Drainage Strategy

The Shelley Arms, 16 Old Guildford Road, RH12 3JU

Presented to: Stonegate Group c/o Vista Planning

Issued: March 2025

Delta-Simons Project No: 99339.584185

Protecting people and planet

Report Details

Client	Stonegate Group c/o Vista Planning
Report Title	Drainage Strategy
Site Address	The Shelley Arms, 16 Old Guildford Road, RH12 3JU
Project No.	99339.584185
Delta-Simons Contact	Rachel Shepherd (Rachel.Shepherd@luciongroup.com)

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1	Final	20th September 2023	-	Oliver Eglington Consultant	Lucy Antell Consultant	Alex Perryman Associate Director
2	Final	12th March 2025	Updates following amendments to proposed development plan.	Tess Webb-Jones Graduate	Luke Bland Principal	Luke Bland Principal

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INOGEN ALLIANCE

Executive Summary

Project Understanding	Delta Simons have been requested by Stonegate Group c/o Vista Planning (the "Client") to prepare a Drainage Strategy (DS) for The Shelley Arms, 16 Old Guildford Road RH12 3JU (the "Site") to inform a planning application for the erection of four dwellings with associated parking, amenity space and landscaping and a new parking layout for the public house.
Drainage Strategy Summary	The proposed development will introduce impermeable drainage area in the form of buildings and access. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used and attenuation provided on Site to accommodate storm events up to and including the 1 in 100 year plus 45% climate change event. All methods of surface water discharge have been assessed. Surface water runoff will be discharged to the existing surface water sewer located in Sullington Mead approximately 35 m south of the Site (manhole 1453) at a rate of 7.8 l/s, subject to agreement with Southern Water. A gravity connection appears to be feasible. As these works would be crossing a highway, additional permissions will be required. Attenuation storage will be required on Site in order to restrict surface water discharge to 7.8 l/s. Attenuation can be provided within the sub-grade of permeable paving in the private paths and car parking spaces on-Site, and in the form of an underground attenuation tank located beneath the western car parking area on-Site. Foul flows can discharge to the existing 150 mm public foul sewer in Old Guildford Road to the south of the Site as per the existing situation. A gravity connection can be achieved.
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

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Appendices

1.0 Introduction

1.1 Appointment

1.1.1 Delta-Simons Limited ("Delta-Simons") was instructed by Stonegate Group c/o Vista Planning (the "Client") to carry out a Drainage Strategy of the Shelley Arms, 16 Old Guildford Road RH12 3JU (the "Site") to inform a planning application for residential development.

1.2 Project Understanding

1.2.1 The proposed development will increase the impermeable area and risk of surface water flooding to downstream receptors. Therefore, a Drainage Strategy with appropriate consideration for Sustainable Drainage Systems (SuDS) in line with CIRIA SuDS (C753) Guidance is required.

1.2.2 West Sussex County Council as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

1.3 Scope of Works

1.3.1 The scope of works has been as follows for this Drainage Strategy

- Review existing conditions including sewer plans, British Geological Survey information and topographical information;
- Review Lead Local Flood Authority (LLFA) (West Sussex County Council) drainage policies;
- Analyse existing and proposed impermeable areas;
- Calculate existing runoff rates (excluding existing drainage system modelling);
- Assess method of surface water runoff disposal (soakaway/watercourse/sewer);
- Establish surface water discharge rate in consultation with the LLFA/sewerage provider;
- Estimate required attenuation volume using MicroDrainage or similar;
- Assess and advise on suitable forms of SuDS;
- Advise on drainage system maintenance measures;
- Advise on surface water treatment methods;
- Establish method of foul water drainage;
- Prepare concept drainage sketch (where development plan is available as dwg. format); and
- Prepare DS report.

1.3.2 This report takes into account the following national and local policies:

- National Planning Policy Framework (NPPF) (2024)[1];
- National Planning Practice Guidance (NPPG) (2022)[2];

1 https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf
2 http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

- CIRIA Guidance: The SuDS Manual (C753) (2015)[3]; and
- Horsham District Council Local Development and Planning Policies.

1.4 Sources of Information

1.4.1 The following sources of information have been reviewed and assessed for the purpose of this DS:

- British Geological Society (BGS) Interactive Map[4]; and
- MAGIC Interactive Map[5].

1.5 Project Limitations

1.5.1 The wider Delta-Simons limitations are contained within Appendix A.

3 https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx
4 http://mapapps.bgs.ac.uk/geologyofbritain/home.html
5 http://www.magic.gov.uk/

2.0 Site Description

2.1.1 The aim of this section of the report is to outline key environmental information associated with the baseline environment.

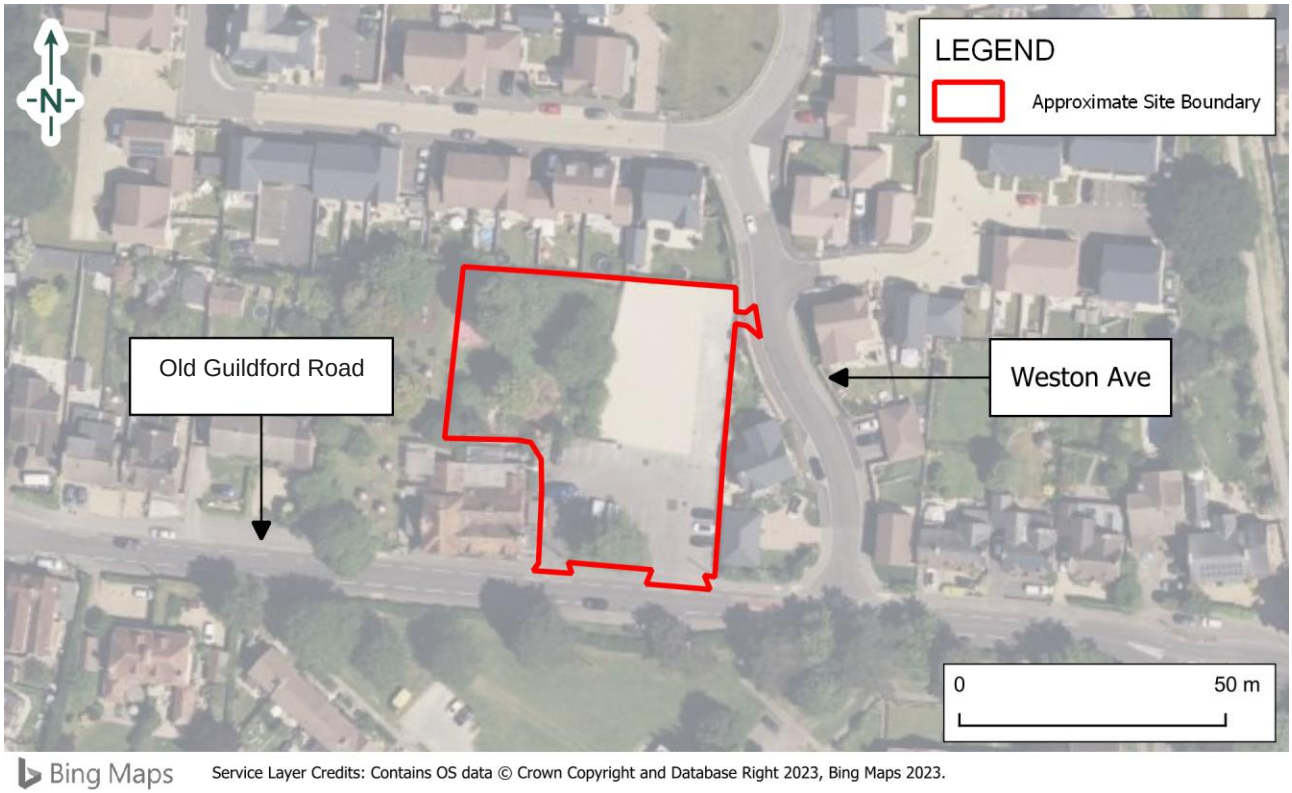


Figure 1: Site Location Plan

Co-ordinates	Centred approximately at National Grid Reference (NGR) 515200, 131540	**Area**	0.25 ha
Site Location	The Site is located in west Horsham, approximately 2.7 km west of Horsham train station.		
Existing Site Conditions	Online mapping (including Google Maps/Google Streetview imagery, accessed 08/08/2023) shows that the Site is brownfield, currently comprising a car parking area for the adjacent Shelley Arms pub. There is an area of soft landscaping in the west of the Site, located behind a fence. The Site is bordered by residential development to the north and east, green space to the west, and the Shelley Arms pub and associated car park to the south. Access to the Site is provided from Weston Avenue to the east and Old Guildford Road to the south. Hardstanding areas on Site currently occupies approximately 1,550 m^2 of the total Site area. The remaining permeable, soft landscaped areas occupy 950 m^2 of the total Site area. Existing hardstanding areas have been estimated from Bing Maps aerial imagery and guided by Site layout plans provided by the Client.		
Topography	A topographical survey has been undertaken by Tag Surveys in July 2023, and is included in Appendix B. The topographical survey shows that the Site slopes from		

	approximately 43.15 metres Above Ordnance Datum (m AOD) in the north-west to approximately 44.40 m AOD in the south-east. Topographic levels to metres Above Ordnance Datum (m AOD) have also been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR ground elevation data shows that the Site slopes from approximately 43 m AOD in the west to approximately 44 m AOD in the east. A LiDAR extract is included in Appendix C.
Hydrology	The nearest watercourse is an unnamed tributary to the River Arun (Ordinary Watercourse, under the jurisdiction of the LLFA) which is located approximately 260 m north of the Site. The watercourse flows in a generally east to westerly direction before joining the River Arun (the closest Main River, under the jurisdiction of the EA) approximately 1.2 km west of the Site.
Geology	Reference to the British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the Site is underlain directly by the Weald Clay formation, primarily comprising mudstone, sandstone, limestone, and clay. There are no superficial deposits indicated to be underlying the Site. The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a Site-specific basis. The closest available historical BGS borehole record (BGS Ref: TQ13SE221) is located approximately 370 m south-east of the Site (NGR 515320, 131160). The borehole record indicates that the underlying geology comprises the following generalised sequence: • Topsoil between 0 m – 0.40 m bgl; • Weald Clay between 0.40 m – 0.70 m bgl; • Clayey silt between 0.70 m – 1.60 m bgl; and • Bands of mudstone and clay between 1.60 m – 3.30 m bgl.
Hydrogeology	According to the EA's Aquifer Designation data, obtained from MAGIC Map's online mapping [accessed 19/09/2023], the underlying Weald Clay Formation is described as 'unproductive strata'. Unproductive Strata are 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'. The EA's 'Source Protection Zones' data, obtained from MAGIC Map's online mapping [accessed 19/09/2023], indicates that the Site is not located within a Groundwater Source Protection Zone.
Local Drainage	Public sewer records have been obtained from Southern Water and are included in Appendix D. The sewer records show that there is a 150 mm public foul sewer located beneath Old Guildford Road to the south of the Site. Manhole 1405 is shown to have a cover level of 43.77 m AOD and an invert level of 41.88 m AOD. There is also a 150 mm public surface water sewer located beneath Sullington Mead to the south-east of the Site. Manhole 2452 is located approximately 30 m south-east of the Site and has a cover level of 45.59 m AOD and an invert level of 44.35 m AOD. Manhole 1453 is also located beneath Sullington Mead approximately 35 m south of the Site and has a cover level of 43.92 m AOD and an invert level of 42.44 m AOD. A previous drainage strategy was conducted for the Site by Ambiental Technical Solutions Ltd in 2018. The report contains a drainage layout for the adjacent

	development to the north of the Site. However, as this drainage system is part of a private development it is not clear if their sewers have been adopted and therefore a connection to this system is not considered feasible for the Site.
Proposed Site Conditions	The proposed development is for the construction of four new residential developments with associated gardens, parking, and access, and a new car park for the existing Shelley Arms pub. A proposed development plan is included in Appendix E. The proposed development will result in an increase in hardstanding areas in the form of buildings and access. Hardstanding will comprise 2,255 m^2 of the total Site area. The remaining permeable, soft landscaped areas will occupy 215 m^2 of the total Site area. Hardstanding measurements were estimated from Site plans provided by the Client (Appendix E).

3.0 Relevant Planning Policy and Guidance

3.1 Introduction

3.1.1 The aim of this section of the report is to discuss the main aspects of the local and national planning policies that are relevant to any proposed development on the Site and relevant guidance and legislation.

3.2 Local policy

3.2.1 On 27th November 2015 Horsham District Council adopted the Horsham District Planning Framework (HDPF). With the exception of land within the South Downs National Park, the HDPF replaces the policies contained in the Horsham District Core Strategy and General Development Control Policies which were both adopted in 2007. The HDPF sets out the planning strategy for the years up to 2031 to deliver the social, economic and environmental needs for the district (outside the South Downs National Park). The Planning Framework contains the following policies relating to drainage:

'Policy 35 - Strategic Policy: Climate Change

Development will be supported where it makes a clear contribution to mitigating and adapting to the impacts of climate change and to meeting the district's carbon reduction targets as set out in the Council's Acting Together on Climate Change Strategy, 2009.

Development must be designed so that it can adapt to the impacts of climate change, reducing vulnerability, particularly in terms of flood risk, water supply and changes to the district's landscape. Developments should adapt to climate change using the following measures:

Provision of appropriate flood storage capacity in new building development;

Use of green infrastructure and dual use SuDS to help absorb heat, reduce surface water runoff, provide flood storage capacity and assist habitat migration;

Use of measures which promote the conservation of water and/or grey water recycling; and

Use of site layout, design measures and construction techniques that provide resilience to climate change (opportunities for natural ventilation and solar gain). If it is not possible to incorporate the adaption and mitigation measures proposed, an explanation should be provided as to why this is the case.

Policy 38 - Strategic Policy: Flooding

Development proposals will follow a sequential approach to flood risk management, giving priority to development sites with the lowest risk of flooding and making required development safe without increasing flood risk elsewhere. Development proposals will;

- *Where there is the potential to increase flood risk, proposals must incorporate the use of sustainable drainage systems (SuDS) where technically feasible, or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere.*
- *Consider the vulnerability and importance of local ecological resources such as water quality and biodiversity when determining the suitability of SuDS. New development should undertake more detailed assessments to consider the most appropriate SuDS methods for each site. Consideration should also be given to amenity value and green infrastructure.*
- *Utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to its source as possible will be required where technically feasible.*

- *Be in accordance with the objective of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements.'*

3.2.2 The Horsham District Council Surface Water Drainage Statement states the following:

- Developers and their design teams need to take into account different factors including the layout of the site, topography and geology when planning and positioning the different SuDS elements for the whole scheme.
- Depending on whether the planning application is 'Outline' or 'Full' will dictate the level of information required for your Surface Water Drainage strategy statement.
- Reference should be made to the Association of SuDS Authorities (ASA) Non- Statutory Technical Standards for Sustainable Drainage – Practice Guidance Section 2.14 for the level of information that would facilitate both West Sussex County Council (LLFA) & Horsham District Council in determining whether the application complies with the current National Planning Policy Framework (NPPF) & Planning Policy Guidance (PPG) requirements.
- SuDS must be properly designed to ensure that the maintenance and operation costs are proportionate and sustainable for the lifetime of the development.
- Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. SuDS seek to mimic natural drainage systems and retain water on or near to the site, when rain falls, in contrast to traditional drainage approaches, which tend to pipe water off-site as quickly as possible. SuDS therefore offer significant advantages over conventional piped drainage systems.
- In accordance with Planning Practice Guidance Paragraph 080, applicants must follow the hierarchy for discharge destinations. Where it is not possible to achieve the first hierarchy, discharge through the grounds (also supported by Approved Document Part H of the Building Regulations 2010), applicants must demonstrate in sequence why the subsequent discharge destination was selected.
- Subject to the evidence being provided to support the choice of discharge destination, proposals to dispose of surface water into a surface water sewer, highway drain or another drainage system, should be accompanied by evidence of the system having spare capacity downstream.

3.3 Consultation

3.3.1 A consultation request was submitted to the LLFA in August 2023. A response is awaited at the time of writing.

4.0 Drainage Strategy

4.1 Introduction

4.1.1 The Site currently comprises a car park and an area of soft landscaping. Surface water runoff is assumed to currently drain to the existing public surface water sewer to the west of the Site via the existing drainage system in Old Guildford Road and Hollands Field at an unrestricted rate.

4.1.2 The Horsham District Planning Framework states that surface water discharge should be managed via the use of SuDS, mimicking the natural drainage pattern where technically feasible.

4.1.3 The proposed development will introduce 2,255 m² of hardstanding in the form of buildings and access.

4.1.4 The increase in hardstanding area will result in an increase in surface water runoff rates and volumes. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the Site will be controlled, and a 30% betterment over the existing brownfield runoff rate will be provided.

4.2 Drainage Hierarchy

4.2.1 The recommended surface water drainage hierarchy (Paragraph 080 of the NPPG: Flood Risk and Coastal Change) is to utilise soakaway systems or infiltration as the preferred option, followed by discharging to an appropriate watercourse. If this is not feasible, the final option is to discharge to an existing public sewer.

Surface Water Discharge to Soakaway

4.2.2 The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above the Site is underlain by bedrock deposits of mudstone and clay which is considered impermeable. Soakaways are therefore unlikely to be considered feasible for this Site.

4.2.3 Infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of soakaways. Soakaways should be located a minimum of 5 m from habitable dwellings.

Surface Water Discharge to Watercourse

4.2.4 Where soakaways are not suitable a connection to watercourse is the next consideration.

4.2.5 The nearest watercourse is the unnamed tributary to the River Arun which is located approximately 260 m north of the Site. The Site is separated from the watercourse by third party, urbanised land. Therefore, discharge to the watercourse is not considered feasible.

Surface Water Discharge to Sewer

4.2.6 Where disposal of surface water to watercourse is not possible, a connection to the public sewer system is the final consideration. Local sewer plans included in Appendix D indicate that there is an existing 150 mm surface water sewer located beneath Sullington Mead to the south of the Site. Manhole 1453 is situated approximately 35 m south of the Site and has a cover level of 43.92 m AOD and an invert level of 42.44 m AOD. Discharge to this sewer may be feasible via gravity connection, as the land between the Site and the manhole is owned by the Council, therefore involvement of private third party landowners is not required. Relevant permissions will need to be obtained for a new connection beneath Old Guildford Road.

4.3 Surface Water Discharge

4.3.1 Based on the existing topographic survey for the Site (Appendix B) and local sewer plans (Appendix D), the Site does not appear to connect to the existing local sewer network.

4.3.2 The existing brownfield runoff rates have been estimated using the Modified Rational Method, which is set out as follows:

2.78 x Rainfall Intensity (mm) x Impermeable Drainage Area (Ha)

4.3.3 The existing brownfield runoff rates are summarised in Table 1 below. The existing 1 in 2 year event brownfield rate for the 0.25 ha development Site is 11.2 l/s.

Table 1: Existing Brownfield Runoff Rates

Return Period (years)	Runoff Rate (l/s)
1 in 1	9.9
1 in 2	**11.2**
1 in 10	18.3
1 in 30	22.9
1 in 100	28.6
1 in 1000	43.8

4.3.4 To ensure the proposed drainage scheme provides a 30% betterment over the existing 1 in 2 year brownfield runoff rate, surface water discharge is to be restricted to a rate of **7.8 l/s**.

4.4 Attenuation Storage

4.4.1 In order to achieve a discharge rate of 7.8 l/s, attenuation storage will be required. Quick Storage MicroDrainage calculations are included in Appendix F, and indicate that 94.4 m^3 of attenuation will be needed.

4.4.2 The storage estimates are based on a flow rate of 7.8 l/s, storage within an underground geocellular structure, an impermeable drainage area of 2,255 m^2.

4.4.3 The attenuation volumes are provided for indicative purposes only and should be verified at the detailed design stage.

4.5 Sustainable Drainage Systems

4.5.1 Attenuation storage should be provided in the form of Sustainable Drainage Systems (SuDS) where practical. The following SuDS options have been considered:

Soakaways

4.5.2 As described above, the use of soakaways is not considered to be feasible.

Swales, Detention Basins and Ponds

4.5.3 The Site will be occupied by buildings, an access road and private residential gardens and there is limited space to accommodate above ground storage features such as ponds and basins.

Rainwater Harvesting

4.5.4 Rainwater butts and planters should be considered for inclusion at downspout locations on-Site to facilitate a robust management train running in series throughout the Site. Rainwater harvesting features can also provide amenity and biodiversity benefits, as well as providing a degree of rainwater attenuation and treatment before discharge to SuDS features on-Site.

Green Roofs

4.5.5 Green roofs are not identified on development plans. Given the nature of the proposed development, the significant additional cost involved in installing and maintaining green roofs and the additional works required to allow for the additional loading on the building, green roofs are not considered a practical option. The benefits achieved through installing a green roof would be disproportionate to the significant ongoing maintenance and construction costs involved.

Porous/Permeable Paving

4.5.6 Permeable paving could be incorporated within private paths and parking spaces on-Site. Storage would be provided within the sub-grade material prior to controlled release to the receiving sewer. The amount of storage offered by permeable paving is subject to sub-grade depth and Site gradient. The use of permeable paving should be considered at the detailed design stage.

4.5.7 Based on an external paved area of approximately 670 m^2, a sub-grade depth of 0.3m and a void ratio of 30%, there is potential to accommodate 60.3 m^3 of attenuation storage within the sub-grade of permeable paving (assuming the base of the sub-grade will be formed at a level gradient).

Underground Attenuation Tanks

4.5.8 Storage could be provided within underground attenuation tanks or within oversized pipes. Sufficient space for an underground tank is provided beneath the proposed western car parking area on-Site.

4.6 Preferred Drainage Scheme

4.6.1 Surface water runoff will be discharged to the existing surface water sewer located in Sullington Mead approximately 35 m south of the Site (manhole 1453) at a rate of 7.8 l/s, subject to agreement with Southern Water. A gravity connection appears to be feasible. As these works would be crossing a highway and Council owned land, additional permissions will be required.

4.6.2 Surface water runoff up to the 1 in 100 year plus 45% climate change allowance event will be attenuated on Site. MicroDrainage Source Control calculations have been completed and are included in Appendix F. A total attenuation volume of 94.4 m^3 will be required to achieve the discharge rate of 7.8 l/s and will be provided in the form of an underground geocellular attenuation crate located beneath the western car parking area on-Site. The attenuation tank will have a width of 4.5 m, a length of 10 m, and a depth of 0.8 m, with a 95% void ratio thereby providing a total attenuation potential of 34.2 m^3.

4.6.3 Attenuation will also be provided in the form of permeable paving located in the private paths and car parking spaces on-Site. Based on an external paved area of approximately 670 m^2, a sub-grade depth of 0.3m and a void ratio of 30%, there is potential to accommodate 60.3 m^3 of attenuation storage within the sub-grade of permeable paving (assuming the base of the sub-grade will be formed at a level gradient).

4.6.4 A Concept Drainage Sketch detailing the above is included in Appendix G. The proposed surface water drainage scheme will create at least a 30% betterment in runoff rate over the existing drainage. The betterment will be greater than 30% for events greater than the 1 in 2 year event.

4.7 Event Exceedance

4.7.1 Storage will be provided for the 1 in 100 year plus 45% CC event. Storm events in excess of the 1 in 100 year plus 45% CC event should be permitted to produce temporary shallow depth flooding within the car park and landscaped areas. Finished floor levels are recommended to be set at a minimum of 150 mm above surrounding ground levels to help prevent exceedance flooding affecting the buildings.

4.8 Surface Water Treatment

4.8.1 In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, with low traffic roads classified as having a 'low' pollution hazard level. Table 3 below shows the pollution hazard indices for each land use.

Table 3: Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2*	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

*Indices values range from 0-1.

4.8.2 Where practical, runoff from roofs and roads will be directed to permeable paving and the drainage system on-Site. Table 4 below demonstrates that the inclusion of permeable paving provides sufficient treatment.

Table 4: SuDS Mitigation Indices

	Mitigation Indices		
Type of SuDS	**Total Suspended Solids (TSS)**	**Metals**	**Hydrocarbons**
Permeable Pavement	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

4.8.3 It can be concluded that the inclusion of permeable paving will provide sufficient treatment. Where attenuation is provided in a below ground system (tank storage), treatment will need to be provided by a suitably sized separator.

4.9 Maintenance

4.9.1 Maintenance of communal drainage features such as permeable paving or an attenuation tank will be the responsibility of the Site owner. Maintenance of shared surface water drainage systems can be arranged through appointment of a Site management company.

4.9.2 Maintenance schedules for an attenuation tank and permeable paving are included in Appendix H. Maintenance of the separator will be as per the manufacturer's guidance.

4.10 Foul Water Discharge

4.10.1 Foul flows should be discharged to the 150 mm public foul sewer in Old Guildford Road as per the existing situation.

5.0 Conclusions and Recommendations

5.1 Conclusions

5.1.1 The proposed development is for the construction of four new residential developments with associated gardens, access, and parking.

5.1.2 The proposed development will introduce impermeable drainage area in the form of buildings and access. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used and attenuation provided on Site to accommodate storm events up to and including the 1 in 100 year plus 45% climate change event.

5.1.3 All methods of surface water discharge have been assessed. Surface water runoff discharge to the existing surface water sewer located in Sullington Mead approximately 35 m south of the Site at a rate of 7.8 l/s appears to be the most practical option, subject to agreement with Southern Water. A gravity connection appears to be feasible. As the proposed connection will cross a highway and Council owned land, additional permissions may be required.

5.1.4 Attenuation storage will be required on Site in order to restrict surface water discharge to 7.8 l/s. Attenuation can be provided within the sub-grade of permeable paving in the private paths and car parking spaces on-Site, and in the form of an underground attenuation tank located beneath the western car parking area on-Site.

5.1.5 Foul flows can discharge to the existing 150 mm public foul sewer in Old Guildford Road to the south of the Site as per the existing situation. A gravity connection can be achieved.

5.2 Recommendations

Drainage Strategy

- Verify the attenuation volumes included in this report when undertaking detailed drainage design;
- Make provision for sustainable drainage features in the proposed western car parking area on-Site; and
- Attain the relevant permissions for works associated with the new connection to the sewer in Sullington Mead to the south-east.

Appendix A – Limitations

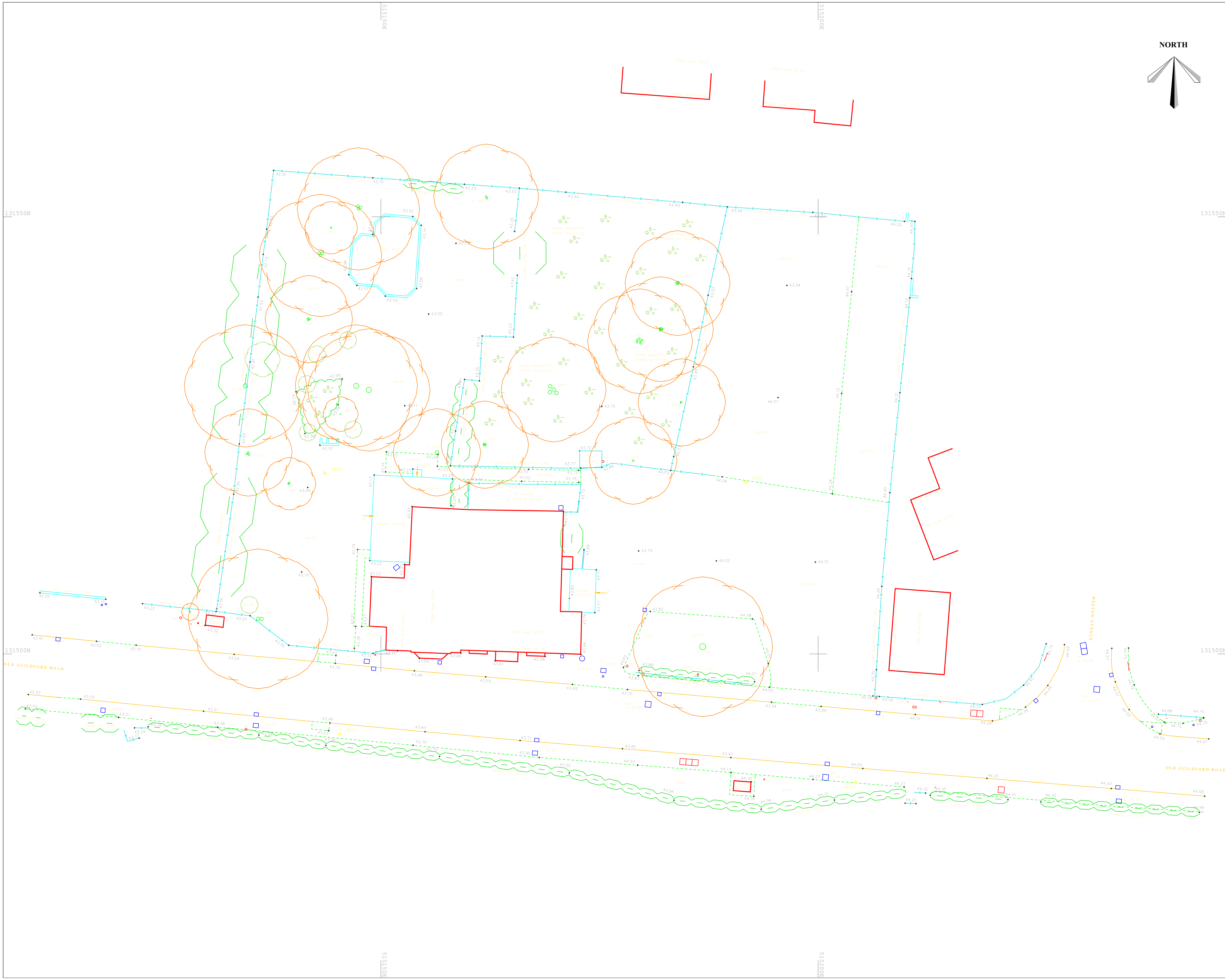
Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B – Topographical Survey



NOTES

GENERAL NOTES :–

ALL LEVELS ARE IN METRES DERIVED FROM GPS TRANSFORMATION.

GRID COORDINATES ARE ORDNANCE SURVEY NATIONAL GRID DERIVED FROM GPS TRANSFORMATION. GPS COORDINATES AND LEVELS SET AT ST01 (NO SCALE FACTOR APPLIED)

THIS DRAWING HAS BEEN PRODUCED WITH A PLOT SCALE ACCURACY OF 1:200

SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS / DETAILS SURVEYED FROM SURFACE INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED

TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL.

OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL VARIATION, AND SHOULD BE TREATED AS APPROXIMATE.

SERVICE COVERS LOCATED UNDER PARKED VEHICLES/MOBILE STRUCTURES MAYBE OMITTED.

BURIED SERVICE COVERS WILL NOT BE INDICATED.

TOPOGRAPHICAL SURVEY/UTILITY KEY :–

(ht) – height
ø – diameter
● – pea trap
a/g – above ground
a/r – assumed route
av – air valve
bb – belisha beacon
bd – back drop
bl – bed level
boll – bollard
bos – bottom of shaft
bt – telecom
c/b fence – closeboard fence
c/box – control box
catv – cable television
cl – cover level
con – conifer
cr – cable riser
cws – combined water sewer
d/chan – drainage channel
ejb – electric junction box
elec – electric
eot – end of trace
ep – electric pole
er – earth rod
f/bed – flower bed
fh – fire hydrant
fl – floor level
fs – fire switch
fws – foul water sewer
g – gully
g/run – gully run
gr – gas riser
h/chestnut – horse chestnut
h/thorn – hawthorn
ic – inspection cover
il – invert level
ill – illuminated
int – interceptor
lp – lamp post
mh – manhole cover
mkr – marker
o/h – over head
ol – off let
osa – off survey area
OSBM – ordnance survey bench mark
p & r fence – post & rail fence
pd – pit depth
pr – pipe riser
ptg – pipe to ground
pts – pipe to surface
re – rodding eye
ret wall – retaining wall
rs – road sign
rwp – rain water pipe
s/birch – silver birch
s/p – safety paving
sap – sapling
sec fence – security fence
sfc – soil filled chamber
sl – spot light
sp – soil pipe
st – stop tap
sv – stop valve
svp – soil vent pipe
sws – storm water sewer
TBM – temporary bench mark
tfr – taken from records
tl – threshold level
toc – top of cap
top – top of pipe
tot – top of tank
tp – telecom pole
ts – traffic signal
t/s – trench scar
u/s – underside
utl – unable to lift
utr – unable to rod
uts – unable to survey
utt – unable to trace
vp – vent pipe
wfc – water filled chamber
wl – water level
wm – water meter
wp – waste pipe
wr – water riser

SURVEY CONTROL :–

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	515204.252	131485.351	44.256
ST02	515145.275	131490.856	43.590
ST04	515143.579	131520.698	43.065
ST05	515191.705	131519.679	44.092
ST06	515144.401	131538.669	42.928

SHEET LAYOUT :–

UTILITY NOTES

0 2 4 8 12 16 20

TAG SURVEYS

UNIT 1, ACCESS HOUSE,
SHERWOOD ROAD,
BROMSGROVE, B60 3DR

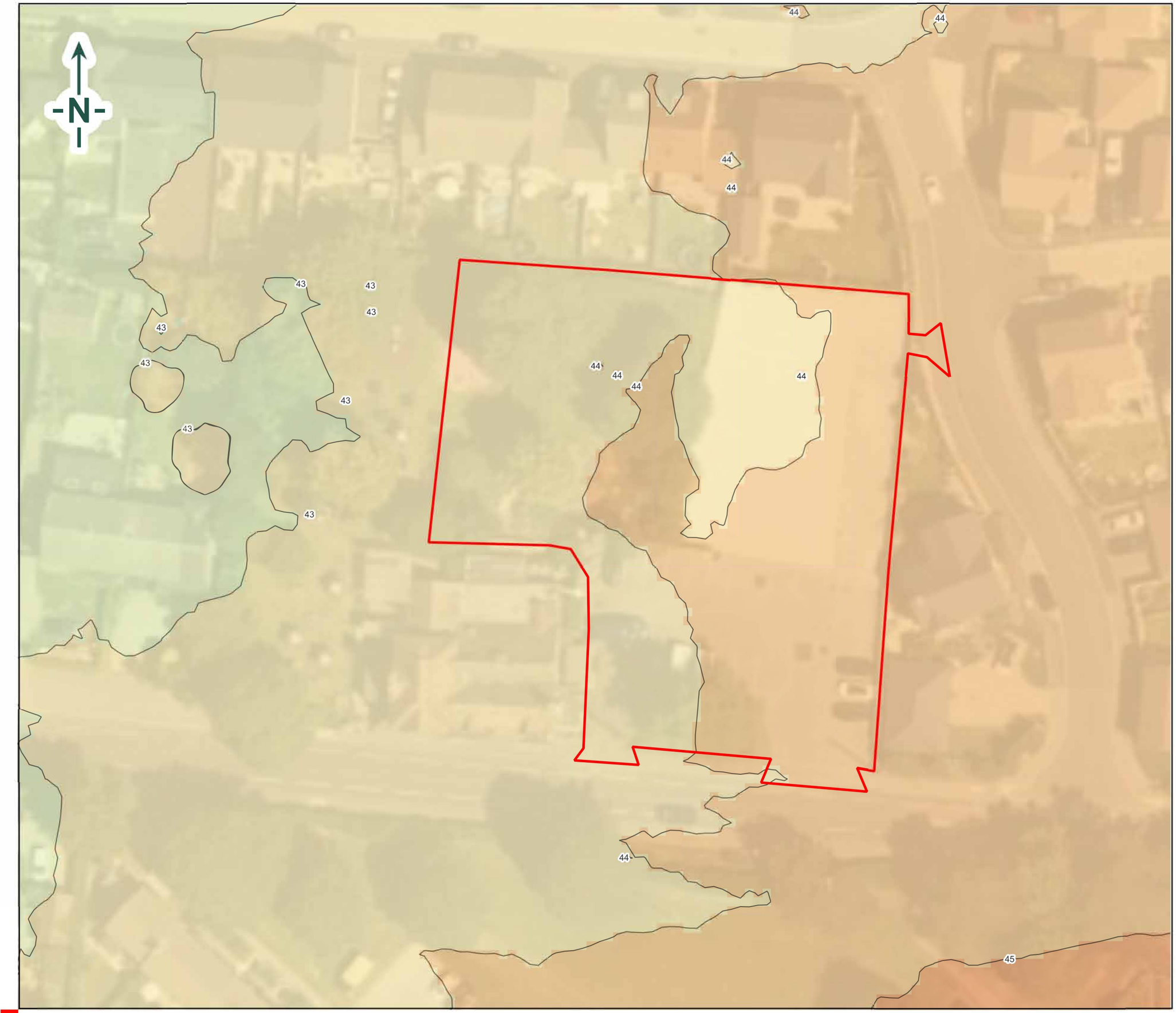
WWW.TAGSURVEYS.CO.UK
INFO@TAGSURVEYS.CO.UK

Client	STONEGATE PUBS
Project	SHELLEY ARMS, OLD GUILDFORD ROAD, RH12 3JU
Title	TOPOGRAPHICAL SURVEY
Date	JULY 2023
Scale	1:200@A1
Dwg No	T0432 – 1
Surveyor	SMc
Checked	SB

Revisions

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

Appendix C – LiDAR Plan



Legend

- Approximate Site Boundary
- Contours

Elevation (m AOD)

Band 1 (Gray)

- <= 39
- 39 - 40
- 40 - 41
- 41 - 42
- 42 - 43
- 43 - 44
- 44 - 45
- 45 - 46
- 46 - 47
- > 47

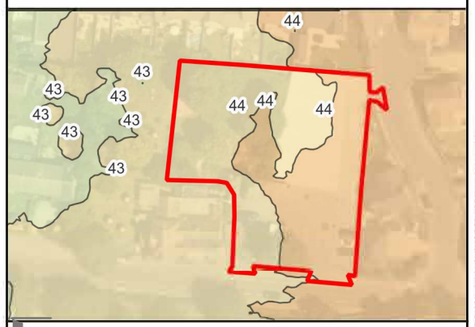
0 5 10 15 20 25 m

Figure	LiDAR Plan
Job	The Shelley Arms, 16 Old Guildford Road, RH12 3JU
Client	Stonegate Group c/o Vista Planning

Appendix	Revision	Date
C	A	19 September 2023
Drawn by	**Checked by**	**Scale**
OE	LA	1:400

Job No.

99339.584185

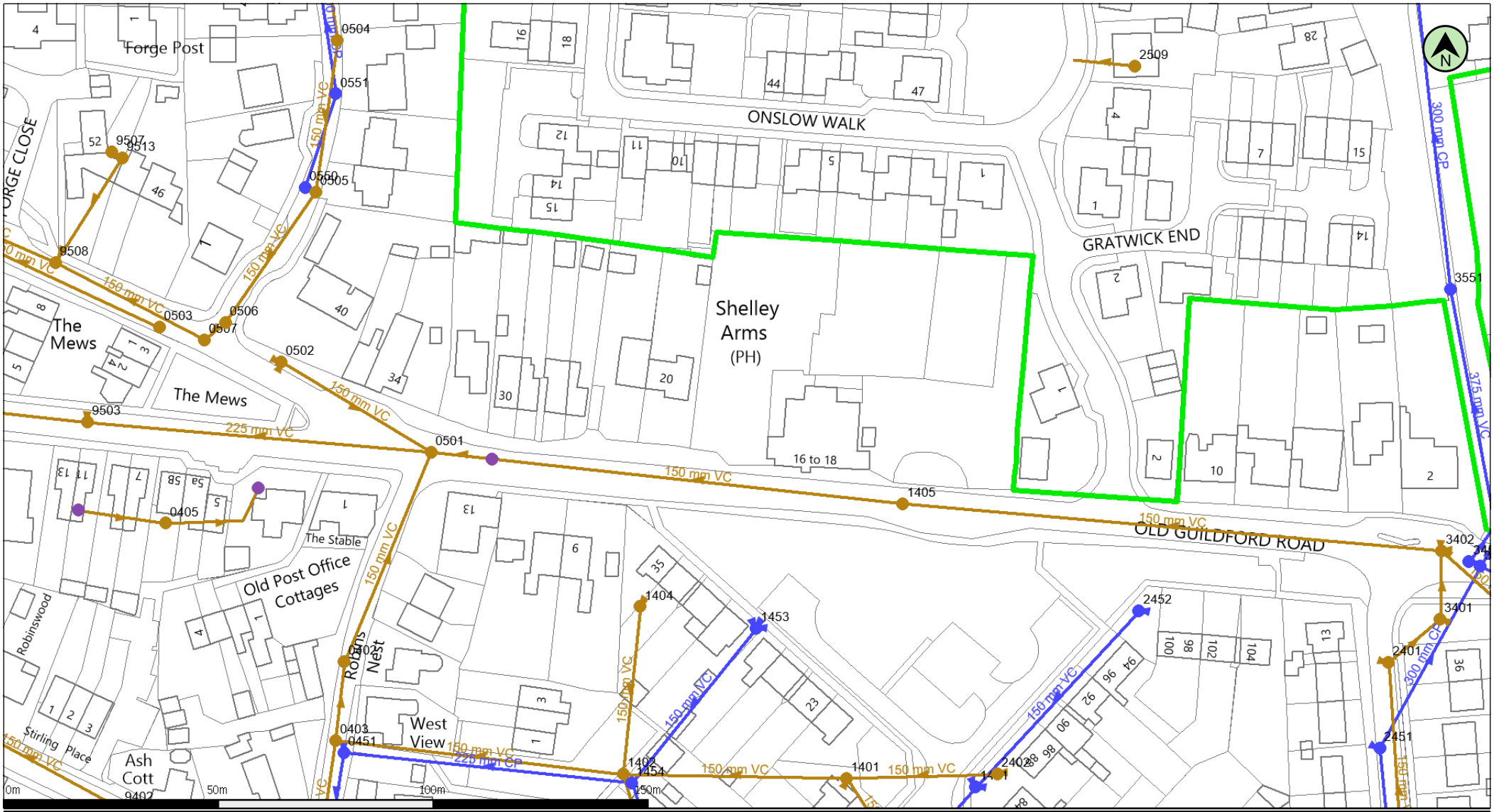


Bing Maps | DeltaSimons

Site Plan Provided by Client.

C:\QGIS\99339.584185 Shelley Arms\qgs\[99339.584185 Shelley Arms.qgz

Appendix D – Local Sewer Plan



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 | Date: 11/03/25 | Scale: 1:1250 | Map Centre: 515145,131515 | Data updated: 26/02/25 | Our Ref: 1712665 - 1 | Wastewater Plan A4 Powered by digdat

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 2025 Ordnance Survey AC0000808122 .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.

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

utilitysitesearch@outlook.com

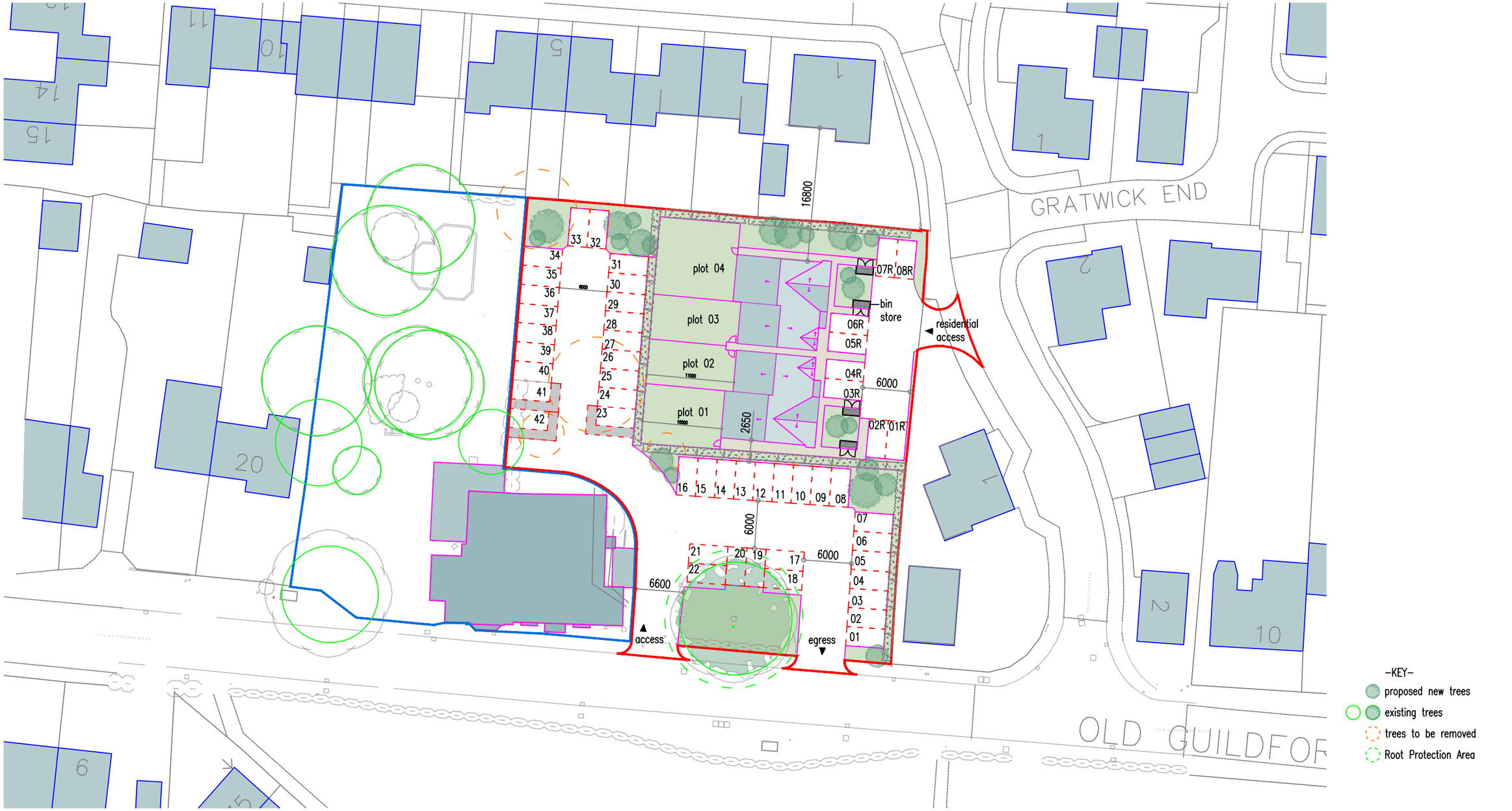
lu

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0402	F	41.81	39.98	-
0403	F	41.89	40.09	-
0405	F	0.00	0.00	-
0501	F	42.56	39.66	-
0502	F	42.16	40.00	-
0503	F	0.00	0.00	-
0504	F	41.06	38.98	-
0505	F	41.35	38.78	-
0506	F	41.67	38.60	-
0507	F	41.64	38.44	-
1401	F	44.50	42.90	-
1402	F	43.08	41.51	-
1404	F	43.20	42.37	-
1405	F	43.77	0.00	-
2401	F	45.93	44.13	-
2402	F	45.23	43.51	-
2509	F	0.00	0.00	-
3401	F	47.04	43.80	-
3402	F	45.89	43.54	-
9402	F	41.16	39.19	-
9503	F	41.01	38.46	-
9507	F	0.00	0.00	-
9508	F	0.00	0.00	-
9513	F	0.00	0.00	-
0451	S	41.94	41.20	-
0550	S	41.36	39.76	-
0551	S	41.16	39.63	-
1451	S	45.13	43.84	-
1453	S	43.92	42.44	-
1454	S	43.09	41.92	-
2451	S	46.43	43.86	-
2452	S	45.59	44.35	-

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
3455	S	0.00	0.00	-
3456	S	0.00	0.00	-
3551	S	45.20	43.05	-

Appendix E – Proposed Development Plan



PROPOSED SITE PLAN

scale 1: 1:500 0 10 20 m

scale 2

scale 3

do not scale from this drawing,
use dimensions only, all discrepancies to be reported to the architect.

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a	22.04.24	parking amended				

dwg no	Rac	3357	s3	001	a	
client	Stonegate Group					
project	The Shelley Arms 16–18 Old Guildford Road Horsham RH12 3JU					
title	proposed site plan					
date	21.08.22	scale	1:500			
drawn	AMB	check	DR	size	A1	

planning

stage 3

north

Appendix F – MicroDrainage Source Control Calculations

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.047	0.447	7.8	52.8	O K
30 min Summer	99.188	0.588	7.8	69.4	O K
60 min Summer	99.303	0.703	7.8	82.9	O K
120 min Summer	99.292	0.692	7.8	81.7	O K
180 min Summer	99.262	0.662	7.8	78.2	O K
240 min Summer	99.230	0.630	7.8	74.4	O K
360 min Summer	99.164	0.564	7.8	66.6	O K
480 min Summer	99.093	0.493	7.8	58.2	O K
600 min Summer	99.032	0.432	7.8	51.0	O K
720 min Summer	98.978	0.378	7.8	44.6	O K
960 min Summer	98.891	0.291	7.8	34.3	O K
1440 min Summer	98.786	0.186	7.7	22.0	O K
2160 min Summer	98.733	0.133	6.8	15.7	O K
2880 min Summer	98.713	0.113	5.7	13.4	O K
4320 min Summer	98.693	0.093	4.3	11.0	O K
5760 min Summer	98.682	0.082	3.5	9.7	O K
7200 min Summer	98.675	0.075	3.0	8.8	O K
8640 min Summer	98.669	0.069	2.6	8.2	O K
10080 min Summer	98.665	0.065	2.4	7.7	O K
15 min Winter	99.108	0.508	7.8	59.9	O K
30 min Winter	99.267	0.667	7.8	78.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	142.680	0.0	59.9	24
30 min Summer	95.549	0.0	80.3	37
60 min Summer	61.404	0.0	103.5	64
120 min Summer	35.608	0.0	120.0	104
180 min Summer	25.818	0.0	130.6	136
240 min Summer	20.557	0.0	138.6	170
360 min Summer	14.950	0.0	151.2	240
480 min Summer	11.945	0.0	161.1	304
600 min Summer	10.051	0.0	169.5	366
720 min Summer	8.740	0.0	176.8	428
960 min Summer	7.031	0.0	189.7	546
1440 min Summer	5.210	0.0	210.8	768
2160 min Summer	3.883	0.0	235.8	1108
2880 min Summer	3.158	0.0	255.7	1472
4320 min Summer	2.362	0.0	286.8	2204
5760 min Summer	1.925	0.0	311.9	2936
7200 min Summer	1.638	0.0	331.7	3672
8640 min Summer	1.440	0.0	349.8	4328
10080 min Summer	1.296	0.0	367.1	5048
15 min Winter	142.680	0.0	67.2	24
30 min Winter	95.549	0.0	90.0	37

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.400	0.800	7.8	94.4	O K
120 min Winter	99.393	0.793	7.8	93.5	O K
180 min Winter	99.353	0.753	7.8	88.9	O K
240 min Winter	99.309	0.709	7.8	83.7	O K
360 min Winter	99.215	0.615	7.8	72.6	O K
480 min Winter	99.106	0.506	7.8	59.7	O K
600 min Winter	99.009	0.409	7.8	48.3	O K
720 min Winter	98.928	0.328	7.8	38.7	O K
960 min Winter	98.812	0.212	7.8	25.1	O K
1440 min Winter	98.733	0.133	6.8	15.7	O K
2160 min Winter	98.705	0.105	5.1	12.4	O K
2880 min Winter	98.691	0.091	4.2	10.8	O K
4320 min Winter	98.677	0.077	3.2	9.0	O K
5760 min Winter	98.668	0.068	2.6	8.0	O K
7200 min Winter	98.662	0.062	2.2	7.3	O K
8640 min Winter	98.658	0.058	1.9	6.8	O K
10080 min Winter	98.654	0.054	1.7	6.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	61.404	0.0	115.9	64
120 min Winter	35.608	0.0	134.5	114
180 min Winter	25.818	0.0	146.3	144
240 min Winter	20.557	0.0	155.3	184
360 min Winter	14.950	0.0	169.4	260
480 min Winter	11.945	0.0	180.5	330
600 min Winter	10.051	0.0	189.8	390
720 min Winter	8.740	0.0	198.1	448
960 min Winter	7.031	0.0	212.4	554
1440 min Winter	5.210	0.0	236.1	756
2160 min Winter	3.883	0.0	264.1	1108
2880 min Winter	3.158	0.0	286.4	1472
4320 min Winter	2.362	0.0	321.2	2200
5760 min Winter	1.925	0.0	349.3	2936
7200 min Winter	1.638	0.0	371.5	3656
8640 min Winter	1.440	0.0	391.8	4312
10080 min Winter	1.296	0.0	411.2	5136

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 515181 131532 TQ 15181 31532
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.225

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.075	4	8	0.075	8	12	0.075

Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	118.0	0.800	118.0	0.801	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0133-7800-0800-7800
Design Head (m)	0.800
Design Flow (l/s)	7.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	133
Invert Level (m)	98.600
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	7.8
Flush-Flo™	0.249	7.8
Kick-Flo®	0.556	6.6
Mean Flow over Head Range	-	6.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.8	1.200	9.4	3.000	14.6	7.000	21.8
0.200	7.7	1.400	10.1	3.500	15.7	7.500	22.6
0.300	7.8	1.600	10.8	4.000	16.7	8.000	23.3
0.400	7.6	1.800	11.4	4.500	17.7	8.500	23.9
0.500	7.1	2.000	12.0	5.000	18.6	9.000	24.6
0.600	6.8	2.200	12.6	5.500	19.5	9.500	25.3
0.800	7.8	2.400	13.1	6.000	20.3		
1.000	8.7	2.600	13.6	6.500	21.1		

Appendix G – Concept Drainage Sketch

Rainwater butts and planters, water falling on the roof will be collected prior to discharging to SuDS on-Site

670 m² of permeable paving, a sub-grade depth 0f 0.3 m and a void ratio of 30%, providing a storage volume of 60.3 m³

45 m² cellular attenuation tank, depth of 0.8 m, 95% void and providing a storage volume of 34.1 m³

Hydro-Brake flow control chamber, restricting discharge rate to 7.8 l/s
(MD-SHE-0133-7800-0800-7800)

New proposed foul manhole connecting into 150 mm public sewer

Surface water runoff to discharge to existing surface water sewer, manhole 1453 (invert levels 42.44 m AOD), a gravity connection should be feasible

GRATWICK END

OLD GUILDFORD ROAD

WESTON AVENUE

NOTES

1. The location and level of existing drainage connections and existing services is to be checked prior to commencement of drainage works. any variance to the details on the drainage drawing is to be brought to the attention of the designer.
2. This drawing provides a Concept Drainage Sketch and is not intended for detailed design. Detailed design will be required at the detailed design state.
3. This design is based on information supplied by third parties, and maybe subject to change resulting from updates available from third parties.
4. Attenuation to be provided through underground geocellular storage crates and permeable paving. Dimensions of proposed geocellular storage crates are confirmed at the detailed design stage.
5. Surface water runoff proposed to discharge into the existing surface water sewer via a Hydro-Brake, subject to agreement with Southern Water.
6. Proprietary treatment to be specified at the detailed design stage and installed and maintained as per relevant supplier's instructions.
7. Further consideration of proposed ground levels will be required at the detailed design stage.

Legend

- Site Boundary
- Rainwater Butts & Planters
- Permeable Paving
- Attenuation Tank
- Surface Water Drainage
- Foul Water Drainage
- Exceedance Flow Path
- Existing Surface Water Sewer
- Existing Foul Sewer

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The Arrow, First Floor (South Wing)
Fifth Avenue,
Team Valley Trading Estate,
Gateshead
NE11 0NG

PROJECT:
The Shelley Arms, 16 Old Guildford Road, RH12 3JU

TITLE:
Concept Drainage Sketch

CLIENT:
Stonegate Group c/o Vista Planning

PROJECT NUMBER:
99339.584185

SCALE:	ISSUED FOR:
NOT TO SCALE	PLANNING
DRAWN: TWJ	CHECKED: LB
DATE: 12/03/2025	REVISION: 3

Appendix H – Maintenance Schedules

Attenuation Storage Tank Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove If necessary	Every 5 years or as required

Ref. Table 21.3, CIRIA C753 'The SuDS Manual'

Permeable Paving Maintenance Schedule

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on Site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and move contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level or the paving	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and / or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Ref. Table 20.15, CIRIA C753 'The SuDS Manual'