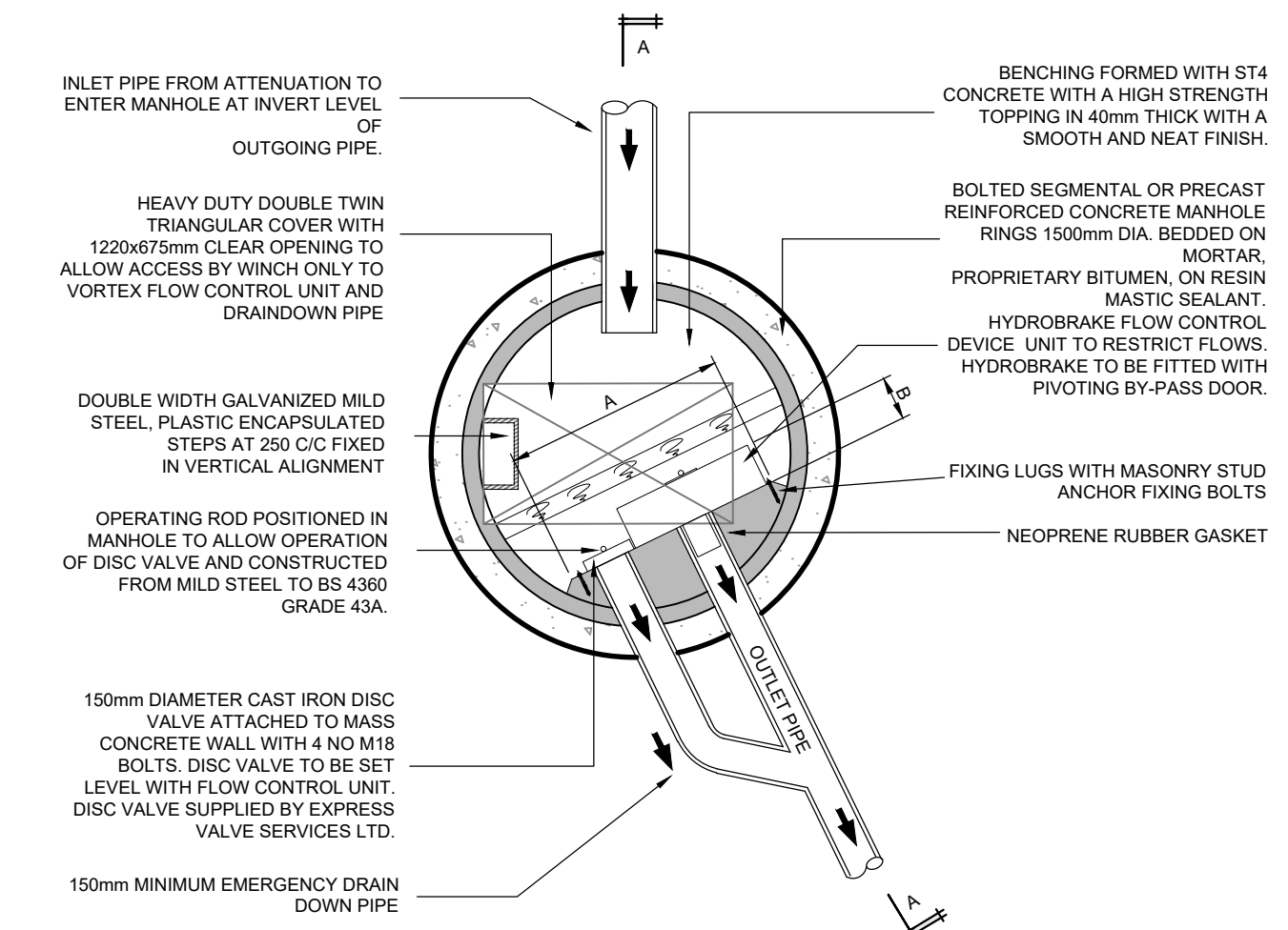
TYPICAL SECTION THROUGH STORMBLOC UNIT

Scale 1:25



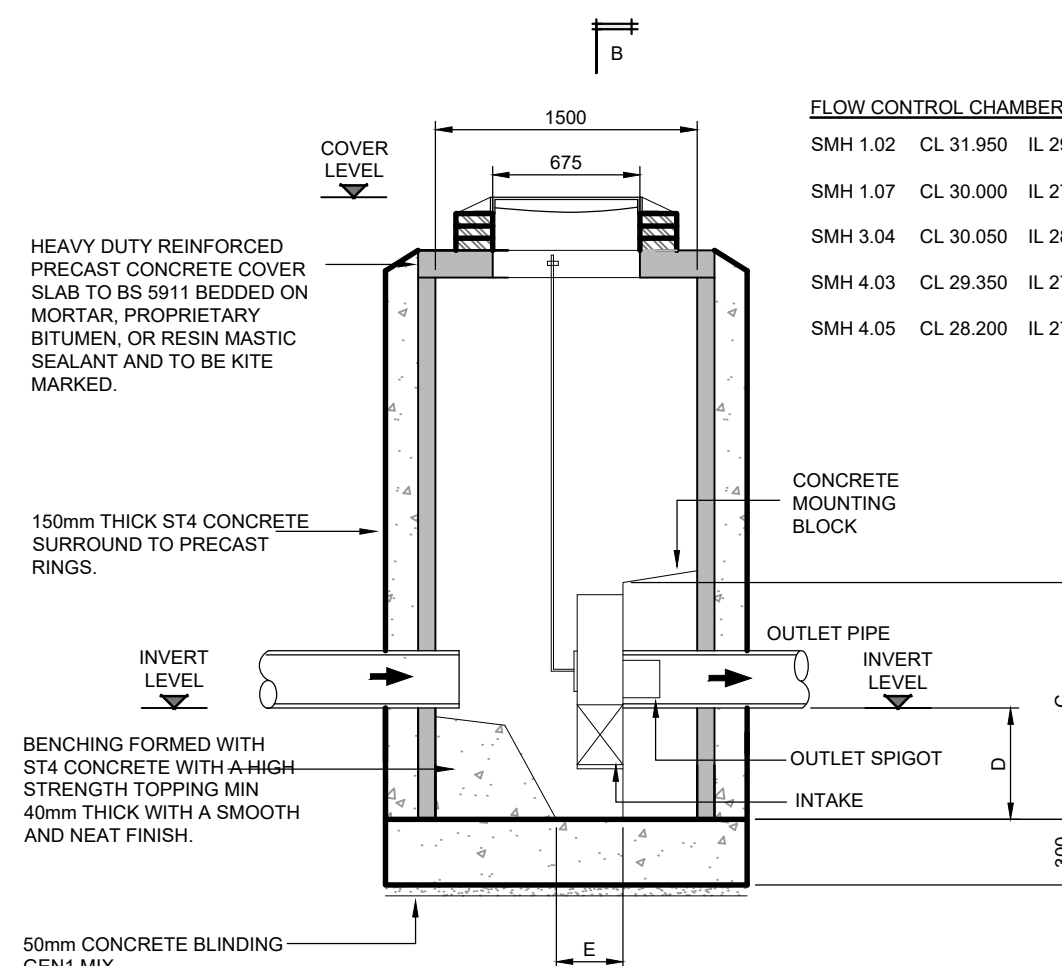
TYPICAL PERMEABLE PAVING DETAIL

SCALE 1:25



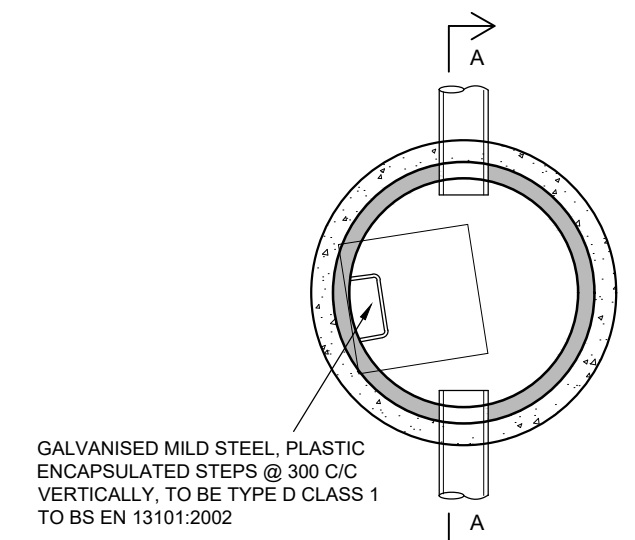
TYPICAL HYDROBRAKE CHAMBER

SCALE 1:25



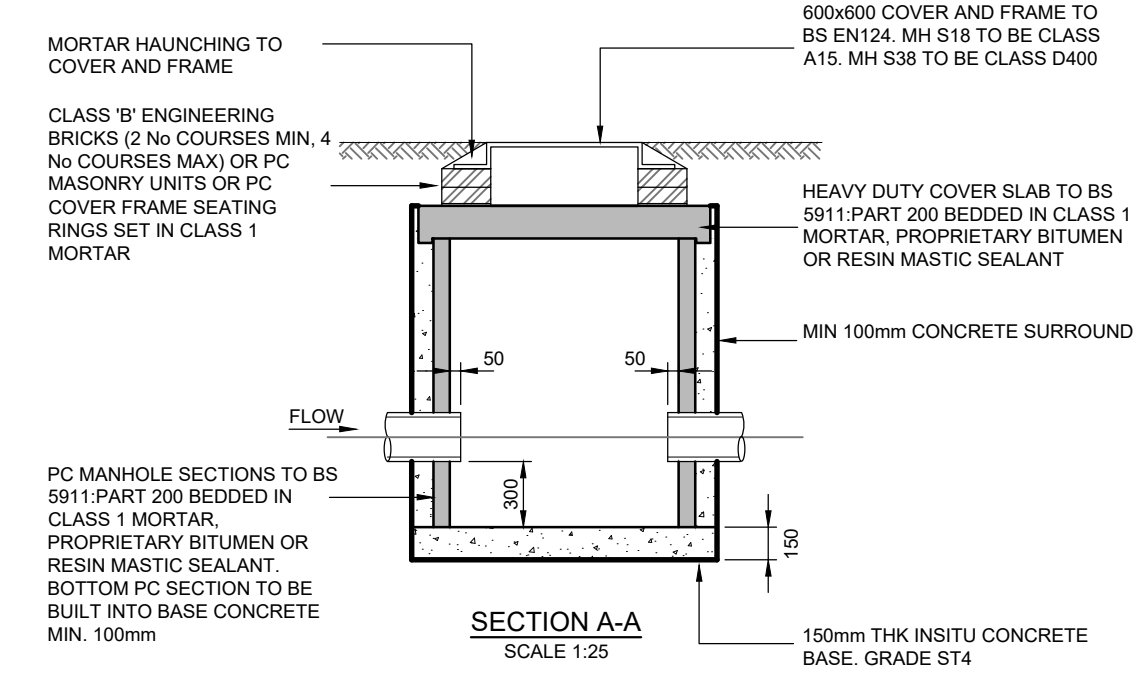
SECTION A-A

SCALE 1:25



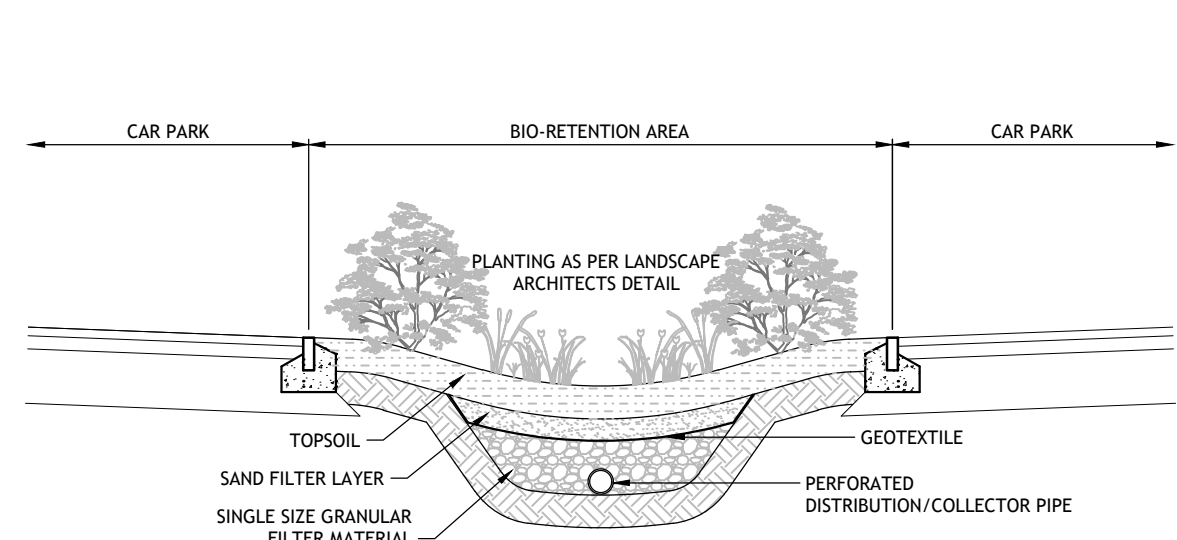
TYPICAL CATCHPIT DETAIL

SCALE 1:25



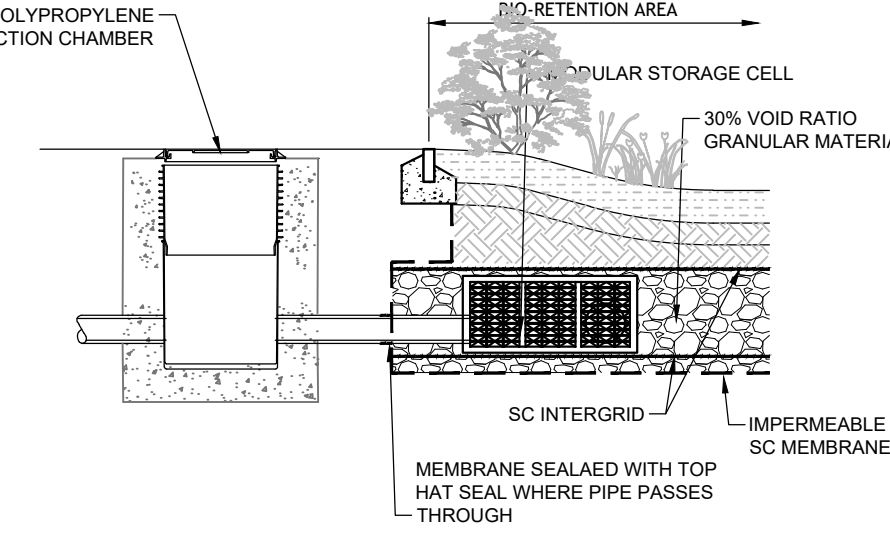
SECTION A-A

SCALE 1:25



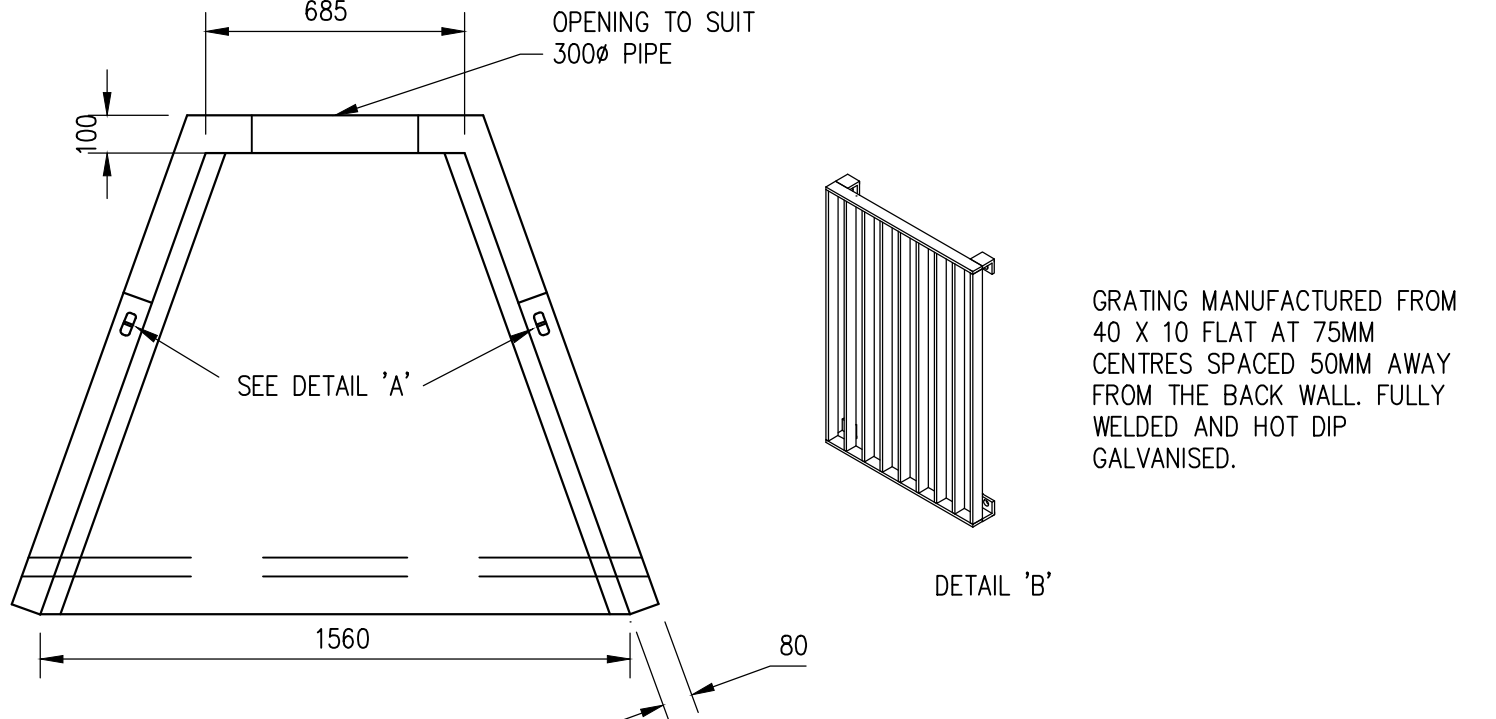
TYPICAL BIO-RETENTION DETAIL

SCALE 1:25



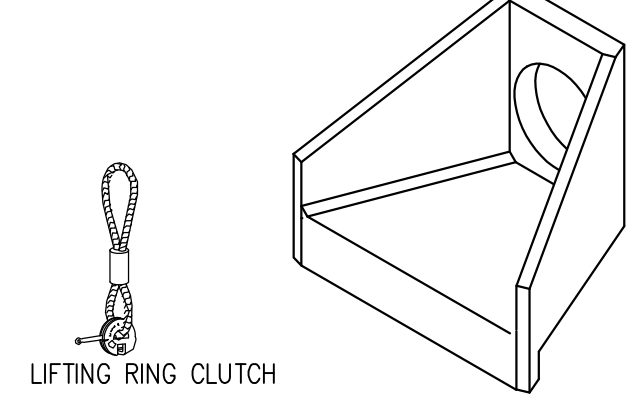
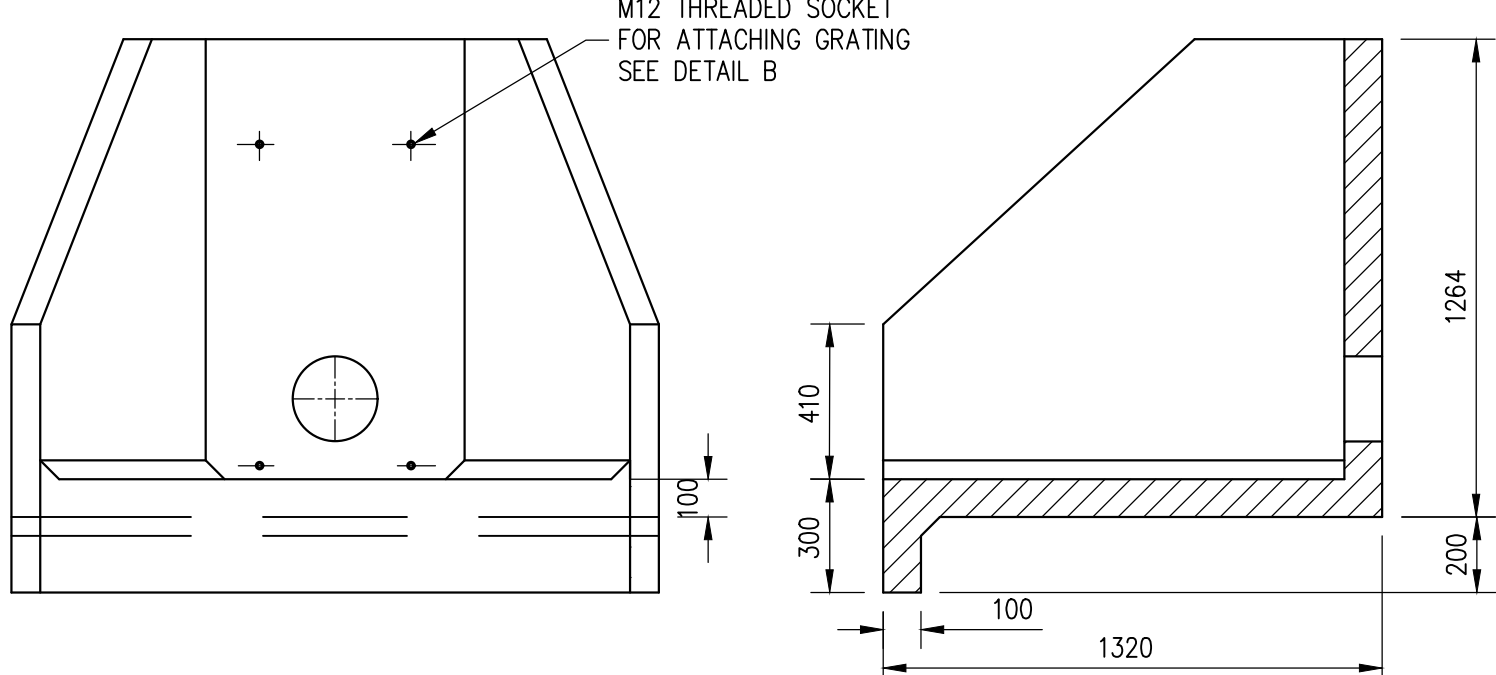
BIO-RETENTION ATTENUATION FACILITY

SCALE 1:25



ALTHON SPILLWAY HEADWALL H6C-B

SCALE 1:20



DETAIL 'A' 'CAST IN' UNIVERSAL ANCHOR POINT

INSTALLATION UNITS SHOULD BE BEDDED ON MINIMUM 100mm OF SEMI-DRY CONCRETE. SIT THE HEADWALL LEVEL OR WITH A SLIGHT FALL 1:50 FROM PIPE TO SPILL MOUTH. FOR FULL DETAILED INSTALLATION INSTRUCTIONS CONTACT ALTHON LTD, 01603 488700

MATERIAL: REINFORCED CONCRETE WEIGHT APPROXIMATELY 1150KG

ALL DIMENSIONS IN mm

CL: 26.928

IL: 25.664

Notes

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10. PIPEWORK WITH MORE THAN 750mm OF COVER TO HAVE CLASS S GRANULAR BED AND SURROUND.
11. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATION.
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15. ALL LEVELS ARE IN METRES UNO & TO OS DATUM.

Legend

Rev	Date	By	Description	Chk	App
P2	21.04.20	JCB	ISSUED FOR INFORMATION	JH	PJB
P1	13.04.20	WNL	ISSUED FOR INFORMATION	PJB	PJB

TENDER

**Tier Consult Ltd.**  
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Chester | CH4 9QZ  
T: 01244 684900

Client: GOLDEV DEVELOPMENTS

Project: EGGLEY ROAD, WOKING.

Title: SUDS CONSTRUCTION DETAILS

Scale	Drawn	Revision
1:200@A1	WNL	P2
Date	Checked	
APR 2020	DRL	

Drawing No: T\_18\_2130-55-03

Wayne Gold  
Goldev Woking Ltd

**JOMAS ASSOCIATES LTD**

6-9 The Square  
Stockley Park  
Uxbridge  
UB11 1FW

Tel: 0843-289-2187

Fax: 0872-115-4505

www.jomasassociates.com

info@jomasassociates.com

P1381J1459/AJH

27/06/2019

Dear Wayne,

**EGLEY ROAD, WOKING, GU22 0AF: SOIL INFILTRATION TESTING**

Jomas attended the above-mentioned site under instruction by Goldev Woking Ltd on 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> June 2019 to carry out soil infiltration testing in general accordance with BRE 365.

A full list of previous reports undertaken for the site by Jomas are detailed in Table 1 below:

**Table 1: Previous Reports - Jomas**

Title	Author	Reference	Date
Desk Study / Preliminary Risk Assessment Report For Land Adjacent To Egley Road Woking GU22 0NJ	Jomas Associates Ltd	P1381J1459/TE Final V1.0	August 2018
Geo-environmental & Geotechnical Assessment Ground Investigation Report for Egley Road, Woking, GU22 0AF	Jomas Associates Ltd	P1381J1549/AMM Final V1.0	11 April 2019
Supplementary Geo-environmental Assessment Ground Investigation Report for Egley Road, Woking, GU22 0AF	Jomas Associates Ltd	P1381J1549/AMM Final V1.0	25 June 2019

During the previous work the predominant soil type encountered at site was reported as sand considered to represent the Bagshot Formation. However these were locally noted to be clays and is considered likely to either represent clay bands/pockets within the Bagshot Formation, or were recovered as such due to the percussive nature of the drilling equipment further disturbing the samples.

7No. pits (STP1 – STP7) were excavated using a mechanical excavator (positions shown on the exploratory hole location plan in Appendix 1). STP1, STP2, STP3, STP4, STP5, STP6 and STP7 were excavated to depths of 1.0mbgl, 1.0mbgl, 1.0mbgl, 2.4mbgl, 2.4mbgl, 2.4mbgl and 2.4mbgl respectively.



An additional pit was excavated (TP8) to aid in determining ground conditions and specifically to observe groundwater levels. (position shown on the exploratory hole location plan in Appendix 1). Slight dampness was noted at 3.70mbgl. The pit was left open for 35 minutes, no water ingress was noted before backfilling.

The pits were then filled with water and allowed to drain over time, with the water level measured at intervals. As prescribed by BRE 365 the water in the pit should be allowed to drain until the water falls to at least 25%. However due to time constraints this was not always possible, where significant drainage had occurred the time required to drain to 25% was extrapolated, however in a number of cases the drainage was noted to be insignificant even after being left to drain over night.

Some general instability was noted in STP5 due to ascribed dimensions within the granular substrate. Subsequent hole collapse occurred during the test.

All locations and pit dimensions were specified to the clients requirements.

### **Ground Conditions**

Full logs of the ground conditions observed in each of the pits are included in Appendix 2, however, a summary of the ground conditions is provided below:

**Table 2: Ground Conditions Encountered**

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
Grass over mid-brown sandy slightly gravelly CLAY with rootlets/cobble content. Sand is fine. Gravel consists of medium to coarse, rounded to well-rounded flint. Cobble consist of rounded flint/angular brick. (MADE GROUND / TOPSOIL).	0.0	0.35-0.50	0.35-0.50
Grey heavily mottled orange brown very silty / slightly gravelly/ SAND with occasional roots and rootlets down to 1.25mbgl. Sand is medium to coarse. Gravel consists of fine to coarse, rounded to well rounded flint. (BAGSHOT FORMATION).	0.35-0.50	>1.00 – >3.40	>0.65-3.40

### **Infiltration Testing Results**

1No. test was conducted for STP1, STP3, STP5 and STP7 , however each of these were deemed to be failed tests as “insufficient drainage” was noted in each of these locations, even though in an number of locations the tests ran over night.

1No. test carried out in each of STP4 and STP6 which reported infiltration rates of between

$6.15 \times 10^{-7}$  m/s and  $6.28 \times 10^{-7}$  m/s respectively, which is indicative of “poor drainage” with “low permeability”.

3No. tests were able to be completed in STP2 within the identified silty Sand stratum encountered from 0.35mbgl. The infiltration rates calculated from these tests in ranged between  $5.66 \times 10^{-6}$  m/s to  $1.16 \times 10^{-5}$  m/s

it is considered that the silty Sand in this area of the site has with “medium” to “poor” permeability with “good” to “poor” drainage conditions.

Although the material that the tests were undertaken in were described by the BGS and by the various phases of investigation by Jomas as a Sand, it is worth noting that the BGS classifies the Bagshot Formation as a “Solid deposit”. It is therefore possible that the lower than would normally be expected infiltration results recorded could potentially be due to the sand grains being cemented together and as such reducing both the porosity and permeability of these materials.

The reduction in infiltration rate is likely due to the soil pore spaces reaching saturation point after the first test. Subsequent tests would indicate that water is unable to effectively permeate away from the soakage pit as soils become water logged.

We trust that this is satisfactory for your current needs, however please do not hesitate to contact the undersigned if we can be of further assistance on either this or any other project.

Yours sincerely,

approved by



**Adam Hines BSc (Hons) MSc**

**Geo-Environmental Engineer**



**Peter Swettenham BSc (Hons) MSc PgCert CEnv  
MIEnvSc**

**Principal Geotechnical Engineer**

**Enc.**

Appendix 1 – Figures

Appendix 2 – Exploratory Hole Logs

Appendix 3 – Infiltration Rates – Results and Calculations

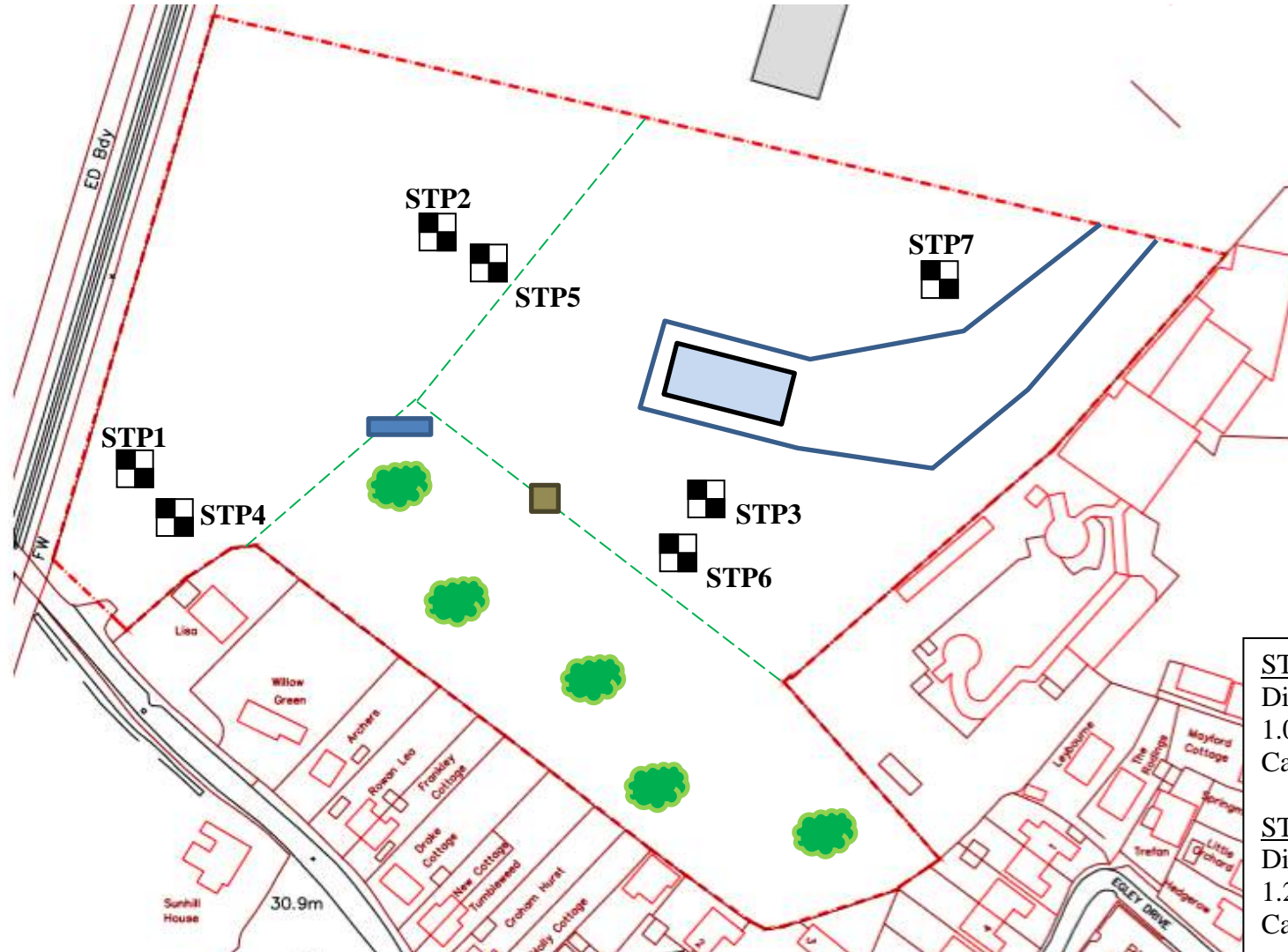
## APPENDIX 1 – FIGURES



<b>Project Name</b>	Egley Road, Woking	<b>Client</b>	Goldev Woking Ltd
<b>Project No.</b>	P1381J1459	<b>Date</b>	15/08/2018
<b>Title</b>	Site Location Plan	<b>Figure No</b>	1



<b>Project Name</b>	Egley Road, Woking	<b>Client</b>	Goldev Woking Ltd
<b>Project No.</b>	P1381J1459	<b>Date</b>	June 2019
<b>Title</b>	Provisional Infiltration Testing Plan	<b>Prepared By</b>	AM



**STP1 – STP3:**  
 Dimensions:  
 1.0m L x 1.0m W x 1.0m D  
 Carry out tests from 0.4m bgl

**STP4 – STP7:**  
 Dimensions:  
 1.2m L x 0.30m W x 2.4m D  
 Carry out tests from 1.0m bgl

## APPENDIX 2 – EXPLORATORY HOLE LOGS



TRIAL PIT RECORD

Exploratory Hole No:

STP1

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	24/06/2019
Checked By:	PSw	Date Completed:	24/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.80	Width: 0.95	Depth: 1.00

Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
					0.00		
							Grass over mid-brown very sandy gravelly CLAY with low cobble content. Sand is fine. Gravel consists of fine to coarse, rounded to well rounded flint. Cobble consist of rounded flint. (TOPSOIL).
					0.35		
					0.50		Grey heavily mottled orange brown very silty slightly gravelly SAND. Sand is medium to coarse. Gravel consists of fine to coarse, rounded to well rounded flint. (BAGSHOT FORMATION).
					1.00		
					1.50		
					2.00		
					2.50		
					3.00		
					3.50		
					4.00		
					4.50		
					5.00		

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U\*) Non recovery of Sample  
 Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD  
 T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com



TRIAL PIT RECORD

Exploratory Hole No:

STP2

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	24/06/2019
Checked By:	PSw	Date Completed:	24/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.70	Width: 1.00	Depth: 1.10


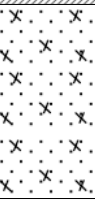
Remarks

1: No water reported.

2: Infiltration tests carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
	0.00				0.35		Grass over mid-brown very sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of fine to coarse, rounded to well rounded flint. (TOPSOIL).
	0.50				1.10		Grey mottled orange brown very silty SAND with occasional pockets of sand. Sand is medium to coarse. (BAGSHOT FORMATION).
	1.00						
	1.50						
	2.00						
	2.50						
	3.00						
	3.50						
	4.00						
	4.50						
	5.00						



TRIAL PIT RECORD

Exploratory Hole No:

STP3

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	25/06/2019
Checked By:	PSw	Date Completed:	25/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.80	Width: 0.95	Depth: 1.00

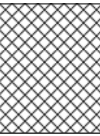

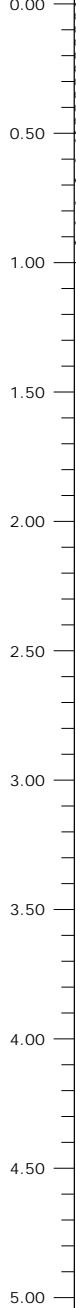
Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
					0.50		Grass over mid-brown sandy gravelly clay with low cobble content and occasional rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. Cobbles consist of angular brick. (MADE GROUND - Topsoil).
					1.00		Light brown to grey mottled orange brown silty SAND with occasional rootlets, wood fragments and slight organic odour. Sand is medium to coarse. (BAGSHOT FORMATION).
							





TRIAL PIT RECORD

Exploratory Hole No: STP4

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	24/06/2019
Checked By:	PSw	Date Completed:	24/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.60	Width: 0.35	Depth: 2.40

Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
					0.35		Grass over mid-brown sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of rounded flint. (TOPSOIL).
					2.40		Grey mottled orange brown very silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U\*) Non recovery of Sample  
 Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD  
 T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com



TRIAL PIT RECORD

Exploratory Hole No:

STP5

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 24/06/2019

Checked By: PSw

Date Completed: 24/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.70 Width: 0.32 Depth: 2.40

Remarks

- 1: No water reported.
- 2: Infiltration test carried out in general accordance with BRE 365.
- 3:
- 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.00		Grass over mid-brown sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of medium to coarse, rounded to well rounded flint. (TOPSOIL).
				0.40		Grey mottled becoming slightly mottled orange brown very silty becoming slightly silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
				2.40		
				2.50		
				3.00		
				3.50		
				4.00		
				4.50		
				5.00		





TRIAL PIT RECORD

Exploratory Hole No: STP6

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	25/06/2019
Checked By:	PSw	Date Completed:	25/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.80	Width: 0.35	Depth: 2.43

Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.00			Grass over mid-brown very sandy slightly gravelly clay with frequent rootlets and occasional roots. Sand is fine. Gravel consists of fine to coarse, rounded flint with occasional angular brick. (MADE GROUND - Topsoil).
				0.50	0.45		
				1.00			Light brown to grey mottled orange brown very silty becoming slightly silty SAND with occasional roots and rootlets down to 1.25mbgl. Sand is medium to coarse. (BAGSHOT FORMATION).
				1.50			
				2.00			
				2.50	2.45		
				3.00			
				3.50			
				4.00			
				4.50			
				5.00			



TRIAL PIT RECORD

Exploratory Hole No:

STP7

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 25/06/2019

Checked By:

Date Completed: 25/06/2019

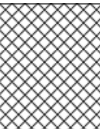
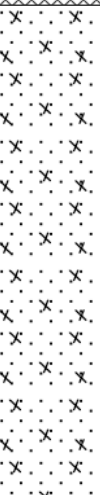

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.60 Width: 0.35 Depth: 2.40

Remarks

- 1: No water reported.
- 2: Infiltration test carried out in general accordance with BRE 365.
- 3:
- 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.50		Grass over mid-brown very sandy gravelly clay with rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. (MADE GROUND - Topsoil).
				2.40		Light brown mottled becoming slightly mottled orange brown very silty becoming slightly silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
						



TRIAL PIT RECORD

Exploratory Hole No:

TP8 - OBS

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	24/06/2019
Checked By:		Date Completed:	24/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 2.00	Width: 1.00	Depth: 3.90




Remarks

1: Material reported to be slightly damp from ~3.70mbgl.

2: Pit left open for 35mins and no water seepage was noted. Monitoring well nearby recorded water at ~4.20mbgl.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
	0.00						Grass over mid-brown very sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of fine to coarse, rounded flint. (TOPSOIL).
	0.50				0.50		Light brown to grey mottled orange brown very silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
	3.00				3.00		Light brown to grey slightly mottled orange brown SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
	3.90				3.90		
	4.00						
	4.50						
	5.00						

## APPENDIX 3 – INFILTRATION RATES – RESULTS AND CALCULATIONS

### BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Egley Road

CALCULATING ENGINEER: AJH  
APPROVED BY: PS

DATE: 26 June 2019  
DATE: 27 June 2019

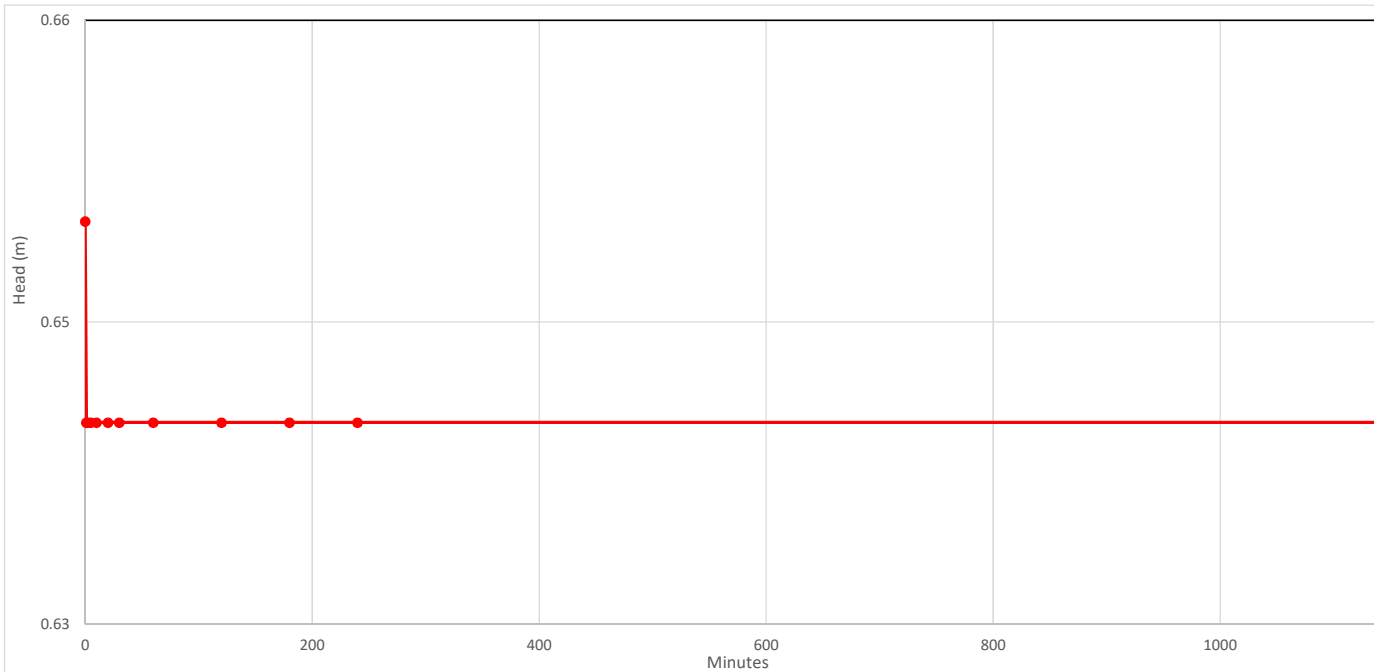
Notes:

Dw = depth to water  
Dg = head of water in the pit

JOMAS JOB NO.: P1381J1459  
TEST LOCATION: STP1  
DATE OF TEST: 24 June 2019

**Pit Details**  
Length 1.2 m  
Breadth 0.95 m  
Depth 1.0 m  
Groundwater? N  
Filled With Gravel? N

	STP1 - Test 1	STP1 - Test 2	STP1 - Test 3
Dg 75% (m)	0.49		
Tp 75%			
Dg 25%	0.16		
Tp 25%			
Vp75% - Vp25% (m <sup>3</sup> )	0.37		
ap50% (m <sup>2</sup> )	2.54		
Tp75-Tp25 (min)			
Soil infiltration rate (m/sec)	Insuff. Drain		
Permeability Description			
Drainage Conditions			



STP1 - Test 1			STP1 - Test 2			STP1 - Test 3		
Min	Dw	Dg	Min	Dw	Dg	Min	Dw	Dg
0	0.36	0.65						
1	0.37	0.64						
2	0.37	0.64						
5	0.37	0.64						
10	0.37	0.64						
20	0.37	0.64						
30	0.37	0.64						
60	0.37	0.64						
120	0.37	0.64						
180	0.37	0.64						
240	0.37	0.64						
1141	0.37	0.64						
	Min	Dg		Min	Dg		Min	Dg
	Insuff. Drain							
75%		0.488	75%			75%		
	Insuff. Drain							
25%		0.163	25%			25%		



## BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Egley Road

CALCULATING ENGINEER: AJH

DATE: 26 June 2019

Notes:

APPROVED BY: PS

DATE: 27 June 2019

Dw = depth to water

Dg = head of water in the pit

JOMAS JOB NO.: P1381J1459

TEST LOCATION: STP2

DATE OF TEST: 25 June 2019

**Pit Details**

Length 1.7 m

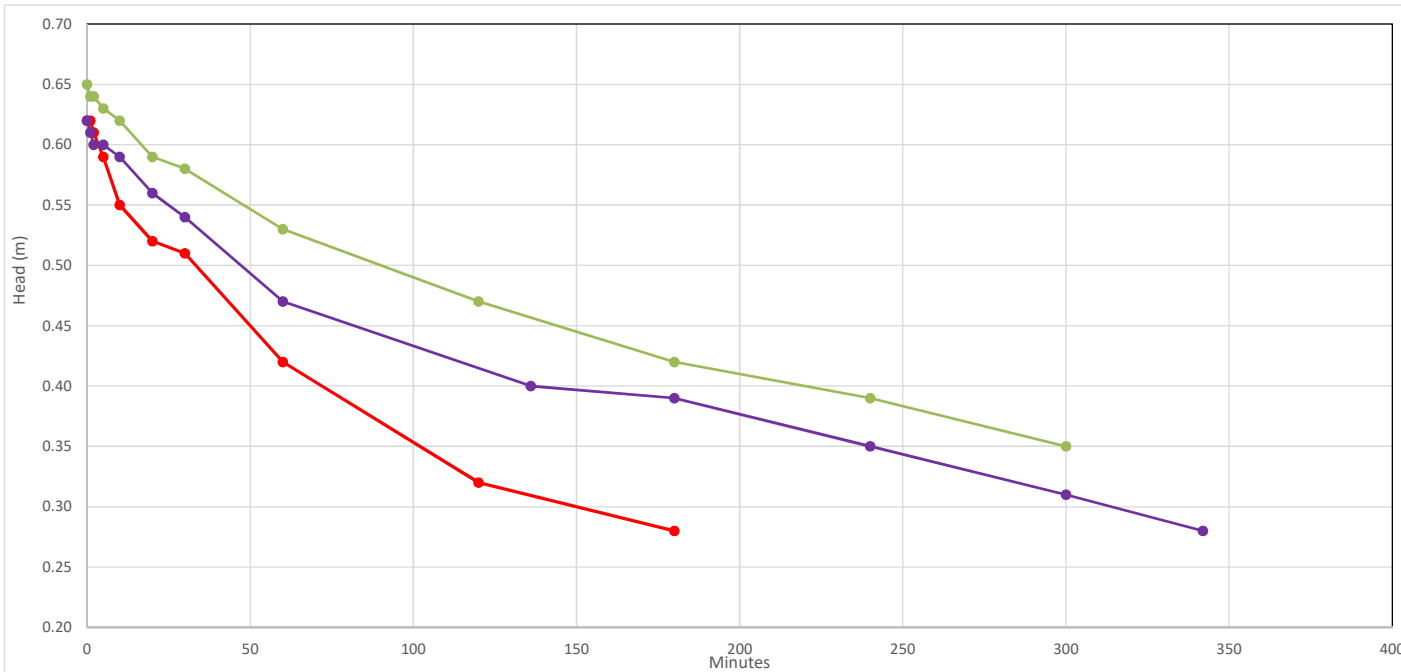
Breadth 1 m

Depth 1.0 m

Groundwater? N

Filled With Gravel? N

	STP2 - Test 1	STP2 - Test 2	STP2 - Test 3
Dg 75% (m)	0.47	0.47	0.49
Tp 75%	45.00	65.43	102.50
Dg 25%	0.16	0.16	0.16
Tp 25%	269.42	525.08	621.69
Vp75% - Vp25% (m <sup>3</sup> )	0.53	0.53	0.22
ap50% (m <sup>2</sup> )	3.37	3.37	3.46
Tp75-Tp25 (min)	224.42	459.65	519.19
Soil infiltration rate (m/sec)	1.16E-05	5.66E-06	2.05E-06
Permeability Description	Medium	Low	Poor
Drainage Conditions	Good	Poor	Poor



STP2 - Test 1			STP2 - Test 2			STP2 - Test 3		
Min	Dw	Dg	Min	Dw	Dg	Min	Dw	Dg
0	0.39	0.62	0	0.39	0.62	0	0.36	0.65
1	0.39	0.62	1	0.40	0.61	1	0.37	0.64
2	0.40	0.61	2	0.41	0.60	2	0.37	0.64
5	0.42	0.59	5	0.41	0.60	5	0.38	0.63
10	0.46	0.55	10	0.42	0.59	10	0.39	0.62
20	0.49	0.52	20	0.45	0.56	20	0.42	0.59
30	0.50	0.51	30	0.47	0.54	30	0.43	0.58
60	0.59	0.42	60	0.54	0.47	60	0.48	0.53
120	0.69	0.32	136	0.61	0.40	120	0.54	0.47
180	0.73	0.28	180	0.62	0.39	180	0.59	0.42
			240	0.66	0.35	240	0.62	0.39
			300	0.70	0.31	300	0.66	0.35
			342	0.73	0.28			
	Min	Dg		Min	Dg		Min	Dg
	Interpolated			Interpolated			Interpolated	
75%	45	0.465	75%	65.43	0.465	75%	102.5	0.488
	Extrapolated			Extrapolated			Extrapolated	
25%	269.4	0.155	25%	525	0.155	25%	621.7	0.163

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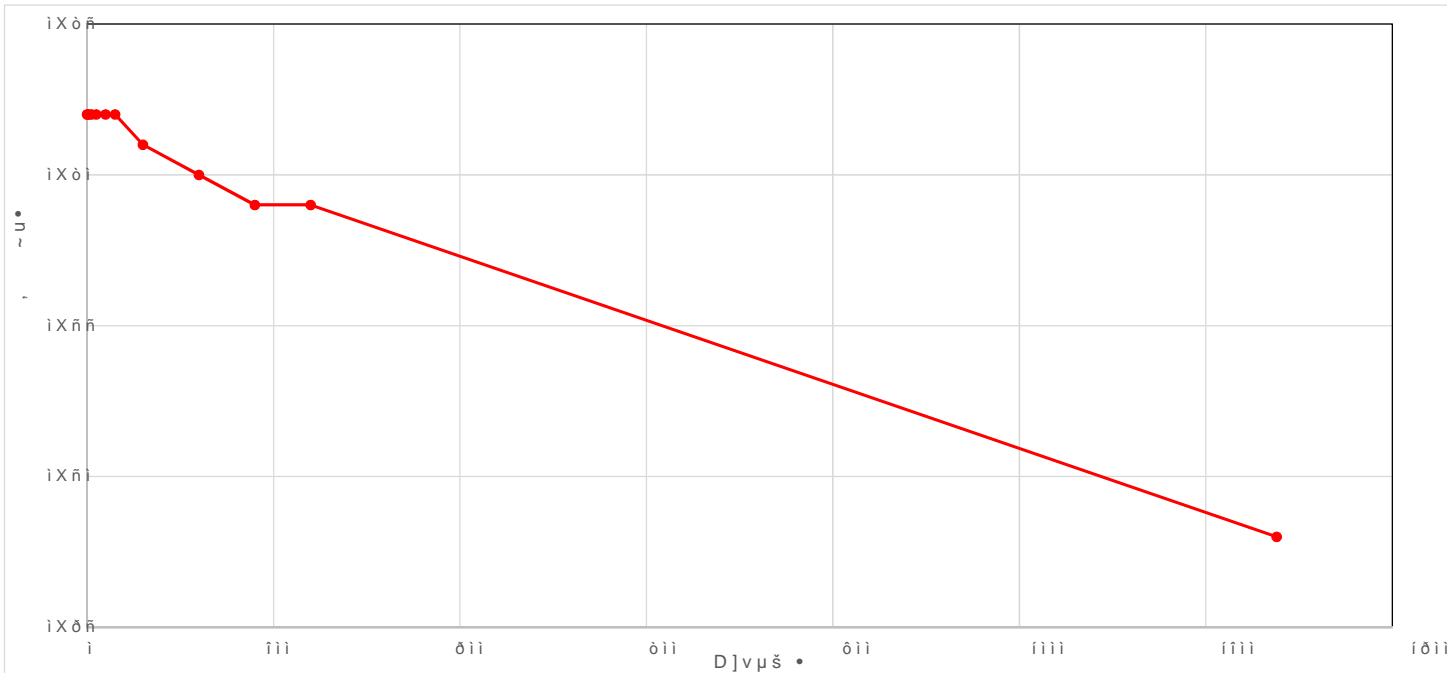
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Wayne Gold  
Goldev Woking Ltd

**JOMAS ASSOCIATES LTD**

6-9 The Square  
Stockley Park  
Uxbridge  
UB11 1FW

Tel: 0843-289-2187

Fax: 0872-115-4505

www.jomasassociates.com

info@jomasassociates.com

P1381J1459/AJH

27/06/2019

Dear Wayne,

**EGLEY ROAD, WOKING, GU22 0AF: SOIL INFILTRATION TESTING**

Jomas attended the above-mentioned site under instruction by Goldev Woking Ltd on 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> June 2019 to carry out soil infiltration testing in general accordance with BRE 365.

A full list of previous reports undertaken for the site by Jomas are detailed in Table 1 below:

**Table 1: Previous Reports - Jomas**

Title	Author	Reference	Date
Desk Study / Preliminary Risk Assessment Report For Land Adjacent To Egley Road Woking GU22 0NJ	Jomas Associates Ltd	P1381J1459/TE Final V1.0	August 2018
Geo-environmental & Geotechnical Assessment Ground Investigation Report for Egley Road, Woking, GU22 0AF	Jomas Associates Ltd	P1381J1549/AMM Final V1.0	11 April 2019
Supplementary Geo-environmental Assessment Ground Investigation Report for Egley Road, Woking, GU22 0AF	Jomas Associates Ltd	P1381J1549/AMM Final V1.0	25 June 2019

During the previous work the predominant soil type encountered at site was reported as sand considered to represent the Bagshot Formation. However these were locally noted to be clays and is considered likely to either represent clay bands/pockets within the Bagshot Formation, or were recovered as such due to the percussive nature of the drilling equipment further disturbing the samples.

7No. pits (STP1 – STP7) were excavated using a mechanical excavator (positions shown on the exploratory hole location plan in Appendix 1). STP1, STP2, STP3, STP4, STP5, STP6 and STP7 were excavated to depths of 1.0mbgl, 1.0mbgl, 1.0mbgl, 2.4mbgl, 2.4mbgl, 2.4mbgl and 2.4mbgl respectively.

An additional pit was excavated (TP8) to aid in determining ground conditions and specifically to observe groundwater levels. (position shown on the exploratory hole location plan in Appendix 1). Slight dampness was noted at 3.70mbgl. The pit was left open for 35 minutes, no water ingress was noted before backfilling.

The pits were then filled with water and allowed to drain over time, with the water level measured at intervals. As prescribed by BRE 365 the water in the pit should be allowed to drain until the water falls to at least 25%. However due to time constraints this was not always possible, where significant drainage had occurred the time required to drain to 25% was extrapolated, however in a number of cases the drainage was noted to be insignificant even after being left to drain over night.

Some general instability was noted in STP5 due to ascribed dimensions within the granular substrate. Subsequent hole collapse occurred during the test.

All locations and pit dimensions were specified to the clients requirements.

### **Ground Conditions**

Full logs of the ground conditions observed in each of the pits are included in Appendix 2, however, a summary of the ground conditions is provided below:

**Table 2: Ground Conditions Encountered**

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
Grass over mid-brown sandy slightly gravelly CLAY with rootlets/cobble content. Sand is fine. Gravel consists of medium to coarse, rounded to well-rounded flint. Cobble consist of rounded flint/angular brick. (MADE GROUND / TOPSOIL).	0.0	0.35-0.50	0.35-0.50
Grey heavily mottled orange brown very silty / slightly gravelly/ SAND with occasional roots and rootlets down to 1.25mbgl. Sand is medium to coarse. Gravel consists of fine to coarse, rounded to well rounded flint. (BAGSHOT FORMATION).	0.35-0.50	>1.00 – >3.40	>0.65-3.40

### **Infiltration Testing Results**

1No. test was conducted for STP1, STP3, STP5 and STP7 , however each of these were deemed to be failed tests as “insufficient drainage” was noted in each of these locations, even though in an number of locations the tests ran over night.

1No. test carried out in each of STP4 and STP6 which reported infiltration rates of between

$6.15 \times 10^{-7}$  m/s and  $6.28 \times 10^{-7}$  m/s respectively, which is indicative of “poor drainage” with “low permeability”.

3No. tests were able to be completed in STP2 within the identified silty Sand stratum encountered from 0.35mbgl. The infiltration rates calculated from these tests in ranged between  $5.66 \times 10^{-6}$  m/s to  $1.16 \times 10^{-5}$  m/s

it is considered that the silty Sand in this area of the site has with “medium” to “poor” permeability with “good” to “poor” drainage conditions.

Although the material that the tests were undertaken in were described by the BGS and by the various phases of investigation by Jomas as a Sand, it is worth noting that the BGS classifies the Bagshot Formation as a “Solid deposit”. It is therefore possible that the lower than would normally be expected infiltration results recorded could potentially be due to the sand grains being cemented together and as such reducing both the porosity and permeability of these materials.

The reduction in infiltration rate is likely due to the soil pore spaces reaching saturation point after the first test. Subsequent tests would indicate that water is unable to effectively permeate away from the soakage pit as soils become water logged.

We trust that this is satisfactory for your current needs, however please do not hesitate to contact the undersigned if we can be of further assistance on either this or any other project.

Yours sincerely,

approved by



**Adam Hines BSc (Hons) MSc**

**Geo-Environmental Engineer**



**Peter Swettenham BSc (Hons) MSc PgCert CEnv  
MIEnvSc**

**Principal Geotechnical Engineer**

**Enc.**

Appendix 1 – Figures

Appendix 2 – Exploratory Hole Logs

Appendix 3 – Infiltration Rates – Results and Calculations

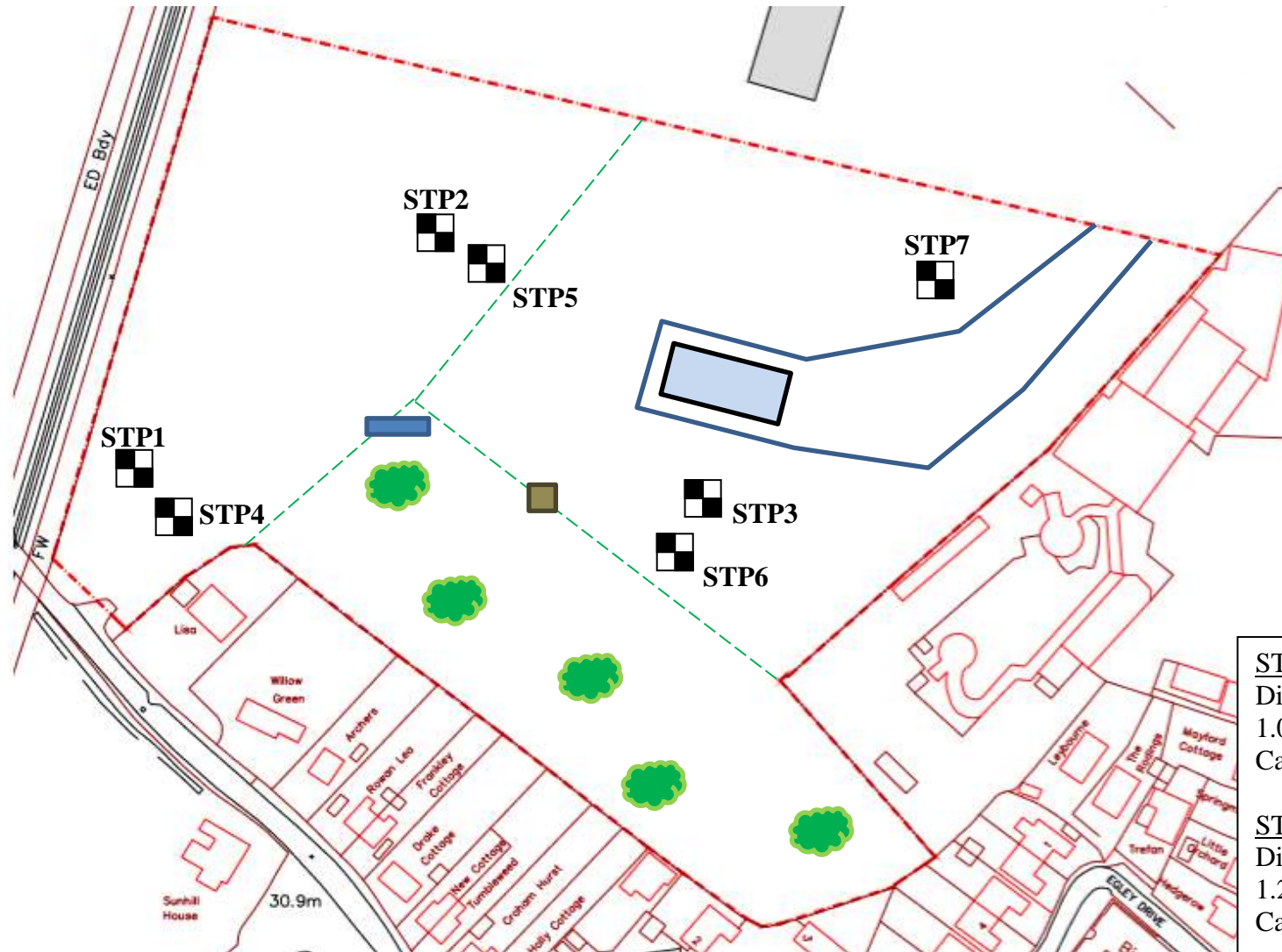
## APPENDIX 1 – FIGURES



<b>Project Name</b>	Egley Road, Woking	<b>Client</b>	Goldev Woking Ltd
<b>Project No.</b>	P1381J1459	<b>Date</b>	15/08/2018
<b>Title</b>	Site Location Plan	<b>Figure No</b>	1



<b>Project Name</b>	Egley Road, Woking	<b>Client</b>	Goldev Woking Ltd
<b>Project No.</b>	P1381J1459	<b>Date</b>	June 2019
<b>Title</b>	Provisional Infiltration Testing Plan	<b>Prepared By</b>	AM



**STP1 – STP3:**  
 Dimensions:  
 1.0m L x 1.0m W x 1.0m D  
 Carry out tests from 0.4m bgl

**STP4 – STP7:**  
 Dimensions:  
 1.2m L x 0.30m W x 2.4m D  
 Carry out tests from 1.0m bgl

## APPENDIX 2 – EXPLORATORY HOLE LOGS



TRIAL PIT RECORD

Exploratory Hole No:

STP1

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 24/06/2019

Checked By: PSw

Date Completed: 24/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.80 Width: 0.95 Depth: 1.00

Remarks

- 1: No water reported.
- 2: Infiltration test carried out in general accordance with BRE 365.
- 3:
- 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
			0.00	0.35		Grass over mid-brown very sandy gravelly CLAY with low cobble content. Sand is fine. Gravel consists of fine to coarse, rounded to well rounded flint. Cobble consist of rounded flint. (TOPSOIL).
			0.50	1.00		Grey heavily mottled orange brown very silty slightly gravelly SAND. Sand is medium to coarse. Gravel consists of fine to coarse, rounded to well rounded flint. (BAGSHOT FORMATION).
			1.00			
			1.50			
			2.00			
			2.50			
			3.00			
			3.50			
			4.00			
			4.50			
			5.00			



TRIAL PIT RECORD

Exploratory Hole No:

STP2

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 24/06/2019

Checked By: PSw

Date Completed: 24/06/2019


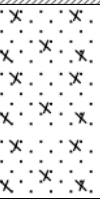
Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.70 Width: 1.00 Depth: 1.10

Remarks

- 1: No water reported.
- 2: Infiltration tests carried out in general accordance with BRE 365.
- 3:
- 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.35		Grass over mid-brown very sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of fine to coarse, rounded to well rounded flint. (TOPSOIL).
				1.10		Grey mottled orange brown very silty SAND with occasional pockets of sand. Sand is medium to coarse. (BAGSHOT FORMATION).
				1.50		
				2.00		
				2.50		
				3.00		
				3.50		
				4.00		
				4.50		
				5.00		



TRIAL PIT RECORD

Exploratory Hole No:

STP3

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	25/06/2019
Checked By:	PSw	Date Completed:	25/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.80	Width: 0.95	Depth: 1.00

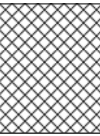

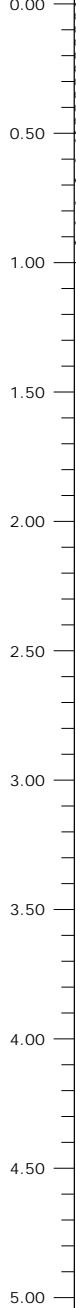
Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
					0.50		Grass over mid-brown sandy gravelly clay with low cobble content and occasional rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. Cobbles consist of angular brick. (MADE GROUND - Topsoil).
					1.00		Light brown to grey mottled orange brown silty SAND with occasional rootlets, wood fragments and slight organic odour. Sand is medium to coarse. (BAGSHOT FORMATION).
							





TRIAL PIT RECORD

Exploratory Hole No: STP4

Site Address:	Egley Road, Woking, GU22 0AF	Project No:	P1381J1459
Client:	Goldev Woking Ltd	Ground Level:	
Logged By:	JLW	Date Commenced:	24/06/2019
Checked By:	PSw	Date Completed:	24/06/2019
Type and diameter of equipment:	JCB 3CX Eco	Sheet No:	1 Of 1
Pit Dimension:	Length: 1.60	Width: 0.35	Depth: 2.40

Remarks

1: No water reported.

2: Infiltration test carried out in general accordance with BRE 365.

3:

4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.00			Grass over mid-brown sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of rounded flint. (TOPSOIL).
				0.35			
				0.50			Grey mottled orange brown very silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
				1.00			
				1.50			
				2.00			
				2.40			
				2.50			
				3.00			
				3.50			
				4.00			
				4.50			
				5.00			



TRIAL PIT RECORD

Exploratory Hole No:

STP5

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 24/06/2019

Checked By: PSw

Date Completed: 24/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.70 Width: 0.32 Depth: 2.40

Remarks

- 1: No water reported.
- 2: Infiltration test carried out in general accordance with BRE 365.
- 3:
- 4:

Type	Depth (mbgl)	Sample or Tests	Result	Strata			Strata Description
				Legend	Depth (mbgl)	Water Strikes (mbgl)	
					0.40		Grass over mid-brown sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of medium to coarse, rounded to well rounded flint. (TOPSOIL).
					2.40		Grey mottled becoming slightly mottled orange brown very silty becoming slightly silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).



TRIAL PIT RECORD

Exploratory Hole No:

STP6

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 25/06/2019

Checked By: PSw

Date Completed: 25/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.80 Width: 0.35 Depth: 2.43

Remarks  
 1: No water reported.  
 2: Infiltration test carried out in general accordance with BRE 365.  
 3:  
 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
				0.00 - 0.45		Grass over mid-brown very sandy slightly gravelly clay with frequent rootlets and occasional roots. Sand is fine. Gravel consists of fine to coarse, rounded flint with occasional angular brick. (MADE GROUND - Topsoil).
				0.45 - 2.45		Light brown to grey mottled orange brown very silty becoming slightly silty SAND with occasional roots and rootlets down to 1.25mbgl. Sand is medium to coarse. (BAGSHOT FORMATION).
				2.45 - 5.00		

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U\*) Non recovery of Sample  
 Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD  
 T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com



TRIAL PIT RECORD

Exploratory Hole No:

STP7

Site Address: Egley Road, Woking, GU22 0AF

Project No: P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced: 25/06/2019

Checked By:

Date Completed: 25/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No: 1 Of 1

Pit Dimension: Length: 1.60 Width: 0.35 Depth: 2.40

Remarks

- 1: No water reported.
- 2: Infiltration test carried out in general accordance with BRE 365.
- 3:
- 4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
			0.00	0.50		Grass over mid-brown very sandy gravelly clay with rootlets. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. (MADE GROUND - Topsoil).
			0.50	2.40		Light brown mottled becoming slightly mottled orange brown very silty becoming slightly silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
			2.50			
			3.00			
			3.50			
			4.00			
			4.50			
			5.00			



TRIAL PIT RECORD

Exploratory Hole No:

TP8 - OBS

Site Address: Egley Road, Woking, GU22 0AF

Project No:

P1381J1459

Client: Goldev Woking Ltd

Ground Level:

Logged By: JLW

Date Commenced:

24/06/2019

Checked By:

Date Completed:

24/06/2019

Type and diameter of equipment: JCB 3CX Eco

Sheet No:

1 Of 1

Pit Dimension:

Length:

2.00

Width:

1.00

Depth:

3.90




Remarks

1: Material reported to be slightly damp from ~3.70mbgl.

2: Pit left open for 35mins and no water seepage was noted. Monitoring well nearby recorded water at ~4.20mbgl.

3:

4:

Sample or Tests			Strata			Strata Description
Type	Depth (mbgl)	Result	Legend	Depth (mbgl)	Water Strikes (mbgl)	
			0.00			Grass over mid-brown very sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel consists of fine to coarse, rounded flint. (TOPSOIL).
			0.50		0.50	Light brown to grey mottled orange brown very silty SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
			3.00		3.00	Light brown to grey slightly mottled orange brown SAND. Sand is medium to coarse. (BAGSHOT FORMATION).
			3.90		3.90	
			4.00			
			4.50			
			5.00			

## APPENDIX 3 – INFILTRATION RATES – RESULTS AND CALCULATIONS



## BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Egley Road

CALCULATING ENGINEER: AJH  
APPROVED BY: PS

DATE: 26 June 2019  
DATE: 27 June 2019

Notes:

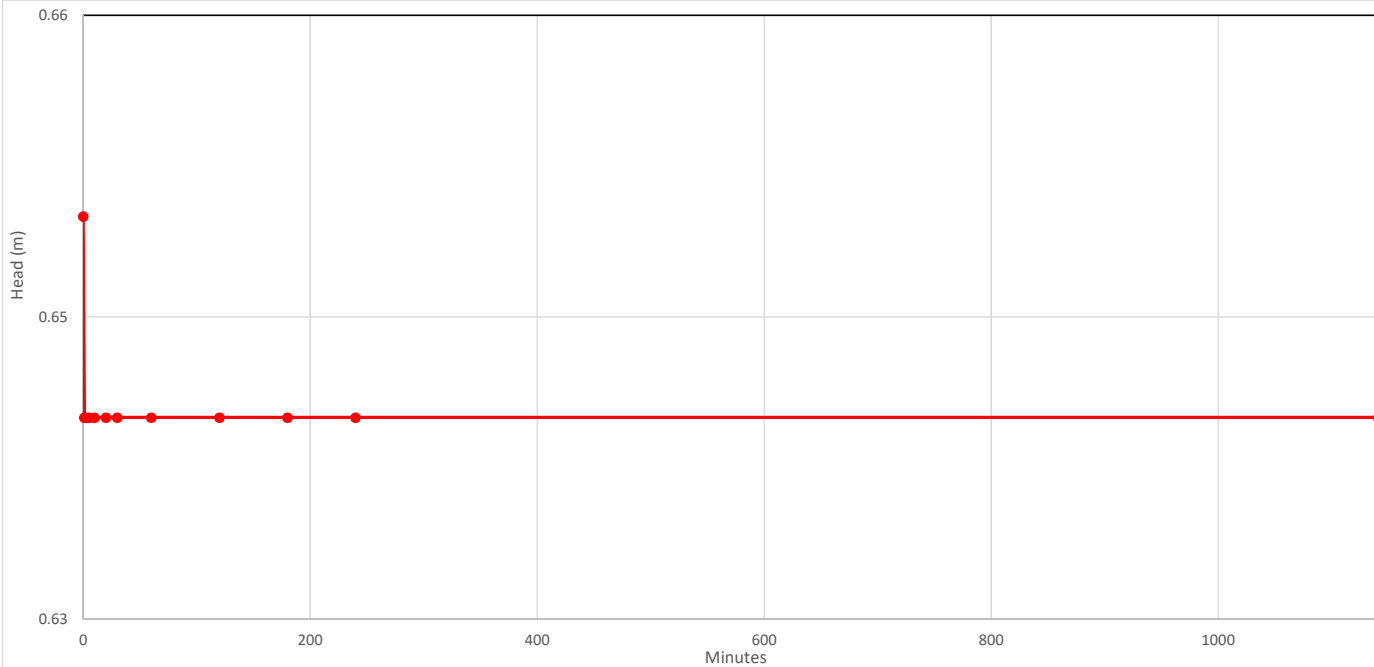
Dw = depth to water  
Dg = head of water in the pit

JOMAS JOB NO.: P1381J1459  
TEST LOCATION: STP1  
DATE OF TEST: 24 June 2019

**Pit Details**

Length 1.2 m  
Breadth 0.95 m  
Depth 1.0 m  
Groundwater? N  
Filled With Gravel? N

	STP1 - Test 1	STP1 - Test 2	STP1 - Test 3
Dg 75% (m)	0.49		
Tp 75%			
Dg 25%	0.16		
Tp 25%			
Vp75% - Vp25% (m <sup>3</sup> )	0.37		
ap50% (m <sup>2</sup> )	2.54		
Tp75-Tp25 (min)			
Soil infiltration rate (m/sec)	Insuff. Drain		
Permeability Description			
Drainage Conditions			



STP1 - Test 1			STP1 - Test 2			STP1 - Test 3		
Min	Dw	Dg	Min	Dw	Dg	Min	Dw	Dg
0	0.36	0.65						
1	0.37	0.64						
2	0.37	0.64						
5	0.37	0.64						
10	0.37	0.64						
20	0.37	0.64						
30	0.37	0.64						
60	0.37	0.64						
120	0.37	0.64						
180	0.37	0.64						
240	0.37	0.64						
1141	0.37	0.64						
	Min	Dg		Min	Dg		Min	Dg
	Insuff. Drain							
75%		0.488	75%			75%		
	Insuff. Drain							
25%		0.163	25%			25%		

### BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Egley Road

CALCULATING ENGINEER: AJH

DATE: 26 June 2019

Notes:

APPROVED BY: PS

DATE: 27 June 2019

Dw = depth to water

Dg = head of water in the pit

JOMAS JOB NO.: P1381J1459

TEST LOCATION: STP2

DATE OF TEST: 25 June 2019

**Pit Details**

Length 1.7 m

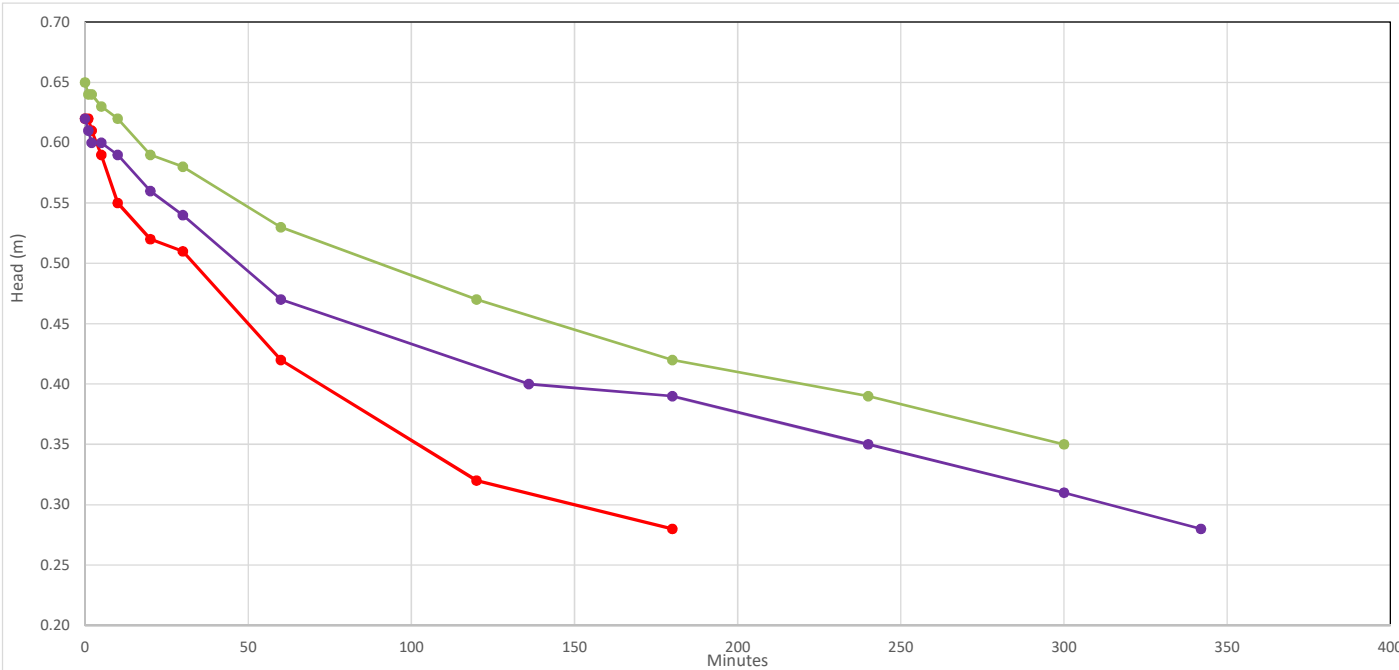
Breadth 1 m

Depth 1.0 m

Groundwater? N

Filled With Gravel? N

	STP2 - Test 1	STP2 - Test 2	STP2 - Test 3
Dg 75% (m)	0.47	0.47	0.49
Tp 75%	45.00	65.43	102.50
Dg 25%	0.16	0.16	0.16
Tp 25%	269.42	525.08	621.69
Vp75% - Vp25% (m <sup>3</sup> )	0.53	0.53	0.22
ap50% (m <sup>2</sup> )	3.37	3.37	3.46
Tp75-Tp25 (min)	224.42	459.65	519.19
Soil infiltration rate (m/sec)	1.16E-05	5.66E-06	2.05E-06
Permeability Description	Medium	Low	Poor
Drainage Conditions	Good	Poor	Poor



STP2 - Test 1			STP2 - Test 2			STP2 - Test 3		
Min	Dw	Dg	Min	Dw	Dg	Min	Dw	Dg
0	0.39	0.62	0	0.39	0.62	0	0.36	0.65
1	0.39	0.62	1	0.40	0.61	1	0.37	0.64
2	0.40	0.61	2	0.41	0.60	2	0.37	0.64
5	0.42	0.59	5	0.41	0.60	5	0.38	0.63
10	0.46	0.55	10	0.42	0.59	10	0.39	0.62
20	0.49	0.52	20	0.45	0.56	20	0.42	0.59
30	0.50	0.51	30	0.47	0.54	30	0.43	0.58
60	0.59	0.42	60	0.54	0.47	60	0.48	0.53
120	0.69	0.32	136	0.61	0.40	120	0.54	0.47
180	0.73	0.28	180	0.62	0.39	180	0.59	0.42
			240	0.66	0.35	240	0.62	0.39
			300	0.70	0.31	300	0.66	0.35
			342	0.73	0.28			
	Min	Dg		Min	Dg		Min	Dg
	Interpolated			Interpolated			Interpolated	
75%	45	0.465	75%	65.43	0.465	75%	102.5	0.488
	Extrapolated			Extrapolated			Extrapolated	
25%	269.4	0.155	25%	525	0.155	25%	621.7	0.163

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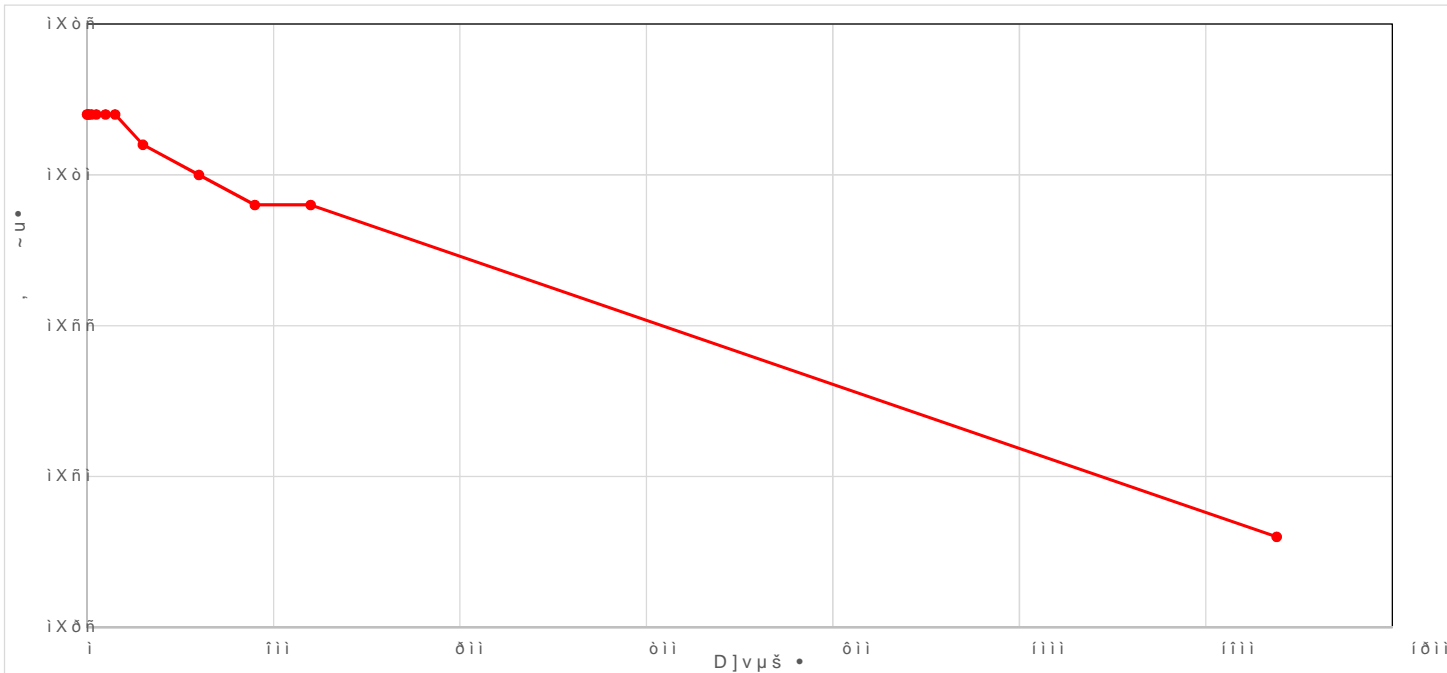
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## ***Appendix D: Thames Water Sewer Records***

# Asset location search



## Property Searches

Groundwise Searches Ltd  
Suite 8 Chichester House  
45 Chichester Road  
SOUTHEND ON SEA  
SS1 2JU

**Search address supplied** Land At Egley Road  
Woking  
GU22 0PL

**Your reference** 23398DM

**Our reference** ALS/ALS Standard/2019\_3949964

**Search date** 8 February 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](http://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](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148



**Search address supplied:** Land At Egley Road, Woking, GU22 0PL

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](mailto:searches@thameswater.co.uk)

Web: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

## Waste Water Services

**Please provide a copy extract from the public sewer map.**

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

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

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

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

For your guidance:

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

## Clean Water Services

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

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

Affinity Water Ltd  
Tamblin Way  
Hatfield  
AL10 9EZ  
Tel: 0845 7823333

# Asset location search



# Property Searches

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](mailto:developer.services@thameswater.co.uk)

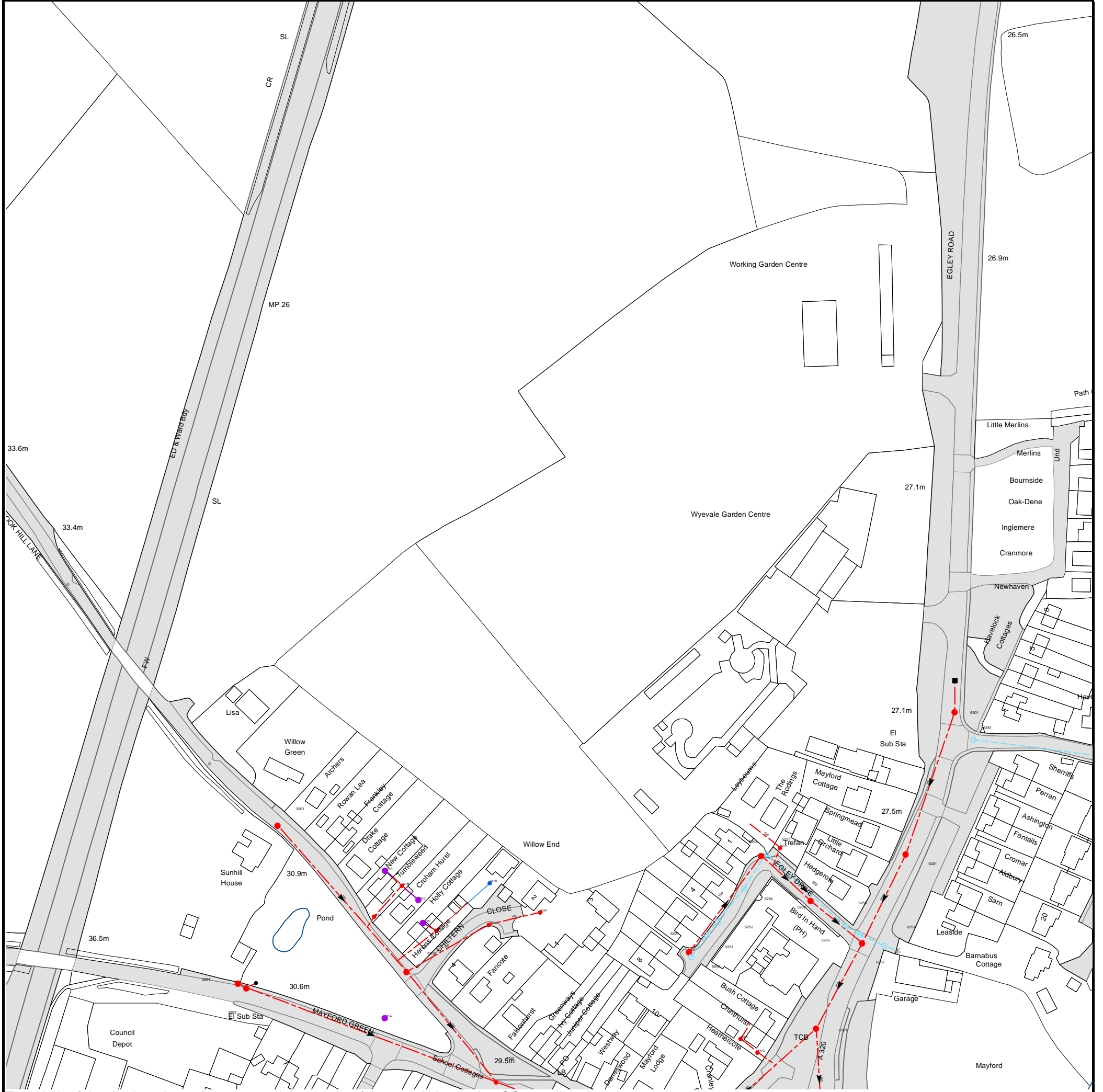
### Clean Water queries

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](mailto:developer.services@thameswater.co.uk)

Asset Location Search Sewer Map - ALS/ALS Standard/2019\_3949964



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 499462,156411

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
4101	29.34	26.93
5101	27.38	24.54
311A	n/a	n/a
3203	31.42	28.5
3204	31.45	n/a
3202	29.74	28.14
5250	28.4	27.81
5201	28.39	27.69
6251	26.97	26.03
6202	27.24	n/a
6250	27.15	26.43
5251	28.43	27.62
421D	n/a	n/a
5255	27.3	26.5
421A	n/a	n/a
421C	n/a	n/a
5252	28.34	27.53
321C	n/a	n/a
421F	n/a	n/a
5202	27.6	26.31
421E	n/a	n/a
5254	28.09	27.25
321B	n/a	n/a
421B	n/a	n/a
321A	n/a	n/a
5203	28.11	26.84
6201	27.47	24.83
5253	28.07	27.06
521A	n/a	n/a
3201	31.7	29.31
6351	n/a	n/a
6301	27.17	24.98

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








# ALS Sewer Map Key

## Public Sewer Types (Operated & Maintained by Thames Water)

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





## 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

### 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.
- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

## Terms and Conditions

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

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

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

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

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

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

### Ways to pay your bill

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

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

## Terms and Conditions

### 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](http://www.tpos.co.uk)  
Email: [admin@tpos.co.uk](mailto:admin@tpos.co.uk)

You can get more information about the PCCB from [www.propertycodes.org.uk](http://www.propertycodes.org.uk)

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



**Ms Melissa Seymour**

**RMA Environmental Ltd,**  
Suite 4, Swallow Court,  
Devonshire Gate,  
Tiverton,  
Devon,  
EX16 7EJ



24 July 2019

## Pre-planning enquiry: Insufficient Capacity

Dear Melissa,

Thank you for providing information on your development.

**Site: Land West of Egley Road, Woking, Surrey - GU22 0PS**

*Existing site: Greenfield.*

*Proposed site: Houses (36 units) + Sports Hall (1,500 visitors/day).*

*Proposed foul water discharge by gravity into manhole SU99565203.*

*Proposed surface water discharge to nearby watercourse and not to Thames Water sewer.*

We have completed the assessment of the foul water flows based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

### Foul Water

We've assessed your **foul water** proposals and concluded that our sewerage network will not have enough capacity for your development at this time.

In order to ensure we make the appropriate upgrades – or 'off-site reinforcement' – to serve the remainder of your development, we'll need to carry out modelling work, design a solution and build the necessary improvements. This work is done at our cost.

Once we've begun modelling, we may need to contact you to discuss changing the connection point for capacity reasons. Please note that we'll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

### How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 8 months

Design: 6 months

Construction: 6 months

**Total: 20 months**



If the time you're likely to take from planning and construction through to first occupancy is longer than this, we'll be able to carry out the necessary upgrades in time for your development. If it's shorter, please contact me on the number below to discuss the timing of our activities.

### What do you need to tell us before we start modelling?

We're responsible for funding any modelling and reinforcement work. We need, though, to spend our customers' money wisely, so we'll only carry out modelling once we're confident that your development will proceed.

In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If you'd like us to start modelling work ahead of this point, we can do this if you agree to underwrite the cost of modelling and design. That means we'll fund the work – but you agree to pay the cost if you don't achieve first occupancy within five years..

If the modelling shows we need to carry out reinforcement work, then before we start construction we'll need you to supply us with notification that you've confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

### Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable.

*The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.*

Only when it can be proven that soakage into the ground or a connection into an adjacent watercourse is not possible we would then consider a restricted discharge into the public surface water/combined sewer network. As a guide a discharge rate of 5 litres/second/Hectare will be use, in most instances, however more onerous constraints may be imposed to fit local circumstances. The system shall not show signs of flooding above ground for the worst 1 in 30-year storm and shall be tested for exceedance in a 1 in 100-year storm to demonstrate any flooding that may occur will not flood properties.

Thames Water Planning team would ask to see why it is not practicable on the site to restrict to Greenfield run-off rates if they are consulted as part of any planning application.

Please see the attached 'Planning your wastewater' leaflet for additional information.

### What do I need to do next?

If you are satisfied with the points above, then you should compare your own timeline with the typical timescales we have suggested for our activities. If the time you're likely to take from planning and construction through to first occupancy is **more** than the total time we're likely to take, we'll be able to carry out the necessary upgrades in time for your development.

If it's **less** than this, you might want to ask us to start modelling earlier – in which case we'll require you to underwrite the cost, as noted above.

If you've any further questions, please contact me on 020 3577 7608

Yours sincerely

Zaid Kazi

Development Engineer  
Developer Services – Sewer Adoptions Team  
Thames Water