

DRAINAGE STRATEGY REPORT

PROPOSED DEVELOPMENT

AT

HEVERCOURT, GOODWOOD CRESCENT,

GRAVESEND, DA12 5EY

vkhp-consulting ltd
The Forge
Little Mount Sion
Tunbridge Wells
Kent TN1 1YS

Tel: 01892 521841
E-mail: tw@vkhp.co.uk

DOCUMENT CONTROL SHEET

Document Title: Surface Water Drainage Strategy

Document No: 531921

ISSUE RECORD:

ISSUE	ISSUE NOTE	DATE
-	Issued for comments	26 th January 2022
A	Initial Issue	22 nd February 2022

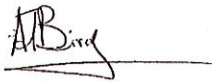
Author:	Andrew Bird Principle Civil Engineer GMICE	
Approved:		

TABLE OF CONTENTS

1.00	Introduction	4
2.00	Existing Drainage	5
3.00	Site Geology	6
4.00	Development Drainage Proposals	7

APPENDICES

Appendix A:	Site Location Plan & Development Proposal
Appendix B:	Existing Drainage Assets
Appendix C:	Site Geology
Appendix D:	Surface Water Drainage Layout
Appendix E:	Flow Calculations & Surface Water Storage Requirements

1.00 Introduction

- 1.01 vkhp consulting limited has been instructed to prepare a Drainage Strategy Report to accompany and support a Planning Application for a proposed residential redevelopment at Hevercourt, Goodwood Crescent, Gravesend, DA12 5EY. The proposed site is shown on the location plan provided in Appendix A.
- 1.02 The site is rectangular on plan and is centred at National Grid Reference 565261, 171032 and occupies an approximate area of 0.55 hectares. The existing site is a residential care home, and the proposed development is an extension to the existing buildings.
- 1.03 Surface water run-off from the new development will be collected and addressed by means of sustainable urban drainage systems (SuDS), with these SuDS compliant facilities to be installed prior to the buildings being fully operational.
- 1.04 The site is suited to the North of Cheltenham Close and at an elevation of approximately 63m AOD.
- 1.05 The Environmental Agency maps indicate that the proposed development is located within Flood Zone 1 and low risk of surface water flooding, therefore there is no recognised risk of flooding to the site. Furthermore, as the proposed development is less than one hectare, there is no requirement for a Flood Risk Assessment to support the Planning Application.

2.00 Existing Drainage

- 2.01 There is an existing foul and surface water drainage system on-site serving the existing buildings and hardstanding areas, Foul water connects into a public sewer located in Cheltenham Close which is own and maintained by Southern Water. Surface water discharges into soakaways.
- 2.02 A Section 106 Agreement (Application to Connect to a Public Sewer) will be submitted to Southern Water prior to the connection of any foul water sewers.
- 2.03 Plans showing existing drainage assets in the area can be found in Appendix B.

3.00 Site Geology

- 3.01 A desktop study using the Geology of Britain web site, has indicated that Lewes Nodular Chalk Formation underlies the site. A plan showing the Bedrock Geology can be seen in Appendix C.
- 3.02 Infiltration Test have been carried out to BRE 365 which indicate that infiltration rates are 10.8×10^{-6} m/s.

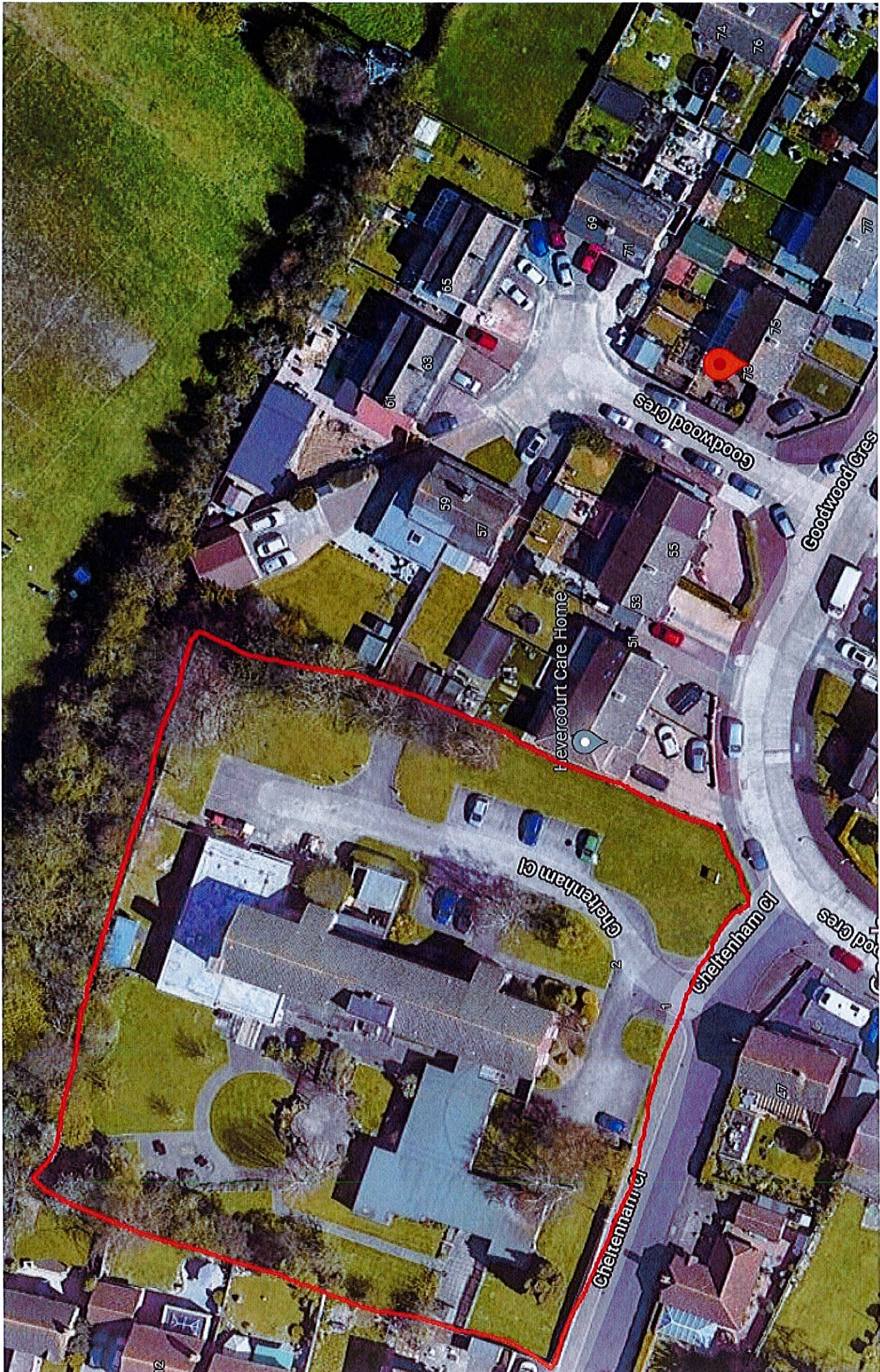


4.00 Development Drainage Proposals

- 4.01 For the consideration of the surface water drainage generated by this proposed development, the principal factor is the impermeable roofs area, access and external parking areas. The development will be sited over 2 of the existing soakaways and surface water entering these will need to be diverted into the new system.
- 4.02 The impermeable roof area is intended to be drained with conventional roof guttering and downpipes, directed into an underground surface water drainage system via 100mm and 150mm diameter pipes at a gradient not less than a 1:100 to ensure self-cleansing velocities. To reduce the risk of contaminants and silt entering into an attenuation tank, all water will pass through silt traps or catch pits.
- 4.03 A new attenuation tank is proposed and will be designed to receive all of the run-offs from roofs, access and parking areas from the proposed development and to infiltrate into the underlying soil.
- 4.04 For a proposed development which consists of 547 square metres of existing roof areas and 805 square metres of new roof area 337 square metres of new parking area, we have calculated the storage volume of 112m³, based on an infiltration rate of 10.8×10^{-6} m/s.
- 4.05 Calculations attached in Appendix E demonstrate that for any rainfall duration of 1/100 year event + 40% climate change (starting with 30 minutes and finishing with a 24-hour storm) the attenuation tank size provides adequate storage.
- 4.06 Exceedance routes indicate that flows will generally remain on site, with eventual flows discharging into the road.

APPENDIX A

SITE LOCATION PLAN & DEVELOPMENT PROPOSAL



- GENERAL NOTES
1. Copyright of this drawing, the design and anything constructed from it is vested in the Architects and may not be produced without their written permission.
 2. The copyright of this design is site specific and may not be reproduced on any other site without the Architects written permission.
 3. Only figured dimensions are to be used for construction purposes. This drawing is to be read in conjunction with all relevant details for the project.
 4. All dimensions are to be checked on site prior to commencement, any discrepancy is to be reported to the Architect or Contract Administrator.
 5. All dimensions are in millimetres unless noted otherwise. All levels are shown in meters unless noted otherwise.
 6. Ordnance Survey data supplied by Promap with the permission of the controller of the Stationary Office.
Crown Copyright MSA No. 10007142.

- CONSTRUCTION NOTES
1. The Contractor is responsible for the correct setting out of the work.
 2. All building materials, components, workmanship to comply with the appropriate Building Regulations, British Standards Codes of Practice and manufacturers' recommendations.
 3. All equipment installed in connection with Gas, Electricity and Water Services shall conform to the Supply Authority's By-Laws and Regulations and shall be subject to their Officer's inspection and approval.
 4. These drawings are to be read in conjunction with all other Architects, Consultants and Specialist sub-contractors drawings.
 5. All structural timber to be pre-treated strength graded to Structural Engineer's details and to be stamped KD (kiln dried).
 6. All external s/w to be pre-treated with preservative.
 7. All dimensions and levels to be checked on site prior to construction and the manufacture of steel-work and architectural ironmongery, stonework and any other purpose made items.
 8. All materials, products etc. to be installed, applied etc. in accordance with the manufacturer's written instructions.
 9. All specialist details are Design Intent only & subject to specialist design & detailing. Our meaning of Design Intent is as follows:
9.1. This drawing demonstrates MKA's/ the employer's objectives.
9.2. The final design/product(s)/ installation are to be fit for purpose.
9.3. The design & manufacture are to comply with the relevant and current Statutory Regulations & British Standards.
9.4. A design warranty is to be provided for the benefit of the Employer/ owner/ end user.
9.5. All technical means to achieve the intent of the design is the responsibility of the appointed specialist.
9.6. The responsibility of the design is by others. The design intent drawing/ specification sets out what the third party design is to achieve.

NOTE - The drawn information on this drawing is survey information by Blueprint Surveys Ltd. Only the title sheet is MKA's.

CLIENT

Mr & Mrs Gilmour

PROJECT

Hevercourt Residential Home
Goodwood Crescent
Gravesend
Kent
DA12 5EY

SHEET

Existing Site
Plan

Rosewood House, High Street,
Hawlow, Tonbridge, Kent TN11 0EF
t: 01732 850995
e: design@mka-architects.co.uk
w: www.mka-architects.co.uk



SCALE AT A1 DATE

1:200 Oct 21

DRAWING STATUS

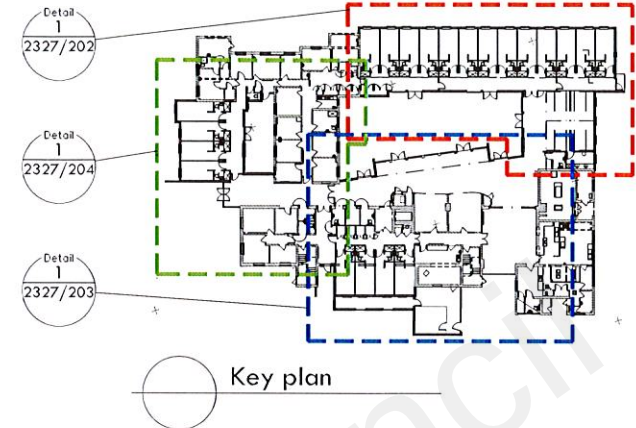
PRELIMINARY

JOB NUMBER DRAWING NUMBER REVISION

2327 20 -



scale in metres
0 1 5 10



- GENERAL NOTES**
1. Copyright of this drawing, the design and anything constructed from it is vested in the Architects and may not be produced without their written permission.
 2. The copyright of this design is site specific and may not be reproduced on any other site without the Architects written permission.
 3. Only figured dimensions are to be used for construction purposes. This drawing is to be read in conjunction with all relevant details for the project.
 4. All dimensions are to be checked on site prior to commencement, any discrepancy is to be reported to the Architect or Contract Administrator.
 5. All dimensions are in millimetres unless noted otherwise. All levels are shown in meters unless noted otherwise.
 6. Ordnance Survey data supplied by Promap with the permission of the controller of The Stationary Office. Crown Copyright MA No. 10007142.

- CONSTRUCTION NOTES**
1. The Contractor is responsible for the correct setting out of the work.
 2. All building materials, components, workmanship to comply with the appropriate Building Regulations, British Standards Codes of Practice and manufacturers' recommendations.
 3. All equipment installed in connection with Gas, Electricity and Water Services shall conform to the Supply Authority's By-Laws and Regulations and shall be subject to their Officer's inspection and approval.
 4. These drawings are to be read in conjunction with all other Architects, Consultants and Specialist sub-contractors drawings.
 5. All structural timber to be pre-treated strength graded to Structural Engineer's details and to be stamped KD (kiln dried).
 6. All external t/w to be pre-treated with preservative.
 7. All dimensions and levels to be checked on site prior to construction and the manufacture of steelwork and architectural ironmongery, stone-work and any other purpose made items.
 8. All materials, products etc. to be installed, applied etc. in accordance with the manufacturer's written instructions.
 9. All specialist details are Design Intent only & subject to specialist design & detailing. Our meaning of Design Intent is as follows:
 - 9.1. This drawing demonstrates MKA's/ the employer's objectives.
 - 9.2. The final design/product(s)/ installation are to be fit for purpose.
 - 9.3. The design & manufacture are to comply with the relevant and current Statutory Regulations & British Standards.
 - 9.4. A design warranty is to be provided for the benefit of the Employer/ owner/ end user.
 - 9.5. All technical means to achieve the intent of the design is the responsibility of the appointed specialist.
 - 9.6. The responsibility of the design is by others. The design intent drawing/ specification sets out what the third party design is to achieve.

Key

- denotes structures to be retained
- denotes construction to match existing
- denotes vertical stack bonded brickwork

Where new openings are formed install new lintel/ beam over to engineer's details, not indicated for clarity.

- + 10.00 denotes existing level
- 10.0000 denotes new level
- ToS denotes Top of Scream
- denotes column to engineer's details
- denotes beam to engineer's details
- denotes drain point
- denotes dimension to suit site conditions
- denotes new floor to be level with existing

CLIENT

Mr & Mrs Gilmour

PROJECT

Hevercourt Residential Home
Goodwood Crescent
Gravesend
Kent
DA12 5EY

SHEET

Ground Floor Plan

Rosewood House, High Street,
Maidlow, Tonbridge, Kent TN11 0EP
t: 01732 850995
e: design@mka-architects.co.uk
w: www.mka-architects.co.uk



SCALE A1:1 **DATE**

1:100 Sept 21

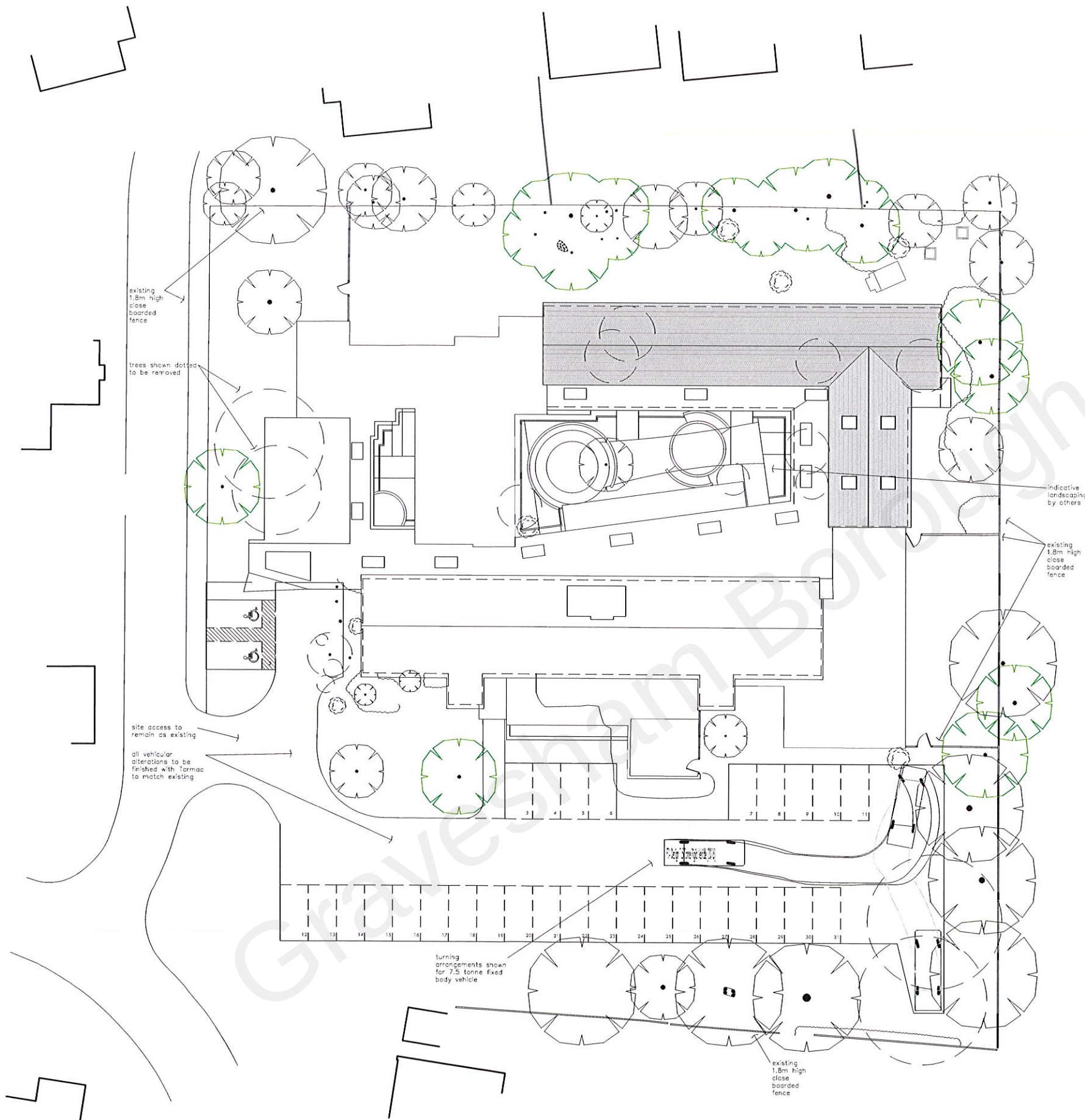
DRAWING STATUS

PRELIMINARY

JOB NUMBER **DRAWING NUMBER** **REVISION**

2327 / 201 / -

1 Ground Floor Plan



- GENERAL NOTES
1. Copyright of this drawing, the design and anything constructed from it is vested in the Architects and may not be produced without their written permission.
 2. The copyright of this design is site specific and may not be reproduced on any other site without the Architects written permission.
 3. Only figured dimensions are to be used for construction purposes. This drawing is to be read in conjunction with all relevant details for the project.
 4. All dimensions are to be checked on site prior to commencement, any discrepancy is to be reported to the Architect or Contract Administrator.
 5. All dimensions are in millimetres unless noted otherwise. All levels are shown in meters unless noted otherwise.
 6. Ordnance Survey data supplied by Promap with the permission of the controller of The Stationary Office.
Crown Copyright AKA No. 10007142.

- CONSTRUCTION NOTES
1. The Contractor is responsible for the correct setting out of the work.
 2. All building materials, components, workmanship to comply with the appropriate Building Regulations, British Standards Codes of Practice and manufacturers' recommendations.
 3. All equipment installed in connection with Gas, Electrical and Water Services shall conform to the Supply Authority's By-Laws and Regulations and shall be subject to their Officer's inspection and approval.
 4. These drawings are to be read in conjunction with all other Architects, Consultants and Specialist sub-contractors drawings.
 5. All structural timber to be pre-treated strength graded to Structural Engineer's details and to be stamped KD (kiln dried).
 6. All external s/w to be pre-treated with preservative.
 7. All dimensions and levels to be checked on site prior to construction and the manufacture of steelwork and architectural ironmongery, stonework and any other purpose made items.
 8. All materials, products etc. to be installed, applied etc. in accordance with the manufacturer's written instructions.
 9. All specialist details are Design Intent only & subject to specialist design & detailing. Our meaning of Design Intent is as follows:
9.1. This drawing demonstrates AKA's/ the employer's objectives.
9.2. The final design/product(s)/ installation are to be fit for purpose.
9.3. The design & manufacture are to comply with the relevant and current Statutory Regulations & British Standards.
9.4. A design warranty is to be provided for the benefit of the Employer/ owner/ end user.
9.5. All technical means to achieve the intent of the design is the responsibility of the appointed specialist.
9.6. The responsibility of the design is by others. The design intent drawing/ specification sets out what the third party design is to achieve.

CLIENT

Mr & Mrs Gilmour

PROJECT

Hevercourt Residential Home
Goodwood Crescent
Gravesend
Kent
DA12 5EY

SHEET

Proposed Site
Plan

Rosewood House, High Street,
Maidlow, Tonbridge, Kent TN11 0FF
t: 01732 830995
e: design@mka-architects.co.uk
w: www.mka-architects.co.uk



SCALE AT A1 DATE

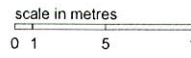
1:200 July 21

DRAWING STATUS

PRELIMINARY

JOB NUMBER DRAWING NUMBER REVISION

2327 04 -



APPENDIX B

EXISTING DRAINAGE ASSETS

APPENDIX C

SITE GEOLOGY

Geology of Britain viewer (classic)

Try the 3D version of the Geology of Britain viewer

- Surface Geology
- 3D Models
- Borehole Scans
- Earthquake Timeline

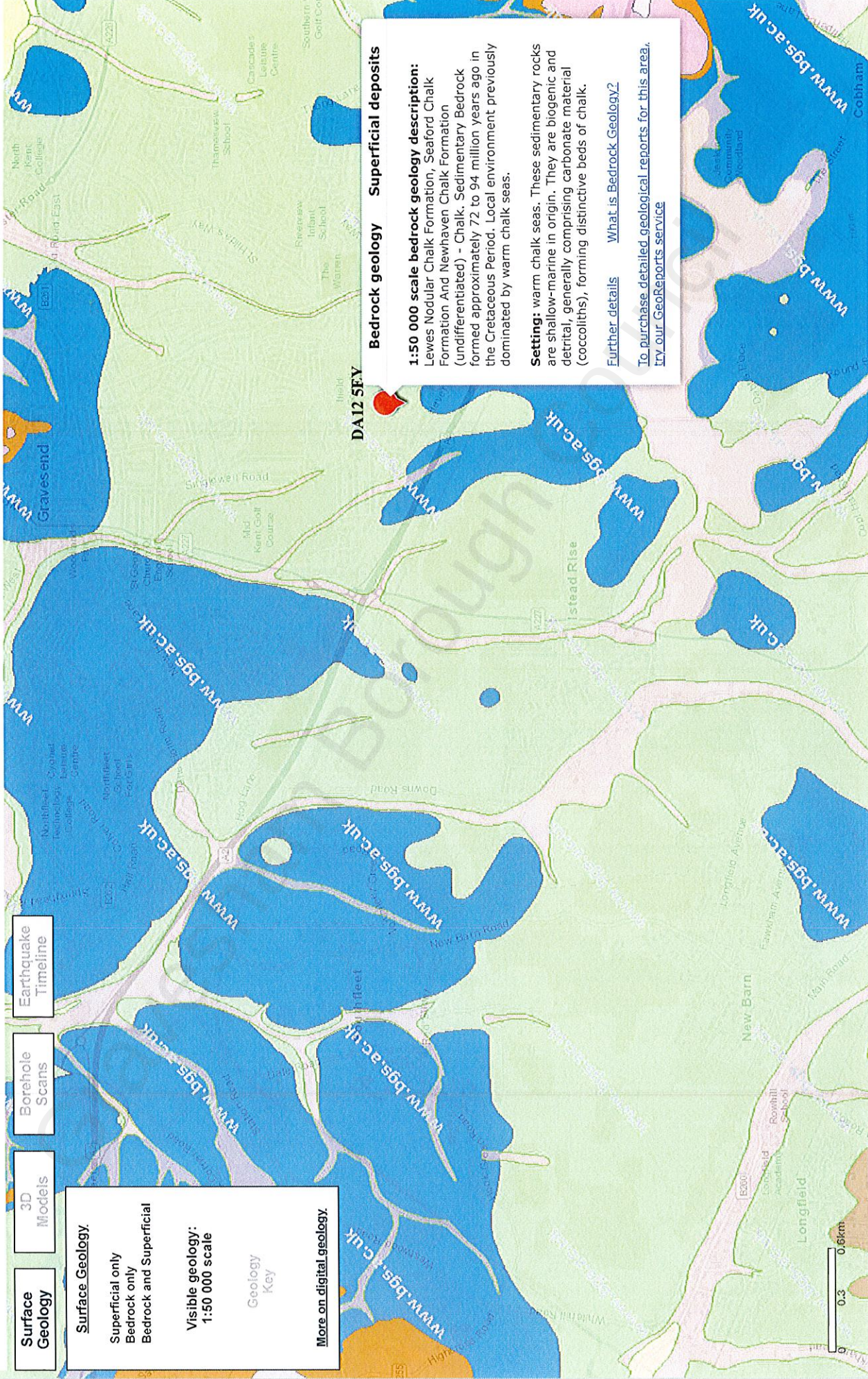
Surface Geology

Superficial only
Bedrock only
Bedrock and Superficial

Visible geology:
1:50 000 scale

Geology Key

[More on digital geology](#)



APPENDIX D

SURFACE WATER DRAINAGE LAYOUT

NOTES

NOTES

1. Do not Scale from this drawing
2. These drawings are to be read in conjunction with the Architects drawings
3. For setting-out dimensions of SPP's, RWP's etc, refer to Architect's or Mechanical Engineer's drawings. Positions shown are indicative and subject to final design
4. Invert levels and positions of existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.
5. All drainage works shall be carried out in accordance with the requirements of the Local Authority, the Environment Agency and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 6th Edition and any addendums as appropriate.
6. All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
7. Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means.
8. Refer to manhole schedules or drawings for manhole types, sizes, depths and specific requirements.
9. All foul connections shall be 100mm diameter Plastron or equivalent PVC-U pipes to BS EN 1401 unless otherwise specified.
10. All surface water drainage shall be 150mm diameter Plastron or equivalent PVC-U pipes to BS EN 1401 unless otherwise stated.
11. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
12. Manhole covers and frames shall be BS EN 124 and shall be Kitemarked. Covers and frames shall be heavy duty D400 in carriageways and vehicular areas and medium duty B125 in footways and soft landscaping. In blocked/concrete paved areas covers shall be recessed fabricated steel.
13. Refer to structural drawings for details of manholes and sewers constructed within floor slabs and foundations.
14. Cover levels are to be adjusted locally to suit finished ground levels.
15. At least one soil pipe at the head of each foul run shall vent to the atmosphere.
16. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation.
17. Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.
18. Existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 250mm.
19. All drain runs from SPP's, stub stacks or flue gullies to be laid at 1:40 gradient unless otherwise stated.
20. Access panels are to be provided to all rainwater pipes, a max. 600 above finished ground level or to discharge into roadable trapped access gullies.
21. All Gradients at drainage runs are indicative, runs to be laid invert to invert.
22. Generally pipes to have granular Bed & Surround (Type S) in accordance with manufacturers recommendations, ensuring adequate protection with respect to depth and location. Drainage with less than 600mm cover to have concrete bed and surround (Type Z).
23. All private drainage to be laid to levels shown using flexible jointed pipes, either uPVC to BS 4560 and BS 5481 or vitrified clayware to BS EN 295.
24. Depth and location of existing services to be traced prior to any excavation.
25. All abandoned, buried obstructions encountered during the construction of Highway & Drainage Works are to be broken out to bed level of drains and sewers, and to the formation of carports and drives etc., and to sufficient depth to allow for laying service company's mains and services.
26. Buried concrete to satisfy the requirements of BRE Special Digest 1 = AC-1 & Site Investigation Report.
27. Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
28. Groundworker to ensure proposed finished ground profile is formed by evenly grading between the spot levels shown.

Preliminary 26.01.22

Rev Revision note Date

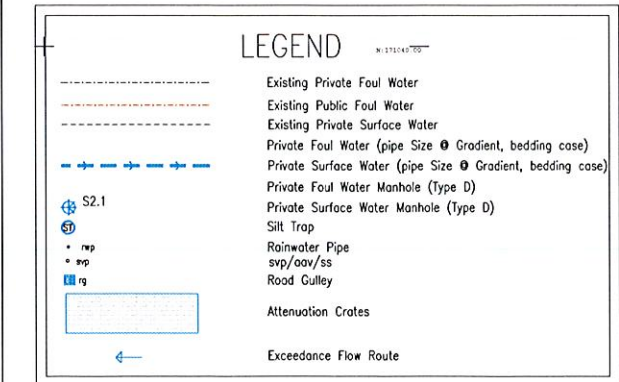
vkhp-consulting
civil and structural

The Forge, Little Mount Stn, Tunbridge Wells, Kent TN11 1YS
Tel 01892 521641 Fax 01892 533149 E-mail tv@vkhp.co.uk
340 High Street, Dorking, Surrey RH4 1GX
Tel 01306 881012 Fax 01306 881190 E-mail dig@vkhp.co.uk
Greenfield House, 3 The Square, Storrington, West Sussex RH20 4DU
Tel 01903 740090 E-mail sto@vkhp.co.uk

Project
Hevercourt, Goodwood Crescent,
Gravesend, DA12 5EY

Title
Proposed Drainage Layout

Drn By AJS	Chk By	DRGN 539121-100	REV -
Date Jan 22	Scale 1:200		



PRELIMINARY

APPENDIX E

FLOW CALCULATIONS & SURFACE WATER STORAGE REQUIREMENTS

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.048	5.00	64.000	450	1.250
S2	0.048	5.00	64.000	450	1.250
S3			64.000	450	1.500
ATT	0.073	5.00	64.000	450	1.550

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S3	25.000	0.600	62.750	62.500	0.250	100.0	150	5.41	50.0
2.000	S2	S3	25.000	0.600	62.750	62.500	0.250	100.0	150	5.41	50.0
1.001	S3	ATT	5.000	0.600	62.500	62.450	0.050	100.0	150	5.50	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.005	17.8	6.5	1.100	1.350	0.048	0.0	63	0.929
2.000	1.005	17.8	6.5	1.100	1.350	0.048	0.0	63	0.929
1.001	1.005	17.8	13.0	1.350	1.400	0.096	0.0	96	1.097

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node END Online Pump Control

Flap Valve	x	Design Depth (m)	1.000	Switch off depth (m)	0.900
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	0.000	Switch on depth (m)	1.000		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.000	0.000	3.000	0.000

Node ATT Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03800	Safety Factor	2.0	Invert Level (m)	61.150
Side Inf Coefficient (m/hr)	0.03800	Porosity	1.00	Time to half empty (mins)	837

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	70.0	75.0	1.600	70.0	302.0	1.601	0.0	302.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	11	63.993	1.243	30.1	1.1519	0.0000	FLOOD RISK
15 minute winter	S2	11	63.993	1.243	30.1	1.1519	0.0000	FLOOD RISK
15 minute winter	S3	11	63.304	0.804	54.3	0.1278	0.0000	SURCHARGED
480 minute winter	ATT	464	62.652	0.202	11.6	105.3645	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S1	1.000	S3	27.1	1.541	1.528	0.4401
15 minute winter	S2	2.000	S3	27.1	1.541	1.528	0.4401
15 minute winter	S3	1.001	ATT	53.4	3.034	3.008	0.0871
480 minute winter	ATT	Infiltration		1.5			