FORMER FLEET LESUIRE, NORTHFLEET

DRAINAGE STRATEGY

Harris Evolution Ltd

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1. INTRODUCTION

1.1. This report is produced in relation to the new sports facility comprising mixed size football pitches including artificial pitches, clubhouse, play area and associated parking at Former Fleet Leisure, Nelson Road, Northfleet, Gravesend, Kent. This report is intended provide a drainage strategy to support a planning application.

1.2. All forms of flooding and their impact on the natural and built environment are material planning considerations. The revised National Planning Policy Framework (NPPF) sets out the Government's objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. Government policy with respect to development in flood risk areas is contained within the revised NPPF and the supporting Planning Practice Guidance (PPG).

1.3. This Drainage Strategy has been completed in accordance with the revised NPPF to review sources of flood risk both to and from the proposed development. The report also considers the most appropriate drainage options including the implementation of Sustainable Drainage Systems (SuDS) in line with national policy.

Objectives & Scope

1.4. The objective of this report is:

- Establish existing drainage provisions
- Determine pre and post development runoff rates
- Detail a suitable drainage strategy for the management and maintenance of the surface water and foul water flows generated from the proposed development
- Provide sufficient information to discharge relevant drainage planning conditions

1.5. The scope of this drainage strategy is to support a planning application and provide sufficient design of drainage for the development proposals.

Planning

1.6. Gravesham Borough Council granted planning permission in July 2020 under application reference 20200001. In respects to drainage, conditions 8 & 9 are pre commencement drainage conditions to which this report is to provide information for discharge of conditions.

1.7. The planning conditions are written as –

> Drainage
>
> *Foul and Surface Water Sewerage Disposal*
>
> **8.** Construction of the relevant part or phase of the development shall not commence until details of the proposed means of foul and surface water sewerage disposal have been submitted to, and approved in writing by, the Local Planning Authority in consultation with Southern Water; the development shall be implemented in accordance with the approved details before the first occupation of any part of the development.

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Reason:

To ensure that an acceptable means of foul disposal for the development is agreed with the sewerage undertaker and in accordance with Policy CS18 of Gravesham Core Strategy Gravesham Local Plan: Core Strategy (September 2014 and Section 94 of the Water Industries Act 1991.

Submission of Detailed Sustainable Surface Water Drainage Scheme - SUDS

9. Development shall not begin in any relevant phase or part of the development until a detailed sustainable surface water drainage scheme and strategy for the site has been submitted to and approved in writing by the Local Planning Authority. The detailed drainage scheme shall demonstrate that the surface water generated by this development (for all rainfall durations and intensities up to and including the climate change adjusted critical 100 year storm) can be accommodated and disposed of within the curtilage of the site without increase to flood risk on or off-site. The drainage scheme shall demonstrate (with reference to published guidance), amongst other things:

- That silt and pollutants resulting from the site use can be adequately managed to ensure there is no pollution risk to receiving waters.
- Appropriate operational, maintenance and access requirements for each drainage feature or SuDS component are adequately considered, including any proposed arrangements for future adoption by any public body or statutory undertaker.

The drainage scheme shall be implemented in accordance with the approved details before the first occupation of any relevant phase or part of the development.

Reason:

To ensure the development is served by satisfactory arrangements for the disposal of surface water and to ensure that the development does not exacerbate the risk of on/off site flooding. These details and accompanying calculations are required prior to the commencement of any relevant phase or part of the development and pursuant to the requirements of paragraph 165 of the National Planning Policy Framework.

Limitations

1.8. The general limitations of this report are that:

- SDS Consulting Ltd has prepared this Report for the sole use of the Client in accordance with the Agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by SDS Consulting Ltd. This Report may not be relied upon by any other party without the prior and express written agreement of SDS Consulting Ltd.
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- This report is based on information available at the time of preparation. There is potential for further information to become available, which may create a need to modify conclusions drawn in this report.

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- SDS Consulting Ltd disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to SDS Consulting Ltd's attention after the date of the Report.

The Development Proposals

1.1. The development proposals are to provide a new sports facility comprising mixed size football pitches including artificial pitches, clubhouse, play area and associated parking at Former Fleet Leisure, Nelson Road, Northfleet, Gravesend, Kent

1.2. Refer to GCP Architects drawing 21030/Sk2 Revision B entitled 'Site Plan - Proposed' in **Appendix A**.

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2. EXISTING SITE

Site Location

2.1. The proposed development is located to the south of Nelson Road, Northfleet, Kent, DA11 7EE. The Ordnance Survey National Grid Reference for the site is TQ 63732 72774 (approximate centre). The site is located red in **Figure 1 & 2** below.

Figure 1: Site Location Plan

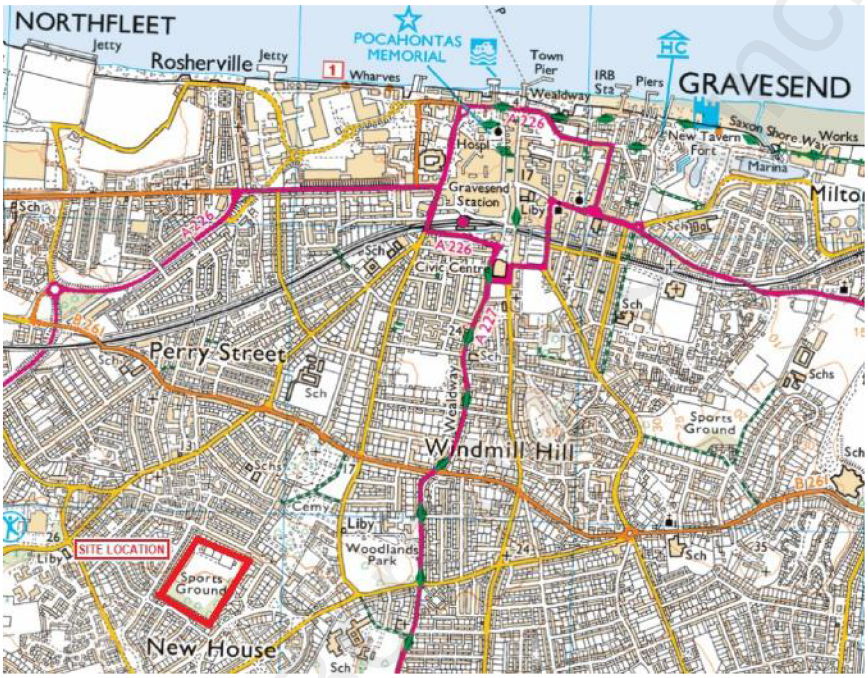


Image courtesy of © 2021 Microsoft – Bing Maps

Figure 2: Approximate red line boundary



Image courtesy of © 2021 Google Maps

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Land Use

2.2. The site is currently comprises of a vacant field with areas of hardstanding and Astro turf playing pitches which were formerly occupied by a leisure centre.

2.3. Access to the site is from the Nelson Road to the north. There are no other evident access locations for vehicles or pedestrians elsewhere within the site.

2.4. The site is classified as a brownfield site.

Topography

2.5. A topographical survey has been undertaken on the site in February 2019, refer to Omega Geomatics drawings 19-0631 TOPO_01 to TOPO 04 reproduced in **Appendix B** for a topographical survey of the site.

2.6. The site falls in a northerly direction with the highest elevation on the southern boundary at 28.15 mAOD. The lowest elevation is to the north of the site at the access from Nelson Road at a level of 20.50 mAOD. The site has a fall of 7.65m over a distance of 326m entailing an average gradient of 1:42.6.

Hydrology

2.7. The closest Environment Agency defined main river is the Robins Creek located approximately 1700m to the west of the site.

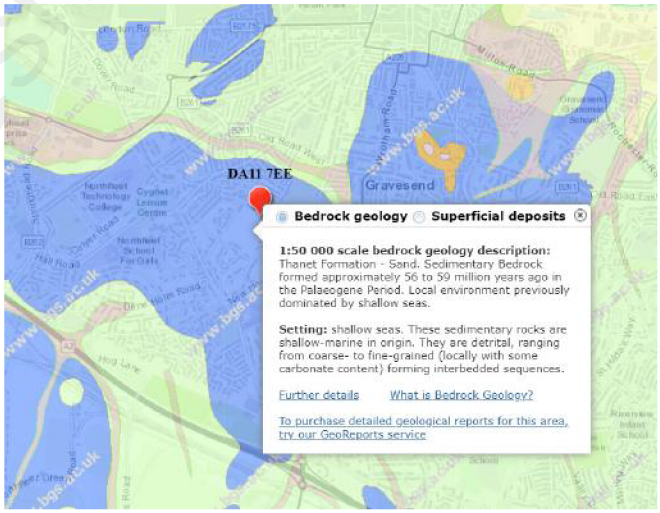
2.8. The River Thames is located approximately 1200m to the north of the site.

2.9. There are no watercourses within the site or its immediate vicinity.

Geology

2.10. The published geological information available through the British Geological Society (BGS) online records indicates that the site is located on the bedrock geology of the Thanet Formation – Sand, refer to **Figure 3**. The site is not overlain by superficial deposits.

Figure 3: BGS Geological Map



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Ground investigation

2.11. Sevenoaks Environmental Consultancy Ltd have undertaken intrusive ground investigations within the site in August 2021.

2.12. Made ground was encountered with various finishes and depths and overlays natural strata which comprised varying layers of a sandy clay. Sandy gravel and sandy silt to a proven depth of 4.45m bgl. Refer to **Appendix C** for an extract of the Sevenoaks Environmental Factual Geotechnical Site Investigation Report reference 4176 08 02 Rpt 02.

2.13. Groundwater was encountered as seepage in WS01 at a depth of 0.6m, subsequent groundwater monitoring visits recorded no groundwater.

Infiltration Testing

2.14. Infiltration testing has been undertaken in trial pits TP03 & TP05 and hand pits HP01 and HP02. Falling head tests were undertaken in WS01 and WS05. Refer to **Appendix C** for an extract of the Sevenoaks Environmental Factual Geotechnical Site Investigation Report reference 4176 08 02 Rpt 02.

2.15. Given the geological classification of the site, infiltration rates are reported to be low but sufficient to support infiltration SuDS. An average infiltration rate of 0.028m/hr is to be utilised in preliminary sizing calculations.

2.16. Falling head tests identifies a 3m drop in water level of 5 hours in WS01 and a 1.77m drop in water levels over 2 hours and 20 minutes in WS05. This may indicate that deep bore soakaways may be viable for implementation within the site (subject to additional investigation)

Existing Drainage

2.17. Refer To **Appendix D** for Southern Water asset mapping. The mapping identifies that no strategic sewers cross the site and all properties surrounding the development site are connected to the Foul Sewer.

2.18. Two manholes are indicatively shown to the east of the site access within the site and serve a number of properties along Nelson Road.

2.19. A review of the topographical survey in Appendix B identifies manholes within the site that are assumed to have connectivity to the Southern Water foul manholes. It is assumed that these manholes served the existing site use and are foul drains.

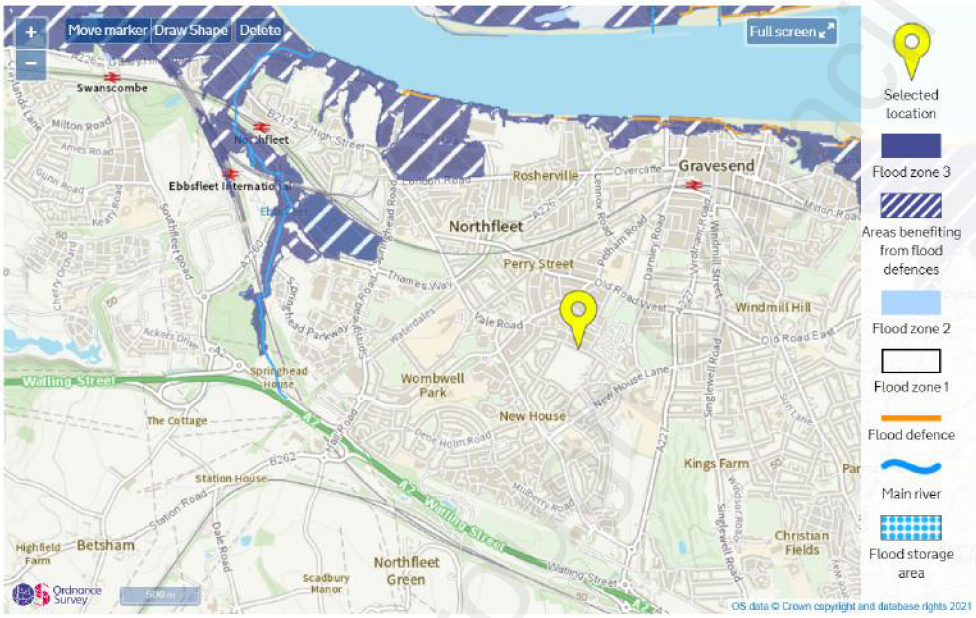
Flood Risk

Fluvial Flooding

2.20. The site falls within the catchment of the River Evenlode. **Figure 4** provides an extract of the Flood Risk Map for planning. It is shown that the site is located in Flood Zone 1.

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Figure 4: Environment Agency's Flood Map for Planning



Pluvial Flooding

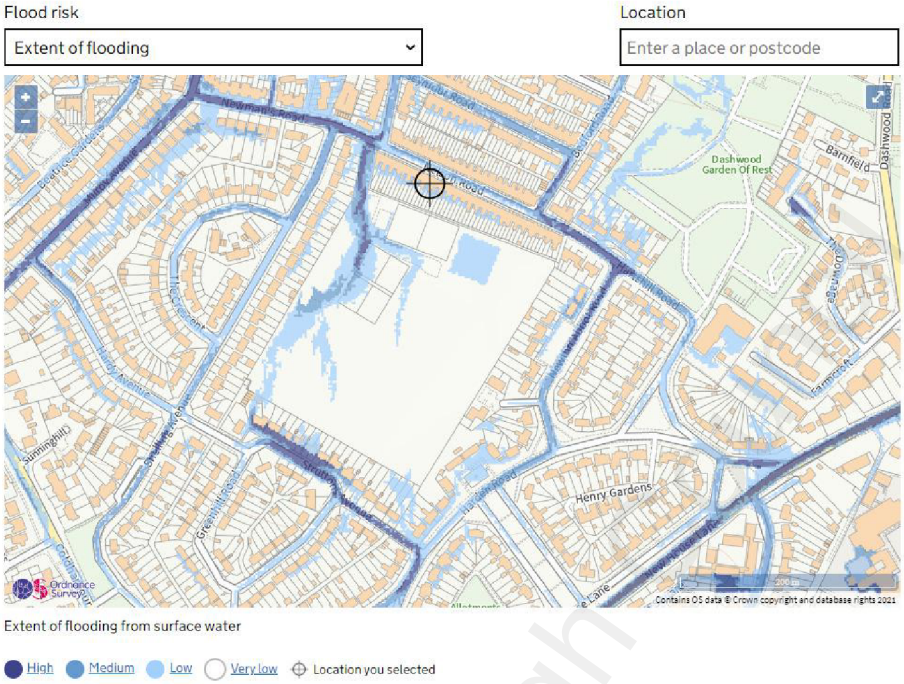
2.21. The Environment Agency's Risk of Flooding from Surface Water (RoFSW) Map indicates where surface water may be expected to flood or pond. A copy of the Environment Agency's Risk of Flooding from Surface Water Map is reproduced in **Figure 5** below.

2.22. This map identifies that there is surface water flow path through the site. Flows indicatively discharge from Struttons Avenue to the south and follow the topography of the site with discharge towards Nelson Road to the north.

2.23. It is noted that the flood flow path is only apparent during the low order RoFSW events (0.1% AEP – 1:1000 events)

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Figure 5: EA Risk of Flooding from Surface Water Map



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3. SURFACE WATER MANAGEMENT

Design Principles

3.1. Key design principles in the following guidance documents steer the approach to managing surface water runoff at sites:

- Building Regulations hierarchy of drainage (H3);
- Interim Code of Practice for SuDS; and
- CIRIA best practice guidance, including the use of the 'SUDS management train'

3.2. Building Regulations hierarchy of drainage outlines the preferred methods for the disposal of surface water with infiltration methods being the preferred option. If this is not possible the next favoured option is to drain to an existing watercourse. If neither of these options are feasible, the regulations state that rainwater discharge should be directed to a sewer.

3.3. The Interim Code of Practice for SUDS provides guidance about the hydraulic design criteria for Sustainable drainage systems. This in general refers to both peak rate of runoff and the volume of runoff, post development. Prior to mitigation measures such as the use of SuDS attenuation features, both the volume and peak rate of runoff may increase post development.

3.4. The design principles for surface water management extend beyond simple hydraulic criteria. CIRIA guidance promotes the use of the SUDS management train, a concept where SUDS techniques are used to treat, convey and store surface water runoff. This approach is considered as part of the SUDS selection methodology.

Sustainable Drainage Systems

3.5. Peak surface water discharge rates to watercourses and sewers should be appropriately managed and where possible reduced. Preference should always be given to SuDS over the traditional methods of buried sewers wherever possible and practical. Sustainable Drainage Systems (SuDS) can address the four key sustainability objectives including: water quantity, water quality, amenity and biodiversity.

3.6. Paragraph 51 in Section 21 of the Flood Risk and Coastal Change Planning Practice Guidance (Reference ID: 7-051-20150323) advises that sustainable drainage systems are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible. Sustainable drainage systems provide opportunities to:

- reduce the causes and impacts of flooding;
- remove pollutants from urban runoff at source;
- combine water management with green space with benefits for amenity, recreation and wildlife.

3.7. Promoting SuDS to deal with surface water at the source, will limit the required attenuation and in turn reduce the volume of surface water in the nearby watercourse and sewer infrastructure. There may be the potential to utilise SuDS features for conveyance/attenuation of surface water flows within the proposed drainage strategy, opposed to the traditional below ground storage methods. Detailed design should confirm whether this site would be suitable for incorporation of SuDS following more detailed analysis of levels, ground conditions and attenuation requirements.

SuDS Selection

3.8. Based upon the indicative layout, SuDS can be incorporated into the development to provide a degree of treatment before flows are carried off site. The following SuDS Selection matrix reviews

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those measures that can be implemented in the site, this matrix is indicative only and does not impart that the viable SuDS within the site are to be installed. Appropriate selection and implementation of the various SuDS are to be discussed between the design team.

3.9. This drainage strategy provides a review of the minimum SuDS measures to be implemented based upon viable SuDS Selection Matrix (**Table A**) and based upon site requirements for conveyance, treatment and attenuation of surface water flows.

Table A: SuDS Feasibility Matrix

SuDS Component	Site Suitability	Comments
Green Roofs	✗	Not proposed
Soakaways	✓	Potential for use
Rainwater harvesting systems	✓	Potential for use as water butt
Filter Strips	✓	Potential for use
Filter Trenches	✓	Potential for use
Infiltration trenches	✓	Potential for use
Swales	✗	Not suitable due to site layout
Bioretention	✓	Potential for use (rain gardens)
Pervious Pavements	✓	Potential for use
Geo-cellular Systems / oversized pipe	✓	Potential for use
Infiltration Basins	✗	Not suitable due to site layout
Detention Basins	✗	Not proposed
Ponds	✗	Not proposed
Wetlands	✗	Not proposed
Proprietary Devices	✗	Not proposed

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Surface Water Flow Balancing

Catchment Areas

3.10. The existing sites impermeable area comprises of

3.11. The existing and proposed impermeable areas comprises of four catchments and are described in Table B below–

Table B: Catchment Areas (m²)

Catchment	Existing	Proposed
Permeable	37378	36430
Impermeable	7592	8540
Total	**44970**	**44970**

3.12. The redeveloped site entails that an additional 948m² of impermeable area is added.

Pre Development Peak Runoff Rate

3.13. The Modified Rational Method has been used to determine the runoff from the impermeable areas of the existing site (refer to **Table C**)–

Q=2.78CiA

Where

Q= flow (l/s)

I = rainfall intensity (mm/hr)

A = Impermeable Area (ha)

C = runoff coefficient

Table C: Pre development site Modified Rational Method permeable runoff

Return Period	C	I	A	Flow (l/s)
1:1 year	0.95	28.809	0.7592	57.763
1:30 year	0.95	70.68	0.7592	141.717
1:100 year	0.95	91.443	0.7592	183.348

Post development unattenuated Peak Runoff Rate

3.14. Where assessing the redeveloped sites peak runoff rate, including allowance for climate change and changes in impermeable areas, the unattenuated peak runoff rate is as presented in **Table D** (calculated utilising the Modified Rational Method).

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Table D: Post development site Modified Rational Method impermeable runoff

Return Period	C	I	A	Flow (l/s)
1:1 year	0.95	28.809	0.854	64.976
1:30 year +10%cc	0.95	77.748	0.854	175.354
1:100 year +40%cc	0.95	128.021	0.854	288.740

3.15. If the site were to discharge at unattenuated rates, the post development site would increase surface water flows due to the increased impermeable area and allowances for climate change.

Proposed surface water discharge arrangements

3.16. The site is a brownfield site with all surface water drainage discharging via infiltration noting that there are no existing surface water drains identified within the topographical survey.

3.17. It is proposed that all surface water drainage from the redeveloped site is to discharge via infiltration SuDS.

Site Discharge Location

3.18. In terms of what sort of sustainable drainage system should be considered, paragraph 80 in Section 21 of the Flood Risk and Coastal Change Planning Practice Guidance (Reference ID: 7-080-20150323) advises that, generally, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable (also stated within The SuDS Manual (CIRIA C753) paragraph 3.2.3):

- Infiltration
- Discharge to surface water body
- Discharge to a surface water sewer, highway drain or another drainage system
- Discharge to a combined sewer.

Infiltration

3.19. The site has sufficient permeability to support infiltration SuDS and will form the discharge method for surface water flows.

Surface Water Drainage Strategy

3.20. The surface water drainage strategy implements SuDS in the form of cellular soakaways located in various locations to serve the impermeable areas of the site. Grass pitches will not have a formalised drainage network with flows discharging to the ground as per current site conditions. Astro turf pitches will be drained via infiltration SuDS (in the form of trench soakaways / filter strips) beneath the pitches and in accordance with the manufacturer's details

3.21. Refer to drawing 5645-C-001 & 5645-C-002 entitled 'Drainage Strategy' in **Appendix E** which indicates the location and sizes of the required storage facilities to serve the various development areas. The layout is subject to detailed design.

3.22. Refer to **Appendix F** for Micro Drainage calculations of soakaways 5 & 6 to represent a standard size soakaway and the largest soakaway requirement for the site.

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3.23. The proposed drainage strategy would ensure that surface water arising from the developed site would be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

3.24. The above plan and calculations demonstrate that a suitable means of drainage can be provided to drain the developed site in terms of surface water runoff in accordance with the guidance and standards.

Overland Flood Flow Paths

3.25. Standard S9 in the Government's 'Non-statutory technical standards for sustainable drainage systems' states that the design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of 1 in 100 year rainfall event are managed in exceedance routes that minimise the risk to people or property.

3.26. Overland flows are assumed to discharge to the north following the topography of the site. The ponding identified in Figure 5 would be removed through the grading of the pitches. Any RoFSW flow paths will be retained on the western site boundary and within the access road. Flows will pass over positively drained areas and as such will be intercepted by the proposed drainage network.

Pollution Prevention

3.27. In terms of water quality, the proposed surface water system offers a suitable level of mitigation in accordance with Environment Agency, DEFRA and CIRIA guidance.

3.28. The CIRIA SuDS Manual C753, 2015 details an approach for establishing the hazard posed by the intended land use activities and the extent to which the proposed SuDS components can reduce and mitigate the contamination risk to the receiving waterbody. Referring to Table 26.2 – 'Pollution hazard indices for different land use classifications' (CIRIA C753, 2015) the proposed development and land use results in a low pollution hazard, therefore a 'simple index' method can be used to make a qualitative assessment of the proposed SuDS management.

3.29. To ensure that there is adequate treatment, all SuDS components utilised should have a pollution mitigation index that equals or exceeds the pollution hazard index. In reference to Table 26.2, the pollution hazard index for the pavilion roof area is

TSS = 0.3,

Metals = 0.2,

Hydrocarbons = 0.05.

3.30. In reference to Table 26.2, the pollution hazard index for the car parking areas is

TSS = 0.5,

Metals = 0.4,

Hydrocarbons = 0.04.

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Figure 6: CIRIA C753, 2015. Table 26.2 – 'Pollution hazard indices for different land use classifications'

TABLE 26.2 Pollution hazard indices for different land use classifications

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

Notes
1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

3.31. In reference to Table 26.4 – 'Indicative SuDS mitigation indices for discharges to groundwater' (CIRIA C753, 2015) the inclusion of 300mm minimum depth of soils with good contamination attenuation potential provide the following mitigation:

TSS = 0.4

Metals = 0.3

Hydrocarbons = 0.3

3.32. The underlying soils must provide good contaminant attenuation potential (e.g. as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater.

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Figure 4: CIRIA C753, 2015. Table 26.4 – 'Indicative SuDS mitigation indices for discharges to groundwater'

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Notes

1 All designs must include a minimum of 1 m unsaturated depth of aquifer material between the infiltration surface and the maximum likely groundwater level (as required in infiltration design – Chapter 25).

2 For example as recommended in Sniffer (2008a and 2008b), Scott Wilson (2010) or other appropriate guidance.

3 Alternative depths may be considered where it can be demonstrated that the combination of the proposed depth and soil characteristics will provide equivalent protection to the underlying groundwater – see note 1.

4 If significant volumes of sediment are allowed to enter an infiltration system, there will be a high risk of rapid clogging and subsequent system failure.

5 See Chapter 14 for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: www.britishwater.co.uk/Publications/codes-of-practise.aspx

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution, where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

3.33. The inclusion of a soakaway only provides sufficient pollution mitigation for the pavilion but does not provide adequate pollution mitigation to the road areas.

3.34. The inclusion Proprietary devices in the form of catchpits will be installed within the surface water network to trap and contain sediment, pollutants and contaminants. The car parking areas are to be assessed for the requirement of a petrol interceptor to provide further pollution mitigation.

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4. SuDS MANAGEMENT & MAINTENANCE PLAN

Management & Maintenance

4.1. Maintenance refers to the inspections required to identify performance issues and plan maintenance as required, operation and maintenance of the drainage system, landscape management and waste management associated with contaminated silt and other waste materials resulting from maintenance.

4.2. CIRIA C753 The SuDS Manual provides information in Chapter 32 for the Operation and maintenance of SuDS. The maintenance activities are broadly defined as regular, occasional and remedial maintenance. It is noted that some scenarios may require one-off maintenance activities. The SuDS Manual defines maintenance as –

- Regular Maintenance: consists of basic tasks carried out to a frequent and predictable schedule, including inspections/monitoring, silt or oil removal if required more frequently than once a year, vegetation management, sweeping or surfaces and litter / debris removal.
- Occasional maintenance: comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks.
- Remedial maintenance: describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised with good design, constructions and regular maintenance activities.

4.3. Maintenance regimes are to be reviewed on an annual basis to ensure that the approach adopted is meeting its objectives.

4.4. All those responsible for the maintenance operations should adhere to the relevant health and safety legislation for the activities listed within this report (including lone working, if relevant). Method statements and risk assessments should always be completed prior to the undertaking of any works.

Indicative Maintenance & Management Plan

Gravity Drains & Catchpits

4.5. Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/debris removal. If maintenance is not undertaken for longs periods, deposits can become hard-packed and require more effort to remove.

Soakaways

4.6. Infiltration systems require regular maintenance to ensure the continuing operation and design performance. The key issue that affects the performance of a soakaway or infiltration system is the presence of sediments which can clog up the infiltration capability.

4.7. The table below gives a summary of the operation and maintenance requirements –

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SOAKAWAYS	
Regular Maintenance	**Frequency**
Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
Trimming of any roots that may be causing blockages	Annually (or as required)
Inspect inlets, outlets and overflows for blockages, and clear if required	
Occasional Maintenance	**Frequency**
Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	**Frequency**
Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	**Frequency**
Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
Check soakaway to ensure emptying is occurring	Annually

Blockages & Spillages

Blockage

4.8. In the event of a blockage within the drainage network, the key risk is that of flooding to the surrounding area. The extent and location of flooding is dependent upon the location of the blockage and the associated storm event.

4.9. In the event of a blockage within the network, the network is to be drained down by use of suction equipment and the blockage removed.

4.10. If a blockage does occur and results in flooding, the exceedance flow routes are anticipated to flow in a westerly direction.

Spillages

4.11. Due to the nature of the development, the likelihood of a spillage is minimal.

4.12. Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

4.13. In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung. Contact the Environment Agency immediately.

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5. FOUL WATER DRAINAGE STRATEGY

Existing Drainage

5.1. A foul drain is identified to discharge in a northerly direction with connectivity to the Southern Water foul Sewerage network. It is assumed that this drain served the existing site buildings and received foul flows only.

Foul Water Strategy

5.2. It is proposed that all foul water drainage arising from the site is discharged in a northerly direction and has connectivity to the Southern Water foul sewerage network via the existing site connectivity.

5.3. A pred development enquiry will be required with Southern Water to determine if the existing sewers to the north of the site have sufficient capacity to accept the proposed sites foul flows.

5.4. Refer to drawing 5645-C-001 & 5645-C-002 entitled 'Drainage Strategy' in **Appendix E** which indicates the location and sizes of the required foul drainage provisions to serve the various development areas.

Adoption

5.5. All drainage serving the property is proposed to be private and the responsibility of the plot owners.

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6. CONCLUSIONS

6.1. This Drainage Strategy report has been developed in respects to the new sports facility comprising mixed size football pitches including artificial pitches, clubhouse, play area and associated parking at Former Fleet Leisure, Nelson Road, Northfleet, Gravesend, Kent. The key conclusions are -

- The site is a brownfield site
- Existing surface water drainage discharges to the ground. Foul flows have connectivity to the Southern Water Foul Sewerage network
- The redeveloped site increases impermeable areas
- Ground conditions have sufficient permeability to support infiltration SuDS
- SuDS are proposed for the treatment, attenuation and discharge of surface water flows in the form of cellular soakaways
- Proprietary devices are required on the networks serving parking areas to provides sufficient pollution mitigation. Proprietary devices can include catchpits and separators.
- Foul drainage is proposed to discharge to the Southern Water drainage network via existing site connectivity

6.2. The overall conclusions drawn from this drainage strategy is that the development would be appropriately safe for its lifetime taking account of the vulnerability of its users and the development would not increase flood risk elsewhere.

6.3. This report provides sufficient information to discharge planning conditions 8 & 9 of planning application reference 20200001.

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APPENDICES

Gravesham Borough Council

APPENDIX A

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original sheet size **A1**

Key_Boundary Treatments - Proposed
1 : 50

Acoustic Timber fence

Tech. Area
11v11
Grass Pitch
11v11
AGP
9v9
Grass Pitch
Phase 2
Main Building
9v9
AGP
emergency access
Plant Room
Refuse / cycle store
Play area
Maintenance Store
5v5
Pitch
7v7
AGP
5v5
Pitch
Site Entrance
NELSON ROAD
STRUTTONS AVENUE
SNELLING AVENUE
NORTH

Gravesham Borough Council

Site Plan - Proposed
1 : 500

0 10 m 20 m 50 m

Rev	Description	By	Date
B	refuse store, maintenance store, plant room relocated	jmp	03.09.2021
A	updated site plan	jmp	17.06.2021

gcp Chartered Architects
ARCHITECTURE | CONSULTING
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Corum Office Park
Crown Way
Warmley
Bristol BS30 8FJ
0117 967 6286
mail@gcparch.co.uk
www.gcparch.co.uk

Project Title:
Kedbull Leisure

Drawing Title:
Site Plan - Proposed

Drawn By: Author **Date:** 06/16/21
Checked By: Checker **Scale:** As indicated@A1
Drawing No: 21030 / Sk2 **Rev:** B
Status: FOR INFORMATION

APPENDIX B

Gravesham Borough Council



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LEGEND

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- BH Borehole
- BL Base Level
- BO Bollard
- BP Brick Pillar
- BPav Brick Paving
- BRW Brick Wall
- BS Bus Stop
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- CPS Concrete Paving Slabs
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- CW Concrete Wall
- DC Drainage Channel
- DIL Dilapidated
- DP Down Pipe
- DPC Damp Proof Course
- EIC Electric Inspection Cover
- EL Eaves Level
- EP Electric Pole
- ER Earth Rod
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- FFL Finished Floor Level
- FH Fire Hydrant
- FL Flood Light
- FP Flag Pole
- G Gully
- GB Grit Box
- GIC Gas Inspection Cover
- GM Gas Meter
- GP Gas Pipe
- GV Gas Valve
- Ht Height (in meters)
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- IC(C) (C)Combined (F)Foul (S)Storm
- IL Invert Level
- JB Junction Box
- LP Lamp Post
- MB Multi Boled Tree
- MK Service Marker
- MRF Metal Railing Fence
- NP Name Plate
- OBF Open Board Fence
- PB Post Box
- PCF Post & Chain Fence
- PM Parking Meter
- PNF Panel Fence
- PRF Post & Rail Fence
- PRL Parapet Wall Level
- PWF Post & Wire Fence
- RE Rodding Eye
- RL Ridge Level
- RS Road Sign
- RTW Retaining Wall
- RWP Rain Water Pipe
- SEG Side Entry Gully
- SI Sign
- SSL Structural Slab Level
- STN Survey Station
- STW Stone Wall
- SU Step Up
- SV Stop Valve (W) Water (G) Gas
- SVP Soil Vent Pipe
- TAC Tactile Paving
- Tap Attached to Wall etc
- TCB Telephone Call Box
- TEP Telegraph & Electric Pole
- THL Threshold Level
- TIC Telecom Inspection Cover
- TM Ticket Machine
- TL Traffic Light
- TLCB Traffic Light Control Box
- TP Telegraph Pole
- TWL Top Of Wall Level
- UTL Unable To Lift
- WIC Water Inspection Cover
- WM Water Meter
- WMF Wire Mesh Fence
- WO Water Wash Out
- WTL Water Level
- VP Vent Pipe

Tree Species

- AC Acer
- AL Alder
- AS Ash
- BE Beech
- CE Cedar
- CH Cherry
- CY Cypress
- DE Dead
- EL Elm
- FR Fruit
- HA Hawthorn
- HB Hornbeam
- HC Horse Chestnut
- HY Holly
- HZ Hazel
- LA Larch
- LB Laburnum
- LI Lime
- LN London Plane
- LO Locust
- MA Maple
- MG Magnolia
- OA Oak
- PI Pine
- PO Poplar
- RO Rowan
- SB Silver Birch
- SC Sweet Chestnut
- SP Spruce
- ST Stump
- SY Sycamore
- U Unidentified
- WA Walnut
- WB Whitebeam
- WI Willow
- YE Yew

Line Types

- Steps / Ramps
- Top / Bottom of Banking
- Bushes / Vegetation
- Change of Surface
- Detail
- Overhead Structure
- —T— Telecom Overhead
- —T & E— Telecom & Power Overhead
- —E— Power Overhead
- Fence
- Building Face
- Drop Kerb
- Kerb
- Wall / Structure
- Single Gate
- Double Gate
- Banking
- △ Survey Station

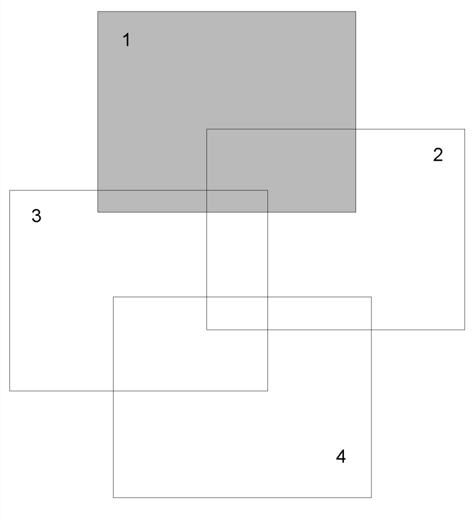
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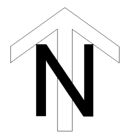
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Do not scale from this drawing.
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Eave levels are taken at the bottom of the lowest roof tile.
It is recommended that all invert levels and pipe sizes be checked prior to construction.
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SHEET LAYOUT





Drawing Revisions

Rev No.	Date	Details
Original	See below	Original survey carried out

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Enquiries: survey@OmegaGeo.co.uk

CLIENT	EUFC ELITE LIMITED		
PROJECT	PLAYING FIELDS, NELSON ROAD NORHFLEET, GRAVESEND KENT, DA11 7EE		
TITLE	TOPOGRAPHICAL SURVEY		
ORIGINAL SURVEY DATE	FEBRUARY 2019		
SCALE	1:200 @ A0	DWG. No.	1 OF 4
JOB Ref.	19-0631	CAD FILE	TOPO_03

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LEGEND

BEB	Bellsha Beacon	MB	Multi Bolted Tree
BH	Borehole	MK	Service Marker
BL	Base Level	MRF	Metal Railing Fence
BO	Bollard	NP	Name Plate
BP	Brick Pier	OBF	Open Board Fence
BPav	Brick Paving	OF	Open Fence
BRW	Brick Wall	PCP	Post & Chain Fence
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BT	Bollard Light	PO	Post Office
CBF	Close Board Fence	PRF	Post & Rail Fence
CL	Cover Level	PWL	Parapet Wall Level
CLF	Chain Link Fence	RF	Railway Fence
Conc	Concrete	RE	Rodding Eye
CPF	Chestnut Paling Fence	RL	Ridge Level
CPO	Concrete Post	RS	Road Sign
CPS	Concrete Paving Slabs	RTW	Retaining Wall
CRW	Concrete Retaining Wall	SBF	Stock Brick Pier
CW	Concrete Wall	SEG	Side Entry Gully
DC	Drainage Channel	SI	Sign
DP	Down Pipe	SLS	Structural Slab Level
DP	Down Pipe	STN	Survey Station
DPC	Damp Proof Course	STW	Stone Wall
EC	Electric Meter Protection Cover	SV	Sluice Valve
EL	Eaves Level	SV	Stop Valve (W) Water (G) Gas
EP	Electric Pole	SVP	Soil Vent Pipe
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GC	Gas Protection Cover	TLC	Traffic Light Control Box
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GP	Gas Pipe	TWL	Top Of Wall Level
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HI	Height (in meters)	WC	Water Injection Cover
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IC(C)	(C)Combined (F)Foul (S)Storm	WMF	Wire Mesh Fence
IL	Invert Level	WO	Water Wash Out
LP	Lamp Post	WP	Water Level
LP	Lamp Post	VP	Vent Pipe

Tree Species

AC	Acer	HC	Horse Chestnut	PO	Poplar
AL	Alder	HT	Holly	RO	Rowan
AS	Ash	HZ	Hazel	BB	Silver Birch
BE	Beech	LA	Larch	SC	Sweet Chestnut
DE	Dead	LB	Laburnum	SP	Spruce
CH	Cherry	LI	Lime	ST	Sycamore
CY	Cypress	LH	London Plane	SY	Sycamore
DE	Dead	LO	Locust	U	Unidentified
EL	Elm	MA	Maple	WA	Walnut
FI	Fir	MG	Magnolia	WB	Whitebeam
HA	Hawthorn	OA	Oak	WI	Willow
HB	Hornbeam	PI	Pine	YE	Yew

Line Types

Steps / Ramps
Top / Bottom of Banking
Bushes / Vegetation
Change of Surface
Kerb
Overhead Structure
Telecom Overhead
Telecom & Power Overhead
Power Overhead
Fence
Building Face
Drop Kerb
Kerb
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Single Gate
Double Gate
Banking
Survey Station

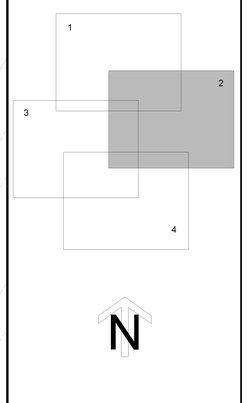
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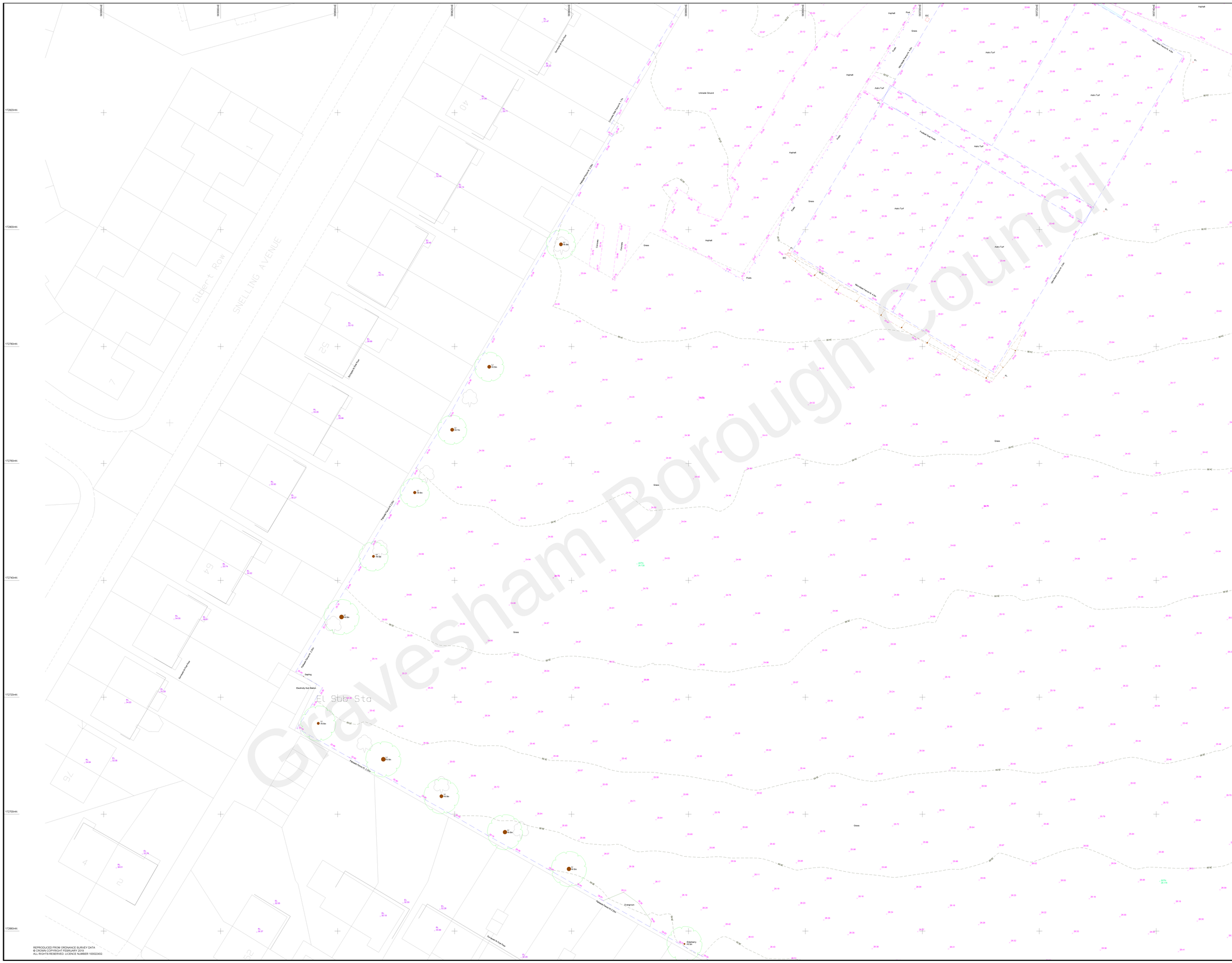
PROJECT
PLAYING FIELDS, NELSON ROAD
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SCALE	1:200 @ A0	DWG. No.	2 OF 4
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Gravesham Borough Council



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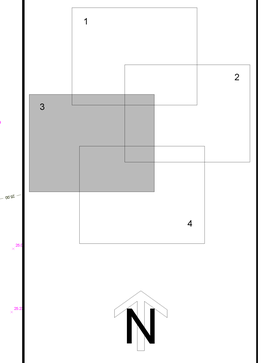
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TITLE TOPOGRAPHICAL SURVEY

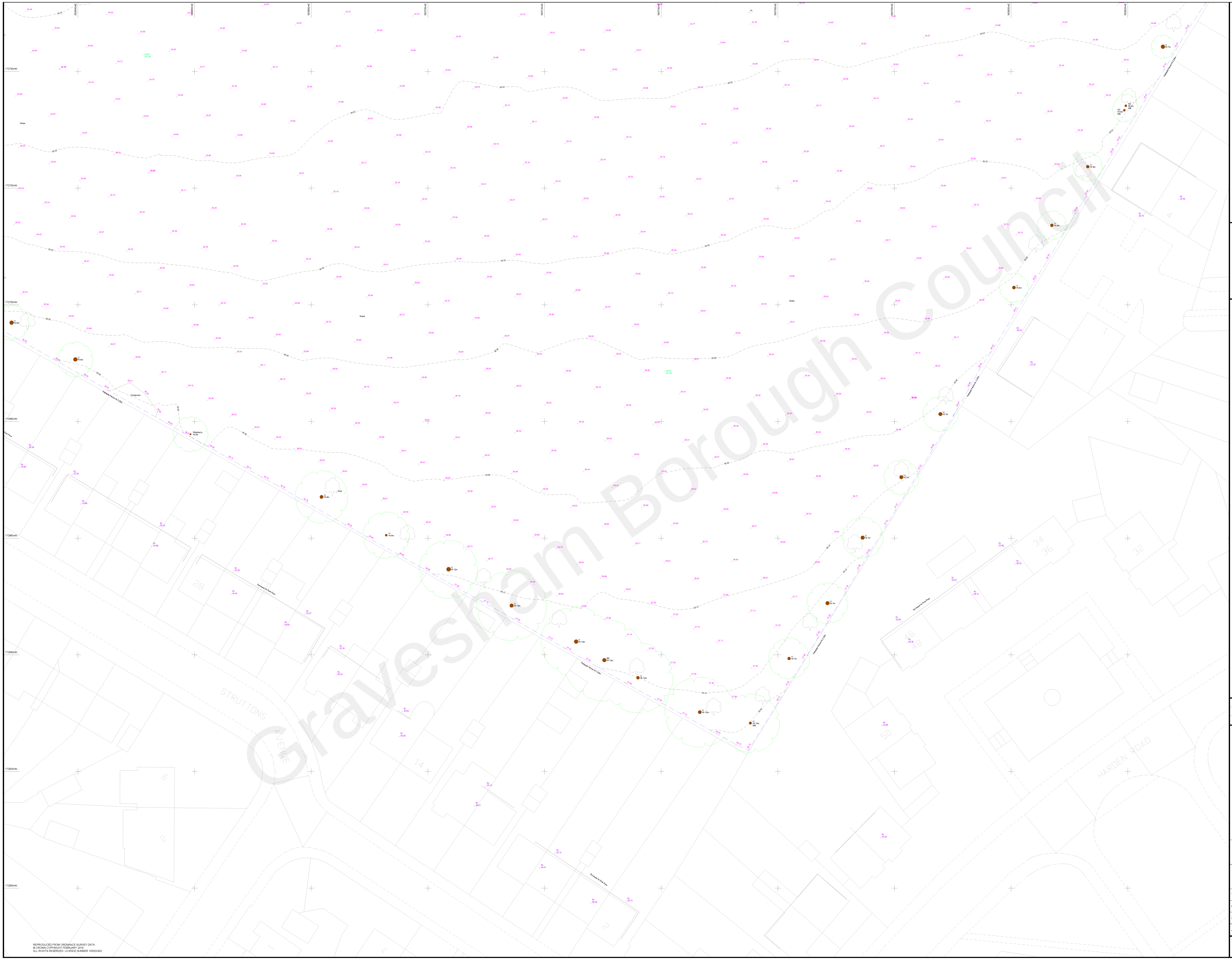
ORIGINAL SURVEY DATE FEBRUARY 2019

SCALE 1:200 @ A0 | DWG. No. 3 OF 4

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FP	Flag Pole	TIC	Telecom Inspection Cover
G	Gully	TM	Ticket Machine
GB	Grit Box	TL	Traffic Light
GIC	Gas Inspection Cover	TLCB	Traffic Light Control Box
GM	Gas Meter	TP	Telegraph Pole
GP	Gas Pipe	TWL	Top Of Wall Level
GV	Gas Valve	UTL	Unable To Lift
Ht	Height (in meters)	WIC	Water Inspection Cover
IC	Inspection Cover	WM	Water Meter
IC(C)	(C)Combined (F)Foul (S)Storm	WMF	Wire Mesh Fence
IL	Invert Level	WO	Water Wash Out
JB	Junction Box	WTL	Water Level
LP	Lamp Post	VP	Vent Pipe

Tree Species

AC	Acer	HC	Horse Chestnut	PO	Poplar
AL	Alder	HY	Holly	RO	Rowan
AS	Ash	HZ	Hazel	SB	Silver Birch
BE	Beech	LA	Larch	SC	Sweet Chestnut
CE	Cedar	LB	Laburnum	SP	Spruce
CH	Cherry	LI	Lime	ST	Stump
CY	Cypress	LN	London Plane	SY	Sycamore
DE	Dead	LO	Locust	U	Unidentified
EL	Elm	MA	Maple	WA	Walnut
FR	Fruit	MG	Magnolia	WB	Whitebeam
HA	Hawthorn	OA	Oak	WI	Willow
HB	Hornbeam	PI	Pine	YE	Yew

Line Types

Steps / Ramps	Fence
Top / Bottom of Banking	Building Face
Bushes / Vegetation	Drop Kerb
Change of Surface	Kerb
Detail	Wall / Structure
Overhead Structure	Single Gate
Telecom Overhead	Double Gate
Telecom & Power Overhead	Banking
Power Overhead	Survey Station

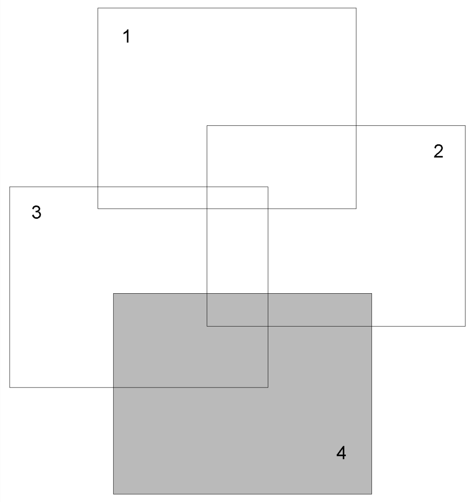
NOTES

All levels and coordinates are related to the Ordnance Survey national grid by means of GPS using the Leica Smartnet RTK network. One survey control point has been fixed using GPS and then the survey orientated to an additional GPS points. No scale factor has been applied therefore only the fixed GPS point is a true Ordnance Survey position.

All dimensions are in meters.
Do not scale from this drawing.
Tree girths and canopy spreads are surveyed as a mean size and shown to scale. Tree heights are quoted based on an estimation taken from the ground and have not been accurately confirmed. Whilst every effort is made to identify tree species and sizes, no responsibility can be taken for the accuracy of this information and an Arborologist should be consulted for confirmation.
Eave levels are taken at the bottom of the lowest roof tile.
It is recommended that all invert levels and pipe sizes be checked prior to construction.
Drawing correct at time of survey and to scale.
Any setting out works should be undertaken using Omega Geomatics Ltd survey control only.

An Ordnance Survey map is shown in the background in grey. Omega Geomatics Ltd takes no responsibility for the accuracy of this information. Its purpose on this drawing is as a guide only and should not be relied upon.

SHEET LAYOUT



N

Drawing Revisions

Rev No.	Date	Details
Original	See below	Original survey carried out

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Enquiries: survey@OmegaGeo.co.uk

CLIENT
EUFC ELITE LIMITED

PROJECT PLAYING FIELDS, NELSON ROAD
NORHFLEET, GRAVESEND
KENT, DA11 7EE

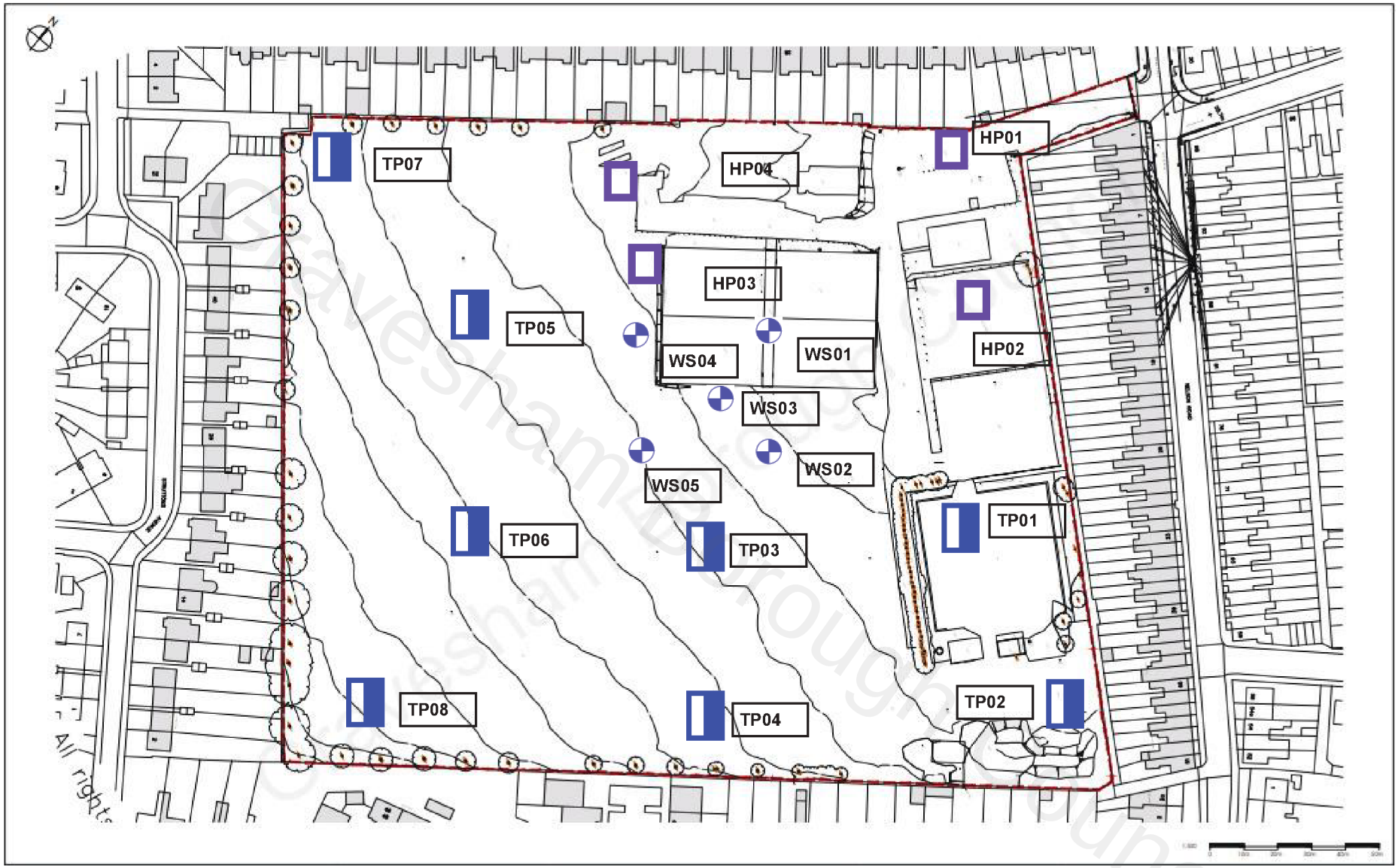
TITLE TOPOGRAPHICAL SURVEY

ORIGINAL SURVEY DATE	FEBRUARY 2019		
SCALE	1:200 @ A0	DWG. No.	4 OF 4
JOB Ref.	19-0631	CAD FILE	TOPO_03

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APPENDIX C

Gravesham Borough Council



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This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Former Fleet Leisure, Gravesend, DA11 7EE	SCALE: NTS	JOB NO: 4176	SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Exploratory Hole Plan	REV: 01	FIGURE NO: 04	

Appendix E

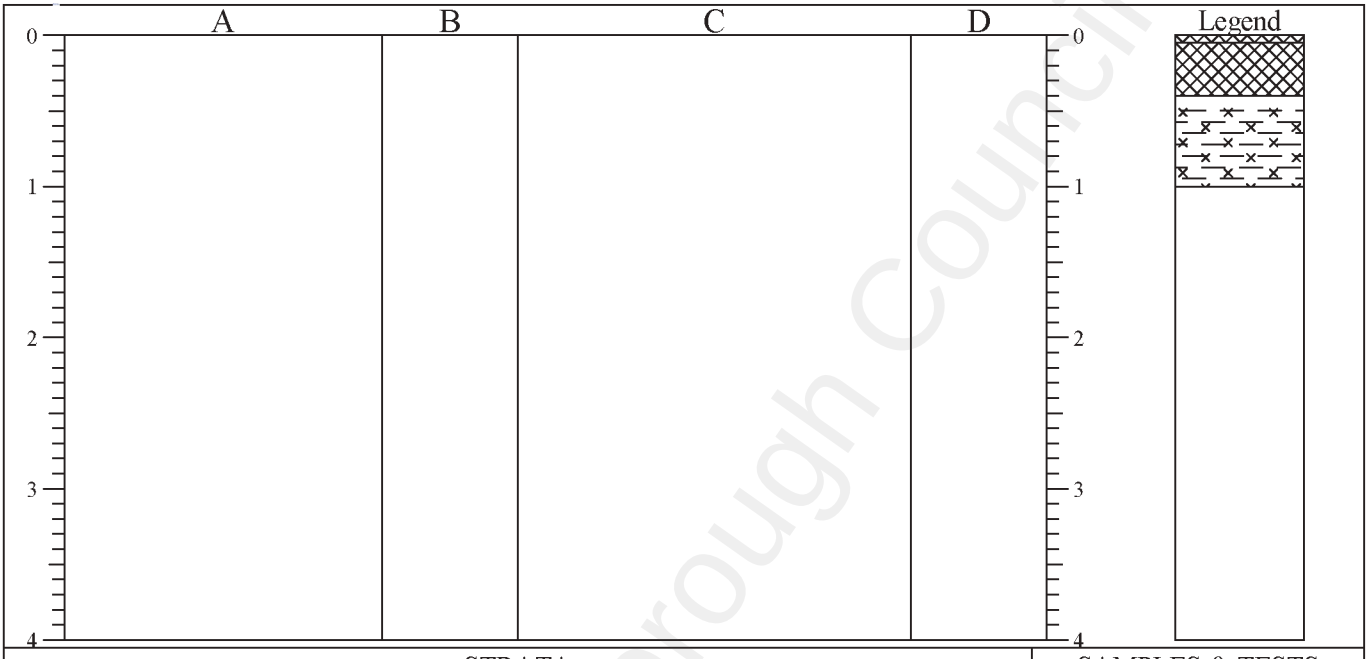
Exploratory Hole Records

Gravesham Borough Council

SEVENOAKS ENVIRONMENTAL CONSULTANCY

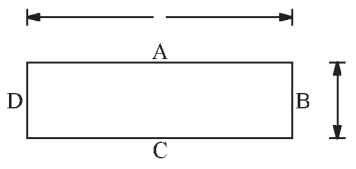
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				HP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.05		MADE GROUND: Tarmac	0.05	D	
0.05-0.40		MADE GROUND: Dark grey slightly sandy Gravel with occasional fine to coarse subrounded cobbles as brick. Sand is fine to coarse. Gravel is as frequent fine to coarse subrounded tarmac, frequent fine to coarse subrounded to subangular concrete, occassional coarse subrounded bricks.	0.20	D	
0.46-1.00		Light brown slightly sandy gravelly sandy silty CLAY. Gravel is as frequent subangular to subrounded fine to coarse flint. @ 0.75m bgl band of gravel of frequent subrounded fine to coarse sandstone.	0.60	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used Hand Pitting Tools	Logged By RD

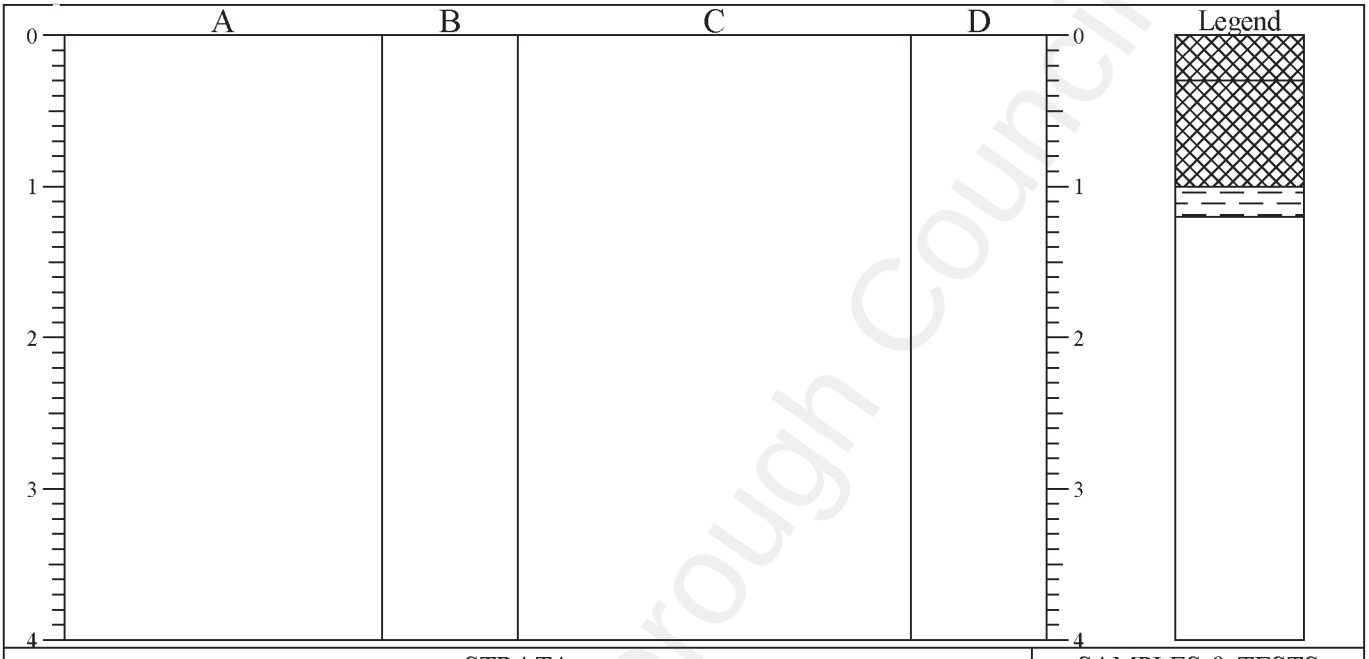
AGS3 UK TP 4176 FORMER FLEET LEISURE.GPJ AGS3_ALL.GDT 20/8/21

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SEVENOAKS ENVIRONMENTAL CONSULTANCY

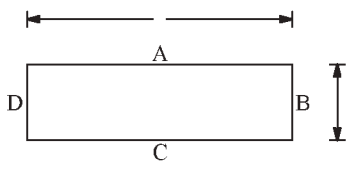
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				HP02
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		MADE GROUND: Light brown greyish sandy silty Clay with occasional rootlets (topsoil)			
0.30-1.00		MADE GROUND: Light brown greyish sandy silty Clay with occasional rootlets, rare fine to medium angular flint and old fence wire	0.20 0.50	D D	
1.00-1.20		Firm brown fine to coarse sandy CLAY	1.10	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

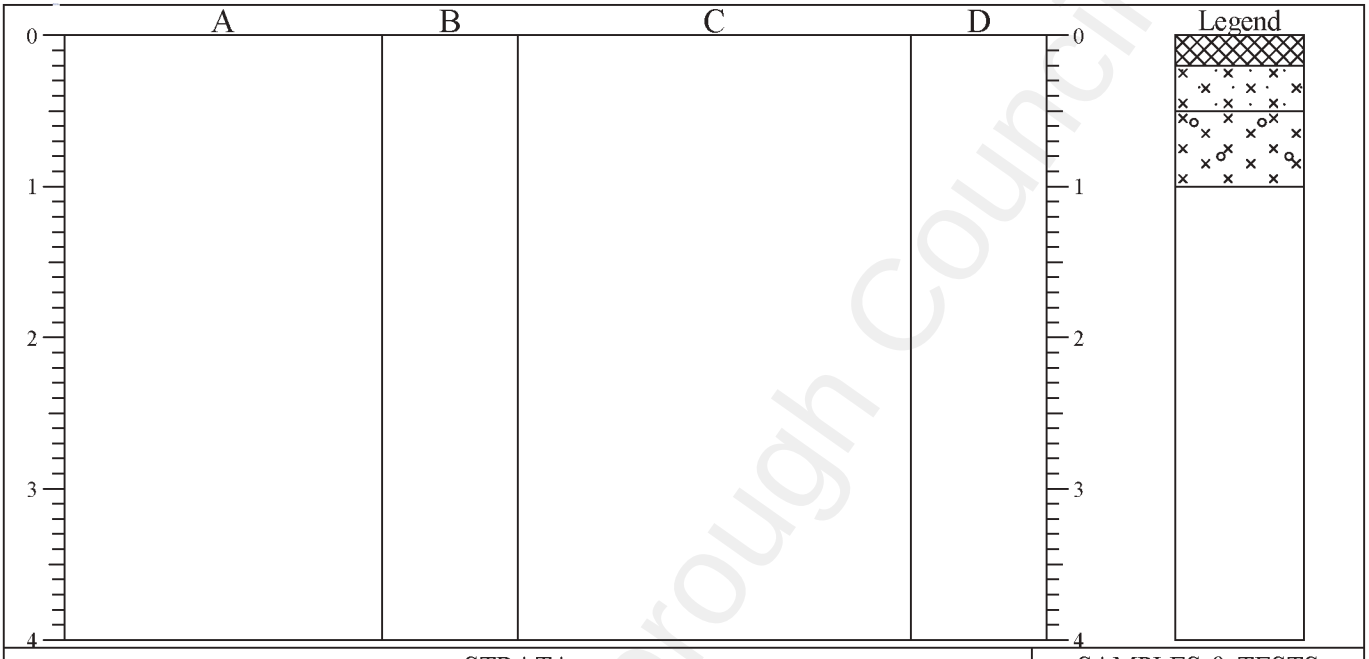
All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used JCB 3CX	Logged By SDW

Gravesham Borough Council

SEVENOAKS ENVIRONMENTAL CONSULTANCY

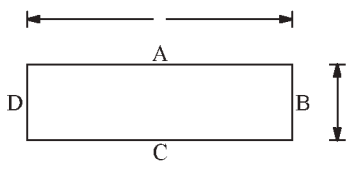
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				HP03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Grass over dark brown slightly sandy gravelly Silt. Gravel is as numerous subrounded to subangular fine to coarse flint and limestone.			
0.20-0.50		Light brown slightly gravelly silty fine SAND. Gravel is as subrounded to subangular fine to coarse frequent flint and sandstone.	0.30	D	
0.50-1.00		Light brown slightly sandy gravelly SILT. Gravel is as frequent fine to coarse subangular to subrounded flint.	0.75	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used Hand Pitting Tools	Logged By RD

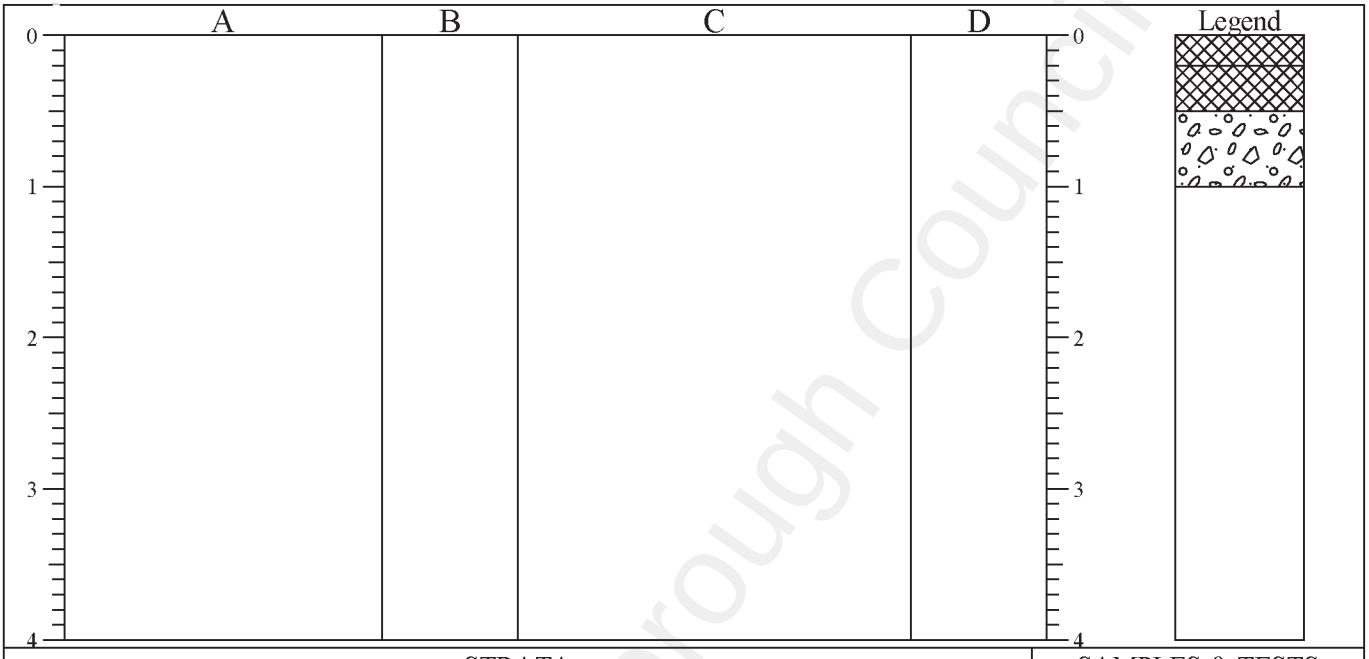
AGS3 UK TP 4176 FORMER FLEET LEISURE.GPJ AGS3_ALL.GDT 20/8/21

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SEVENOAKS ENVIRONMENTAL CONSULTANCY

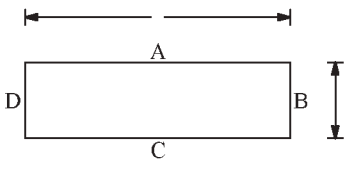
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				HP04
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Grass over dark brown slightly sandy slightly gravelly SILT. Sand is fine. Gravel is as numerous fine to coarse subrounded flint.			
0.20-0.50		MADE GROUND: Light brown silty clayey very gravelly SAND. Gravel is as frequent fine to coarse subangular to subrounded flint, rare fine to coarse subrounded brick.	0.40	D	
0.50-1.00		Light brown slightly sandy GRAVEL. Gravel is as frequent subangular fine to coarse flint.	0.80	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used Hand Pitting Tools	Logged By RD

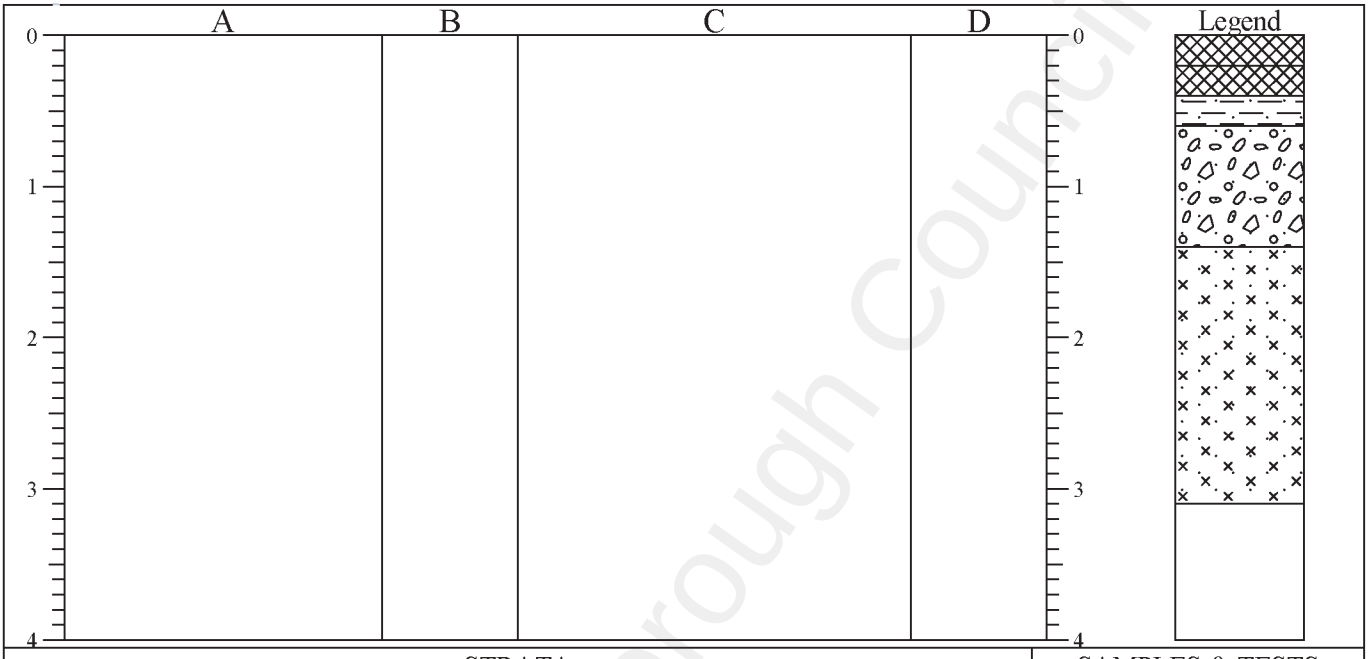
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SEVENOAKS ENVIRONMENTAL CONSULTANCY

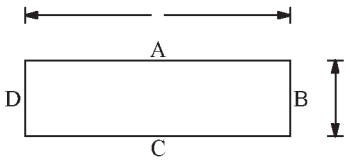
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				TP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Light brown greyish sandy silty Clay with occasional rootlets (topsoil)	0.10	D	
0.20-0.40		MADE GROUND: Greyish brown ashy sub-base material (possible sub-base to the bowling green)	0.30	D	
0.40-0.60		Soft to firm light brown slightly sandy CLAY	0.50	D	
0.60-1.40		Medium dense brown slightly clayey fine to coarse sandy GRAVEL. Gravel comprises frequent fine to cobble sub to well rounded flint	0.80	D	
			1.20	D	
1.40-3.10		firm to stiff grey fine to medium sandy SILT	1.90	D	
			2.40	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used JCB 3CX	Logged By SDW

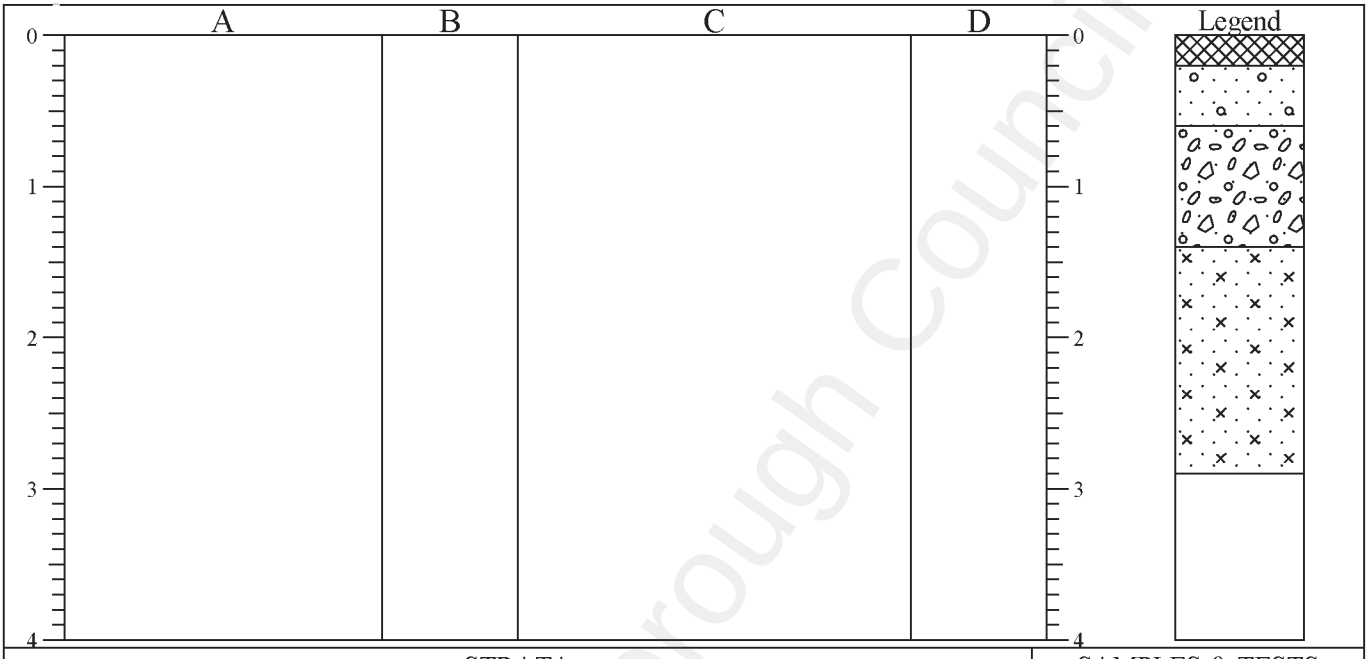
AGS3 UK TP 4176 FORMER FLEET LEISURE.GPJ AGS3_ALL.GDT 20/8/21

Gravesham Borough Council

SEVENOAKS ENVIRONMENTAL CONSULTANCY

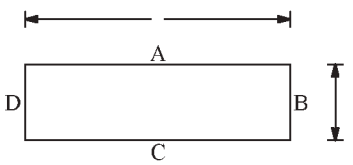
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				TP02
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Light brown greyish sandy silty Clay with occasional rootlets (topsoil)	0.10	D	
0.20-0.60		Medium dense brown gravelly fine to coarse SAND. Gravel comprises occasional fine to coarse angular flint	0.30	D	
0.60-1.40		Medium dense brown fine to coarse sandy GRAVEL. Gravel comprises frequent fine to cobble angular flint	0.50	D	
			0.80	D	
			1.20	D	
1.40-2.90		Firm to stiff grey very silty SAND	1.80	D	
			2.50	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used JCB 3CX	Logged By SDW

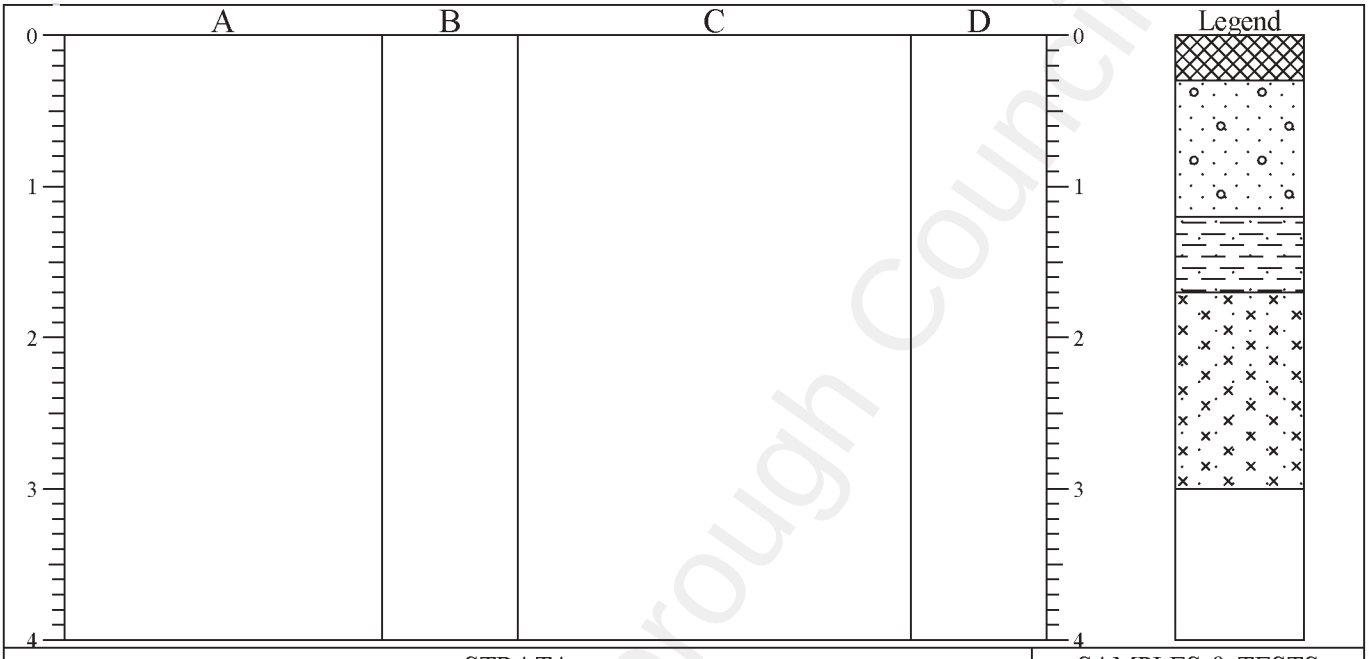
Gravesham Borough Council

AGS3 UK TP 4176 FORMER FLEET LEISURE.GPJ AGS3_ALL.GDT 20/8/21

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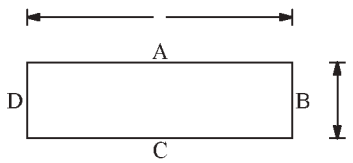
TRIAL PIT LOG

Project				TRIAL PIT No
Geotechnical Site Investigation				TP03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
4176	18-06-21 18-06-21			
Contractor				Sheet
Sevenoaks Environmental Consultancy Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		MADE GROUND: Light brown greyish sandy silty Clay with occasional rootlets (topsoil)			
0.30-1.20		Medium dense brown gravelly fine to coarse SAND. Gravel comprises occasional fine to coarse angular flint	0.70	D	
1.20-1.70		Firm brown fine to coarse sandy CLAY	1.50	D	
1.70-3.00		Firm to stiff orangish grey fine sandy SILT	2.50	D	

Shoring/Support:
Stability:





GENERAL REMARKS

No groundwater encountered

All dimensions in metres Scale 1:50	Client Harris Evolution Ltd	Method/ Plant Used JCB 3CX	Logged By SDW

AGS3 UK TP 4176 FORMER FLEET LEISURE.GPJ AGS3_ALL.GDT 20/8/21

Gravesham Borough Council

Appendix H

BRE365 Soakage and Falling Head Test Data

Gravesham Borough Council

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 4176
Site: Former Fleet Centre

Job Number	4176
Borehole Location	WS01
Test No.	Test 1
GW Dip Prior to test (m)	Dry
Plumb Depth from ground (m)	4.26
Vol of water added (l)	12
Borehole diameter	40mm
Date	02/07/2021

WS03 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head from ground (m)
0	00:00:00	0.71	3.55
30	00:00:30	1.25	3.01
45	00:00:45	1.32	2.94
60	00:01:00	1.35	2.91
90	00:01:30	1.38	2.88
120	00:02:00	1.4	2.86
150	00:02:30	1.41	2.85
180	00:03:00	1.42	2.84
210	00:03:30	1.43	2.83
240	00:04:00	1.44	2.82
300	00:05:00	1.44	2.82
360	00:06:00	1.44	2.82
420	00:07:00	1.49	2.77
480	00:08:00	1.51	2.75
555	00:09:15	1.53	2.73
600	00:10:00	1.52	2.74
660	00:11:00	1.56	2.70
720	00:12:00	1.58	2.68
780	00:13:00	1.6	2.66
840	00:14:00	1.63	2.63
960	00:16:00	1.68	2.58
1080	00:18:00	1.78	2.48
1200	00:20:00	1.88	2.38
1500	00:25:00	1.99	2.27
3150	00:39:00	2.15	2.11
3600	00:53:00	2.35	1.91
3900	01:05:00	2.50	1.76
5100	01:25:00	2.72	1.54
6600	01:50:00	2.93	1.33
8340	02:19:00	3.09	1.17
10,680	02:58:00	3.27	0.99
14,040	03:54:00	3.48	0.78
15,840	04:24:00	3.59	0.67
17,220	04:47:00	3.67	0.59
18,000	05:00:00	3.71	0.55

Gravesham Borough Council

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Falling Head Test Results
Ref: 4176
Site: Former Fleet Centre

Job Number	4176
Borehole Location	WS05
Test No.	Test 1
GW Dip Prior to test (m)	Dry
Plumb Depth from ground (m)	4.00
Vol of water added (l)	17
Borehole diameter	50mm
Date	02/07/2021

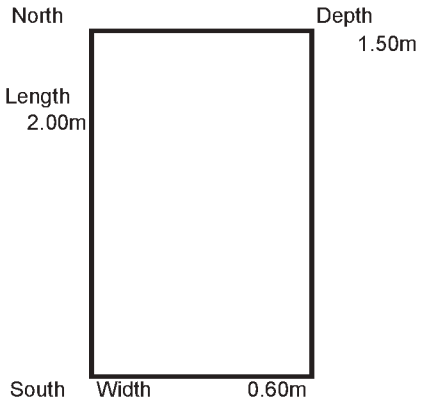
WS03 Test 1			
t (s)	t (h:m:s)	Dip (m bgl)	Head from ground (m)
0	00:00:00	1.76	2.24
15	00:00:15	1.77	2.23
30	00:00:30	1.78	2.22
45	00:00:45	1.79	2.21
60	00:01:00	1.80	2.20
90	00:01:30	1.80	2.20
120	00:02:00	1.80	2.20
150	00:02:30	1.81	2.19
180	00:03:00	1.82	2.18
210	00:03:30	1.83	2.17
240	00:04:00	1.83	2.17
270	00:04:30	1.84	2.16
300	00:05:00	1.85	2.15
480	00:08:00	0.91	3.09
540	00:09:00	0.93	3.07
660	00:11:00	0.96	3.04
720	00:12:00	0.97	3.03
780	00:13:00	0.99	3.01
840	00:14:00	2.00	2.00
960	00:16:00	2.03	1.97
1080	00:18:00	2.06	1.94
1320	00:22:00	2.11	1.89
1500	00:25:00	2.15	1.85
1800	00:30:00	2.21	1.79
2400	00:40:00	2.32	1.68
3000	00:50:00	2.43	1.57
3600	01:00:00	2.59	1.41
4320	01:12:00	2.73	1.27
6240	01:44:00	3.13	0.87
8,400	02:20:00	3.53	0.47

Gravesham Borough Council

4176	TP03		
Soakage Test 1		Test 2	Test 3
Time (Minutes)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)
0	0.77		
1	0.77		
3	0.81		
5	0.81		
8	0.81		
10	0.82		
20	0.84		
30	0.85		
90	0.91		
120	0.93		
180	0.95		
210	0.96		

Water used ~600 litres

Trial Pit Parameters



Gravesham Borough Council

4176	TP05		
Soakage Test 1		Test 2	Test 3
Time (Minutes)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)
0	0.78		
1	0.82		
2	0.84		
3	0.84		
5	0.84		
10	0.84		
30	0.85		
60	0.86		
90	0.86		
120	0.86		
150	0.86		
180	0.86		
210	0.89		

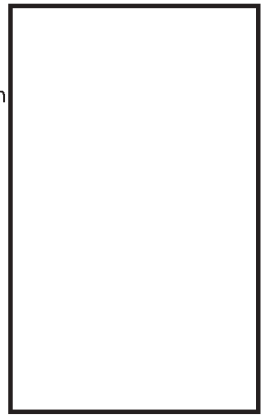
Water used ~600 litres

Trial Pit Parameters

North

Depth 1.50m

Length 2.10m



South

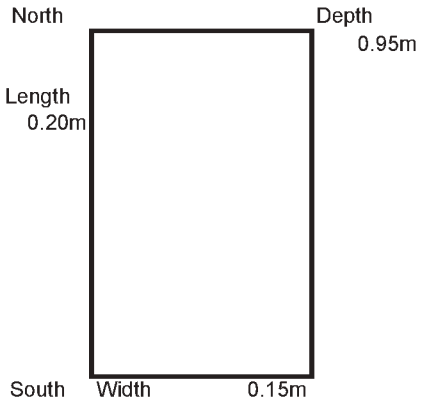
Width 0.60m

Gravesham Borough Council

4176	HP01		
Soakage Test 1		Test 2	Test 3
Time (Minutes)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)
0	0.5		
1	0.56		
2	0.59		
3	0.62		
5	0.65		
7	0.68		
12	0.73		
16	0.75		
20	0.77		
25	0.79		
30	0.81		
60	0.86		
90	0.86		
120	0.86		
180	0.9		

Water used ~30 litres

Trial Pit Parameters

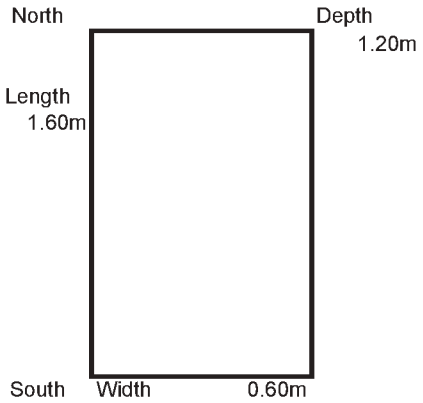


Gravesham Borough Council

4176	HP02		
Soakage Test 1		Test 2	Test 3
Time (Minutes)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)
0	0.6		
1	0.63		
2	0.65		
5	0.65		
30	0.67		
45	0.67		
60	0.68		

Water used ~100 litres

Trial Pit Parameters



Gravesham Borough Council

Job Number	4176
Site Location	Former Fleet Leisure
Hole ID	TP03
Test Number	1
Date	18/06/2021

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Input
Calculation
Output

Type of Test	Trial Pit
How was water depth measured?	Depth from top of pit to water level (m)
Time (seconds or minutes)	Minutes
Pit length (m)	2
Pit width (m)	0.6
Pit depth (m)	1.5
Max water level (m)	**0.73**
25% Max water level (m)	**0.183**
25% reached? Yes or No	NO
Effective depth difference (m)	**0.19**
25% Effective depth level (m)	**0.588**
75% Effective depth level (m)	**0.683**
Lower limit for measurement	25%
Upper limit for measurement	75%
Base (m2)	**1.2**
Sides (m2)	**1.46** *Up to 50% of effective depth*
Ends (m2)	**0.438** *Up to 50% of effective depth*
a_{p50} (m2)	**3.098** *Up to 50% of effective depth*
V_{p75} (m3)	**0.819** *The volume at 75% effective depth*
V_{p25} (m3)	**0.705** *The volume at 25% effective depth*
V_{p75-25} (m3)	**0.114** *Difference in volume*

75% Max water level (m) **0.548**

If 25% was reached, then the test is as per BRE365 Procedure. Otherwise effective depth is used.

These values are based on max water level if 25% Max Water Level was reached during the test. Otherwise, they are based on the difference in depth between the last measurement and the start of the test

Interpolation between	tp75	Vp75	
lower	**8**	**0.828**	*The reading just before Vp75*
upper	**10**	**0.816**	*The reading just after Vp75*
Interpolation between	tp25	Vp25	
lower	**90**	**0.708**	*The reading just before Vp25*
upper	**120**	**0.684**	*The reading just after Vp25*

t_{p75} (mins)	**9.5**
t_{p25} (mins)	**93.8**
t_{p75-25} (mins)	**84.3**

Soil Infiltration Rate

m/s	m/h
7.28E-06	**0.026206**

The test failed to reach 25% total depth. The above infiltration rate is not fully compliant with BRE365 procedure

Time	Depth from Top of Pit to Water Level (m)	Water Level (m)	Volume
0	0.77	**0.73**	**0.876**
1	0.77	**0.73**	**0.876**
3	0.81	**0.69**	**0.828**
5	0.81	**0.69**	**0.828**
8	0.81	**0.69**	**0.828**
10	0.82	**0.68**	**0.816**
20	0.84	**0.66**	**0.792**
30	0.85	**0.65**	**0.780**
90	0.91	**0.59**	**0.708**
120	0.93	**0.57**	**0.684**
180	0.95	**0.55**	**0.660**
210	0.96	**0.54**	**0.648**

Gravesham Borough Council

Job Number	4176
Site Location	Former Fleet Leisure
Hole ID	TP05
Test Number	1
Date	18/06/2021

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Input
Calculation
Output

Type of Test	Trial Pit
How was water depth measured?	Depth from top of pit to water level (m)
Time (seconds or minutes)	Minutes
Pit length (m)	2.1
Pit width (m)	0.6
Pit depth (m)	1.5
Max water level (m)	**0.72**
25% Max water level (m)	**0.180**
25% reached? Yes or No	NO
Effective depth difference (m)	**0.11**
25% Effective depth level (m)	**0.638**
75% Effective depth level (m)	**0.693**
Lower limit for measurement	25%
Upper limit for measurement	75%
Base (m2)	**1.26**
Sides (m2)	**1.512**
Ends (m2)	**0.432**
a_{p50} (m2)	**3.204**
V_{p75} (m3)	**0.873**
V_{p25} (m3)	**0.803**
V_{p75-25} (m3)	**0.069**

75% Max water level (m) **0.540**

If 25% was reached, then the test is as per BRE365 Procedure. Otherwise effective depth is used.

These values are based on max water level if 25% Max Water Level was reached during the test. Otherwise, they are based on the difference in depth between the last measurement and the start of the test

Up to 50% of effective depth

Up to 50% of effective depth

Up to 50% of effective depth

The volume at 75% effective depth

The volume at 25% effective depth

Difference in volume

	Time	Depth from Top of Pit to Water Level (m)	Water Level (m)	Volume
	0	0.78	**0.72**	**0.907**
	1	0.82	**0.68**	**0.857**
	2	0.84	**0.66**	**0.832**
	3	0.84	**0.66**	**0.832**
	5	0.84	**0.66**	**0.832**
	10	0.84	**0.66**	**0.832**
	30	0.85	**0.65**	**0.819**
	60	0.86	**0.64**	**0.806**
	90	0.86	**0.64**	**0.806**
	120	0.86	**0.64**	**0.806**
	150	0.86	**0.64**	**0.806**
	180	0.86	**0.64**	**0.806**
	210	0.89	**0.61**	**0.769**

Interpolation between	tp75	Vp75	
lower	**0**	**0.907**	*The reading just before Vp75*
upper	**1**	**0.857**	*The reading just after Vp75*
Interpolation between	tp25	Vp25	
lower	**180**	**0.806**	*The reading just before Vp25*
upper	**210**	**0.769**	*The reading just after Vp25*

t_{p75} (mins)	**0.7**
t_{p25} (mins)	**182.5**
t_{p75-25} (mins)	**181.8**

Soil Infiltration Rate

m/s	m/h
1.98E-06	**0.007138**

The test failed to reach 25% total depth. The above infiltration rate is not fully compliant with BRE365 procedure

Gravesham Borough Council

Job Number	4176
Site Location	Former Fleet Leisure
Hole ID	HP01
Test Number	1
Date	18/06/2021

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Input
Calculation
Output

Type of Test	Trial Pit
How was water depth measured?	Depth from top of pit to water level (m)
Time (seconds or minutes)	Minutes
Pit length (m)	0.2
Pit width (m)	0.15
Pit depth (m)	0.95
Max water level (m)	**0.45**
25% Max water level (m)	**0.113**
25% reached? Yes or No	YES
Effective depth difference (m)	**0.4**
25% Effective depth level (m)	**0.150**
75% Effective depth level (m)	**0.350**
Lower limit for measurement	25%
Upper limit for measurement	75%
Base (m2)	**0.03**
Sides (m2)	**0.09** *Up to 50% of effective depth*
Ends (m2)	**0.068** *Up to 50% of effective depth*
a_{p50} (m2)	**0.188** *Up to 50% of effective depth*
V_{p75} (m3)	**0.010** *The volume at 75% max water level*
V_{p25} (m3)	**0.003** *The volume at 25% max water level*
V_{p75-25} (m3)	**0.007** *Difference in volume*

75% Max water level (m) **0.338**

If 25% was reached, then the test is as per BRE365 Procedure. Otherwise effective depth is used.

These values are based on max water level if 25% Max Water Level was reached during the test. Otherwise, they are based on the difference in depth between the last measurement and the start of the test

Interpolation between	tp75	Vp75	
lower	**2**	**0.011**	*The reading just before Vp75*
upper	**5**	**0.010**	*The reading just after Vp75*
Interpolation between	tp25	Vp25	
lower	**30**	**0.004**	*The reading just before Vp25*
upper	**180**	**0.003**	*The reading just after Vp25*

t_{p75} (mins)	**4.3**
t_{p25} (mins)	**112.5**
t_{p75-25} (mins)	**108.3**

Soil Infiltration Rate

m/s	m/h
5.54E-06	**0.019954**

The test reached 25% total depth. The above infiltration rate is compliant with BRE365 procedure

Time	Depth from Top of Pit to Water Level (m)	Water Level (m)	Volume
0	0.5	**0.45**	**0.014**
1	0.56	**0.39**	**0.012**
2	0.59	**0.36**	**0.011**
3	0.62	**0.33**	**0.010**
5	0.65	**0.3**	**0.009**
7	0.68	**0.27**	**0.008**
12	0.73	**0.22**	**0.007**
16	0.75	**0.2**	**0.006**
20	0.77	**0.18**	**0.005**
25	0.79	**0.16**	**0.005**
30	0.81	**0.14**	**0.004**
60	0.86	**0.09**	**0.003**
90	0.86	**0.09**	**0.003**
120	0.86	**0.09**	**0.003**
180	0.9	**0.05**	**0.002**

Gravesham Borough Council

Job Number	4176
Site Location	Former Fleet Leisure
Hole ID	HP02
Test Number	1
Date	18/06/2021

SEVENOAKS ENVIRONMENTAL CONSULTANCY

Input
Calculation
Output

Type of Test	Trial Pit
How was water depth measured?	Depth from top of pit to water level (m)
Time (seconds or minutes)	Minutes
Pit length (m)	1.6
Pit width (m)	0.6
Pit depth (m)	1.2
Max water level (m)	**0.6**
25% Max water level (m)	**0.150**
25% reached? Yes or No	NO
Effective depth difference (m)	**0.08**
25% Effective depth level (m)	**0.540**
75% Effective depth level (m)	**0.580**
Lower limit for measurement	25%
Upper limit for measurement	75%
Base (m2)	**0.96**
Sides (m2)	**0.96** *Up to 50% of effective depth*
Ends (m2)	**0.360** *Up to 50% of effective depth*
a_{p50} (m2)	**2.280** *Up to 50% of effective depth*
V_{p75} (m3)	**0.557** *The volume at 75% effective depth*
V_{p25} (m3)	**0.518** *The volume at 25% effective depth*
V_{p75-25} (m3)	**0.038** *Difference in volume*

75% Max water level (m) **0.450**

If 25% was reached, then the test is as per BRE365 Procedure. Otherwise effective depth is used.

These values are based on max water level if 25% Max Water Level was reached during the test. Otherwise, they are based on the difference in depth between the last measurement and the start of the test

Interpolation between	tp75	Vp75	
lower	**0**	**0.576**	*The reading just before Vp75*
upper	**1**	**0.547**	*The reading just after Vp75*
Interpolation between	tp25	Vp25	
lower	**5**	**0.528**	*The reading just before Vp25*
upper	**30**	**0.509**	*The reading just after Vp25*

t_{p75} (mins)	**0.7**
t_{p25} (mins)	**17.5**
t_{p75-25} (mins)	**16.8**

Time	Depth from Top of Pit to Water Level (m)	Water Level (m)	Volume
0	0.6	**0.6**	**0.576**
1	0.63	**0.57**	**0.547**
2	0.65	**0.55**	**0.528**
5	0.65	**0.55**	**0.528**
30	0.67	**0.53**	**0.509**
45	0.67	**0.53**	**0.509**
60	0.68	**0.52**	**0.499**

Soil Infiltration Rate

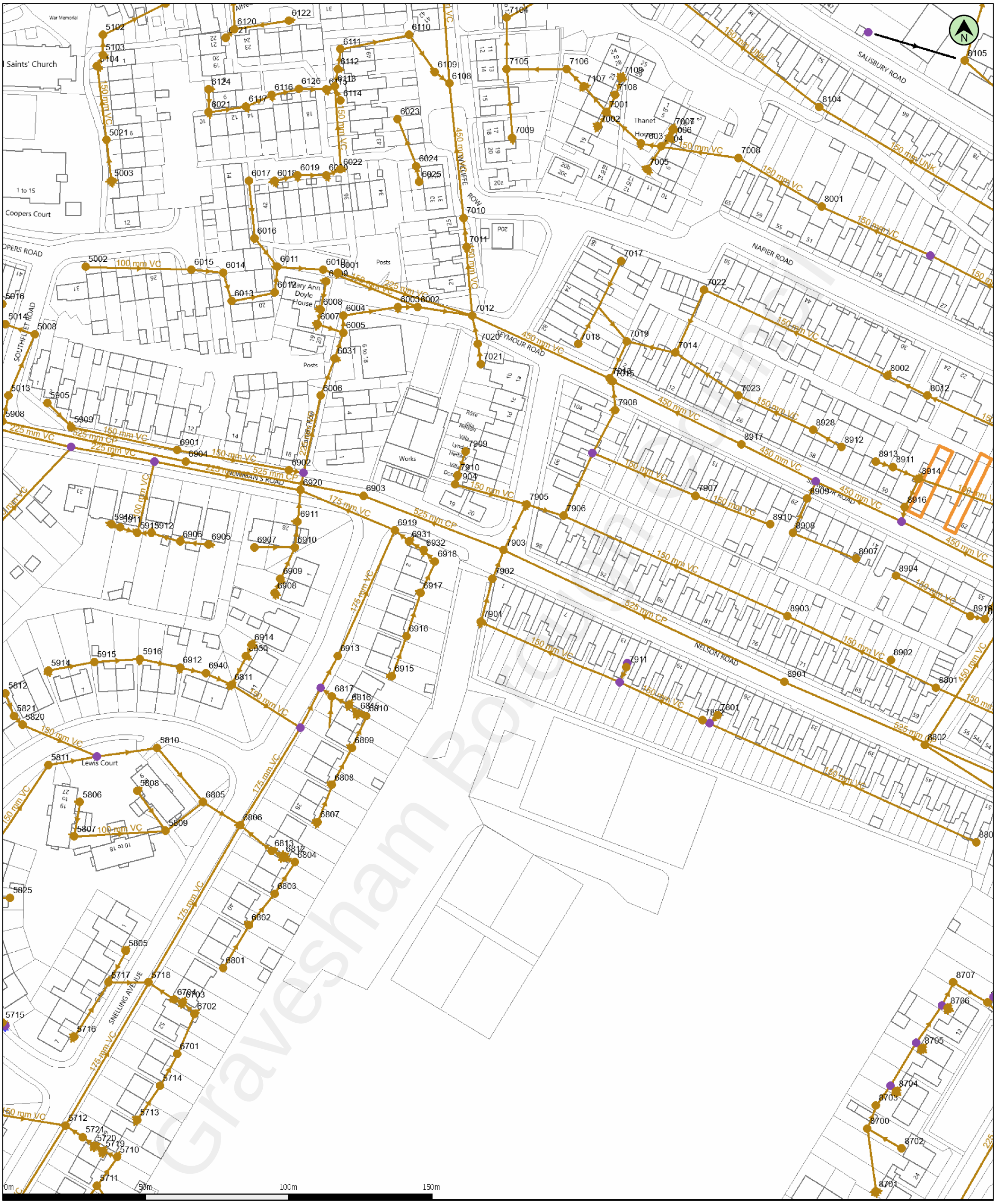
m/s	m/h
1.67E-05	**0.060031**

The test failed to reach 25% total depth. The above infiltration rate is not fully compliant with BRE365 procedure

Gravesham Borough Council

APPENDIX D

Gravesham Borough Council



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Scale: 1:1250 | Date: 27/04/21 | Wastewater Plan A3

Data updated: 19/04/21 | Map Centre: 563715,172928 | Our Ref: 547194 - 1 | Powered by digdat

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

mark@sds-consulting.co.uk

5645

WATER for LIFE from Southern Water

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2021 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
5002	F	18.01	18.00	
5003	F	17.22	16.13	
5008	F	0.00	0.00	
5013	F	0.00	0.00	
5014	F	18.58	17.40	
5016	F	18.87	18.86	
5021	F	0.00	0.00	
5101	F	15.08	13.80	
5102	F	15.40	14.20	
5103	F	15.66	14.57	
5104	F	15.84	14.73	
5710	F	25.44	24.43	
5711	F	0.00	0.00	
5712	F	25.39	23.23	
5713	F	25.05	24.40	
5714	F	24.80	0.00	
5715	F	0.00	0.00	
5716	F	24.62	23.54	
5717	F	24.16	22.25	
5718	F	23.95	21.94	
5719	F	25.44	24.32	
5720	F	25.44	24.27	
5721	F	25.42	0.00	
5805	F	23.84	22.62	
5806	F	23.21	22.82	
5807	F	23.26	22.61	
5808	F	22.80	22.42	
5809	F	22.76	22.16	
5810	F	22.51	20.33	
5811	F	22.59	21.84	
5812	F	22.69	21.55	
5820	F	22.45	21.44	
5821	F	22.44	21.52	
5825	F	0.00	0.00	
5905	F	19.40	18.39	
5908	F	19.50	17.64	
5909	F	19.59	17.92	
5910	F	20.45	19.96	
5911	F	20.45	19.92	
5912	F	20.25	19.71	
5913	F	20.35	19.71	
5914	F	22.38	21.58	
5915	F	22.14	0.00	
5916	F	21.90	20.86	
6001	F	17.96	16.23	
6002	F	18.52	14.85	
6003	F	18.33	15.29	
6004	F	18.42	15.66	
6005	F	18.59	15.70	
6006	F	0.00	0.00	
6007	F	18.61	15.78	
6008	F	18.48	15.96	
6009	F	18.17	17.59	
6010	F	17.99	15.69	
6011	F	18.11	15.91	
6012	F	18.15	16.13	
6013	F	18.01	16.46	
6014	F	18.15	16.60	
6015	F	18.15	17.10	
6016	F	17.81	16.30	
6017	F	17.61	17.60	
6018	F	17.64	16.70	
6019	F	17.63	16.61	
6020	F	17.61	16.49	
6021	F	16.35	15.65	
6022	F	17.63	16.39	
6023	F	16.56	0.00	
6024	F	17.72	0.00	
6025	F	17.72	17.04	
6031	F	18.76	17.88	
6108	F	16.39	11.74	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
6109	F	16.57	14.34	
6110	F	15.52	14.70	
6111	F	15.58	14.98	
6112	F	16.00	15.44	
6113	F	16.03	15.16	
6114	F	16.00	15.99	
6115	F	16.32	15.20	
6116	F	16.30	0.00	
6117	F	16.34	15.55	
6120	F	15.42	14.12	
6121	F	15.47	15.46	
6122	F	15.51	14.49	
6124	F	16.33	15.72	
6126	F	16.31	0.00	
6701	F	24.56	0.00	
6702	F	24.46	23.64	
6703	F	24.29	23.44	
6704	F	24.28	23.26	
6801	F	23.82	23.81	
6802	F	23.42	22.78	
6803	F	23.11	0.00	
6804	F	22.89	0.00	
6805	F	22.57	20.06	
6806	F	22.62	19.61	
6807	F	22.56	22.21	
6808	F	22.52	21.70	
6809	F	22.11	21.53	
6810	F	21.89	21.27	
6811	F	21.94	20.43	
6812	F	22.85	21.92	
6813	F	22.84	21.76	
6815	F	21.87	21.21	
6816	F	21.86	21.16	
6817	F	21.80	20.12	
6901	F	19.67	17.57	
6902	F	20.05	17.05	
6903	F	20.23	18.24	
6904	F	19.55	17.93	
6905	F	20.45	19.95	
6906	F	20.25	19.72	
6907	F	20.92	20.91	
6908	F	21.35	20.75	
6909	F	21.21	20.50	
6910	F	20.84	0.00	
6911	F	20.65	19.59	
6912	F	21.93	20.71	
6913	F	21.40	18.69	
6914	F	22.03	21.00	
6915	F	21.44	20.81	
6916	F	21.11	0.00	
6917	F	20.90	20.02	
6918	F	20.72	19.53	
6919	F	20.57	17.93	
6920	F	20.03	16.98	
6930	F	21.99	20.98	
6931	F	20.61	18.77	
6932	F	20.70	19.26	
6940	F	21.95	20.63	
7001	F	17.06	15.61	
7002	F	16.95	15.98	
7003	F	17.74	16.04	
7004	F	17.72	16.05	
7005	F	17.96	16.57	
7006	F	17.73	16.46	
7007	F	17.70	16.77	
7008	F	18.06	16.41	
7009	F	17.10	17.09	
7010	F	17.93	11.93	
7011	F	18.06	16.94	
7012	F	18.81	11.94	
7013	F	19.88	17.21	

Gravesham Borough Council

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7014	F	19.88	17.81	
7015	F	0.00	0.00	
7017	F	19.49	19.48	
7018	F	19.50	19.49	
7019	F	19.44	17.53	
7020	F	18.50	18.49	
7021	F	18.50	18.49	
7022	F	19.29	18.02	
7023	F	0.00	0.00	
7104	F	15.45	13.61	
7105	F	16.39	14.66	
7106	F	16.73	15.18	
7107	F	16.91	15.34	
7108	F	17.02	15.90	
7109	F	16.95	16.02	
7801	F	0.00	0.00	
7802	F	0.00	0.00	
7901	F	20.89	19.14	
7902	F	20.77	19.14	
7903	F	20.71	18.82	
7904	F	19.75	18.74	
7905	F	20.51	18.61	
7906	F	0.00	0.00	
7907	F	0.00	0.00	
7908	F	20.31	0.00	
7909	F	0.00	0.00	
7910	F	0.00	0.00	
7911	F	0.00	0.00	
8001	F	18.44	16.98	
8002	F	20.07	18.72	
8012	F	0.00	0.00	
8104	F	0.00	0.00	
8105	F	20.00	17.79	
8700	F	25.36	24.07	
8701	F	25.80	24.99	
8702	F	25.48	24.38	
8703	F	25.11	0.00	
8704	F	25.06	24.21	
8705	F	24.81	23.93	
8706	F	24.52	23.51	
8707	F	24.52	23.28	
8709	F	24.53	0.00	
8801	F	0.00	0.00	
8802	F	23.19	17.97	
8804	F	23.79	0.00	
8901	F	22.34	20.25	
8902	F	0.00	0.00	
8903	F	0.00	0.00	
8904	F	21.69	20.29	
8907	F	21.26	20.86	
8908	F	21.19	20.68	
8909	F	20.92	19.67	
8910	F	21.18	21.17	
8911	F	0.00	0.00	
8912	F	20.95	20.94	
8913	F	0.00	-0.01	
8914	F	21.24	19.94	
8916	F	21.24	18.73	
8917	F	20.54	0.00	
8918	F	21.85	0.00	
8919	F	22.18	20.26	
8928	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Gravesham Borough Council

APPENDIX E

Gravesham Borough Council



Gravesham Borough Council

SDS consulting
civil & structural engineers

Unit 16, Shrivenham Hundred Business Park,
Swindon, Wiltshire, SN6 8TZ

enquiries@sds-consulting.co.uk

telephone : 01793 783287

NOTES:

1. Drawing for information only
2. Not to be used for construction purposes
3. Do not scale from this drawing

Rev	Date	Description	Initials	Check

Job Title

KEDBULL LESUIRE

Drawing Title

DRAINAGE STRATEGY SHEET 1 OF 2

Drawing No. 5645-C-001

Status **For Planning**

Not for Construction

Job Number	5645	Date	SEP 2021
Scale	1:200 @ A0		
Drawn By	MTD	Checked By	LB

SDS consulting
civil & structural engineers

Unit 16, Shrivenham Hundred Business Park,
Swindon, Wiltshire, SN6 8TZ

enquiries@sds-consulting.co.uk

telephone : 01793 783287

NOTES:

1. Drawing for information only
2. Not to be used for construction purposes
3. Do not scale from this drawing

SOAKAWAY 6
Contributing area: 1110m²
3m (w) x 30m (l) x 1.2m (d)
+ 40% allow. voids

SOAKAWAY 7
Contributing area: 1350m²
3m (w) x 30m (l) x 1.2m (d)
+ 40% allow. voids

SOAKAWAY 8
Contributing area: 540m²
2m (w) x 30m (l) x 1.2m (d)
+ 40% allow. voids

SOAKAWAY 9
Contributing area: 540m²
2m (w) x 30m (l) x 1.2m (d)
+ 40% allow. voids

FFL 24.00

ACODrain

Wire Mesh Fence Ht. 4.0m

Timber Fence Ht. 2.0m

Palisade Fence Ht. 2.45m

5v5 Pitch

7v7 Pitch

7 v 7 astro turf pitch to be drained independently and in accordance with the manufacturers recommendations

5v5 Pitch

9v9 Pitch

9 v 9 astro turf pitch to be drained independently and in accordance with the manufacturers recommendations

11v11 Pitch

11 v 11 astro turf pitch to be drained independently and in accordance with the manufacturers recommendations

Sub Sta

0m 10m 20m
Scale 1:200

Rev	Date	Description	Initials	Check

Job Title

KEDBULL LESUIRE

Drawing Title

DRAINAGE STRATEGY SHEET 2 OF 2

Drawing No. 5645-C-002

Status **For Planning**

Not for Construction

Job Number	5645	Date	SEP 2021
Scale	1:200 @ A0		
Drawn By	MTD	Checked By	LB

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APPENDIX F

Gravesham Borough Council

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	3.982	0.320	12.4	0.047	5.00	0.0	0.600	o	300	Pipe/Conduit
2.000	13.798	0.070	197.1	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit
1.001	6.822	0.001	6822.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	21.500	0.047	0.0	4.48	316.7
2.000	21.250	0.031	0.0	1.12	78.9
1.001	21.180	0.078	0.0	0.18	12.8

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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	User	-	100	0.047	0.047	0.047
2.000	User	-	100	0.031	0.031	0.031
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.078	0.078	0.078

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)
1.001	DUMMY	22.944	21.179	0.000	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 * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Gravesham Borough Council

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Online Controls for Storm

Weir Manhole: SOAKAWAY 5, DS/PN: 1.001, Volume (m^3): 4.5

Discharge Coef 0.544 Width (m) 1.200 Invert Level (m) 23.153

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Storage Structures for Storm

Cellular Storage Manhole: SOAKAWAY 5, DS/PN: 1.001

Invert Level (m) 20.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.02800 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.02800

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	42.0	42.0	1.201	0.0	73.1
1.200	42.0	73.1			

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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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S5A	15 Winter	1	+0%	100/480 Winter			
2.000	S5B	15 Winter	1	+0%	100/360 Winter			
1.001	SOAKAWAY 5	480 Winter	1	+0%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S5A	21.541	-0.259	0.000	0.05		6.5	OK	
2.000	S5B	21.301	-0.249	0.000	0.07		4.3	OK	
1.001	SOAKAWAY 5	20.273	-1.207	0.000	0.00		0.0	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S5A	15 Winter	30	+10%	100/480 Winter			
2.000	S5B	15 Winter	30	+10%	100/360 Winter			
1.001	SOAKAWAY 5	960 Winter	30	+10%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S5A	21.570	-0.230	0.000	0.12		17.5	OK	
2.000	S5B	21.336	-0.214	0.000	0.18		11.6	OK	
1.001	SOAKAWAY 5	20.779	-0.701	0.000	0.00		0.0	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S5A	960 Winter	100	+40%	100/480 Winter			
2.000	S5B	960 Winter	100	+40%	100/360 Winter			
1.001	SOAKAWAY 5	960 Winter	100	+40%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S5A	22.322	0.522	0.000	0.01		1.8	SURCHARGED	
2.000	S5B	22.322	0.772	0.000	0.02		1.2	SURCHARGED	
1.001	SOAKAWAY 5	22.322	0.842	0.000	0.00		0.0	SURCHARGED	

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	4.880	0.105	46.5	0.045	5.00	0.0	0.600	o	300	Pipe/Conduit
2.000	11.225	0.070	160.4	0.030	5.00	0.0	0.600	o	300	Pipe/Conduit
2.001	12.842	0.030	428.1	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit
1.001	8.196	0.000	0.0	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	22.000	0.045	0.0	2.31	163.4
2.000	21.475	0.030	0.0	1.24	87.6
2.001	21.405	0.056	0.0	0.75	53.3
1.001	21.375	0.111	0.0	0.00	0.0

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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	User	-	100	0.045	0.045	0.045
2.000	User	-	100	0.030	0.030	0.030
2.001	User	-	100	0.026	0.026	0.026
1.001	User	-	100	0.009	0.009	0.009
				Total	Total	Total
				0.111	0.111	0.111

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)
1.001	DUMMY	23.251	21.375	0.000	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 * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Weir Manhole: SOAKAWAY 6, DS/PN: 1.001, Volume (m^3): 4.6

Discharge Coef 0.544 Width (m) 1.200 Invert Level (m) 23.277

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Storage Structures for Storm

Cellular Storage Manhole: SOAKAWAY 6, DS/PN: 1.001

Invert Level (m) 20.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.02800 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.02800

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	60.0	1.201	0.0	97.2
1.200	60.0	97.2			

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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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S6A	15 Winter	1	+0%	100/960 Winter			
2.000	S6B	15 Winter	1	+0%	100/360 Winter			
2.001	S6C	15 Winter	1	+0%	100/360 Winter			
1.001	SOAKAWAY 6	480 Winter	1	+0%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S6A	22.056	-0.244	0.000	0.08		6.2	OK	
2.000	S6B	21.527	-0.248	0.000	0.06		4.1	OK	
2.001	S6C	21.496	-0.209	0.000	0.20		7.2	OK	
1.001	SOAKAWAY 6	20.776	-0.899	0.000	0.00		0.0	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S6A	15 Winter	30	+10%	100/960 Winter			
2.000	S6B	15 Winter	30	+10%	100/360 Winter			
2.001	S6C	15 Winter	30	+10%	100/360 Winter			
1.001	SOAKAWAY 6	960 Winter	30	+10%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S6A	22.093	-0.207	0.000	0.21		16.9	OK	
2.000	S6B	21.585	-0.190	0.000	0.17		11.1	OK	
2.001	S6C	21.572	-0.133	0.000	0.58		21.1	OK	
1.001	SOAKAWAY 6	21.291	-0.384	0.000	0.00		0.0	OK	

Gravesham Borough Council

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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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 10, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S6A	1440 Winter	100	+40%	100/960 Winter			
2.000	S6B	1440 Winter	100	+40%	100/360 Winter			
2.001	S6C	1440 Winter	100	+40%	100/360 Winter			
1.001	SOAKAWAY 6	1440 Winter	100	+40%	100/360 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S6A	22.826	0.526	0.000	0.02		1.3	SURCHARGED	
2.000	S6B	22.826	1.051	0.000	0.01		0.9	FLOOD RISK	
2.001	S6C	22.826	1.121	0.000	0.04		1.6	SURCHARGED	
1.001	SOAKAWAY 6	22.826	1.151	0.000	0.00		0.0	SURCHARGED	

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