

Henshall Drive
Chellaston

Drainage Strategy

HSP2021-C3728-C&S-C-240
July 2021



CIVIL | STRUCTURAL | GEOTECHNICAL & ENVIRONMENTAL | TRAFFIC AND TRANSPORT

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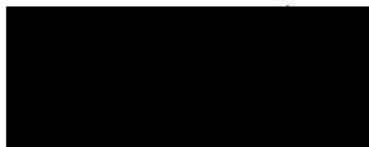
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Signed for and on behalf of HSP Consulting:



Paul Daykin, Director

Issue & Revision History

Revision	Status	Originator	Checked	Approved	Date
-	FINAL	Stuart Argyle BSc (Hons) MSc	-	Paul Daykin BSc(Hons) MCIQB MCIHT CEnv	19.07.21
Project: Henshall Drive			Document Reference: HSP2021-C3728-C&S-C-240		

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1 Introduction

1.1 General

1.1.1 HSP Consulting Engineers Ltd has been commissioned to undertake a Drainage Strategy Report for a proposed development at Henshall Drive, Chellaston.

1.1.2 It is understood that this Drainage Strategy will support a full planning application for the development site.

1.2 Sources of Data

1.2.1 This report is based on information from the following principal sources of information:

- i.* Development Site Proposals
- ii.* Topographical Survey Data
- iii.* Severn Trent Water Sewer Records and Developer Enquiry Response
- iv.* Publicly Available Environment Agency Data
- v.* Site Investigation Data

2 Site Location, Description & Proposed Development

2.1 Site Location

2.1.1 The site is located at National Grid reference (NGR) 438590,329700 (approximately).

2.1.2 The existing site is greenfield.

2.1.3 The total site area is approximately 4200m². The site comprises a developed area and an area defined as being 'landscaped for ecological benefits.'

2.1.4 The developed area (comprising proposed buildings, hardstanding and plot garden areas) is approximately 1900m².

2.1.5 The new site will be accessed directly off of Henshall Drive.

2.1.6 The nearest postcode for the development is DE73 6WU.

2.1.7 The relevant planning authority is South Derbyshire District Council.

2.1.8 The Lead Local Flood Authority is Derbyshire County Council.

2.1.9 A site location plan is included in Appendix 1.

2.2 Existing Drainage

- 2.2.1 Topographical survey information indicates that there are formal drainage systems located within Henshall Drive, directly adjacent to the development site.
- 2.2.2 A copy of the topographical survey information has been reproduced in Appendix 2.
- 2.2.3 A Severn Trent Water (STW) developer enquiry has been completed, and associated sewer records have been procured. This information indicates the following:
 - i. Sewer records show the closest point of connection for surface water to be at the 225mm surface water sewers west of the site, adjacent to the site boundary at MH5609, MH5704 and MH5705.
 - ii. The closest point of connection for gravity foul flows is at MH4713 on the 150mm foul sewer west of the site off Ferrers Drive.
 - iii. The depth of the existing sewers noted above are currently unknown.
 - iv. These sewers are currently under a Section 104 adoption agreement, and it is not clear if the networks have been fully adopted by STW at present. It is likely that the networks are still under an adoption agreement and would therefore be classed as private sewers. On this basis, the developer would need to seek approval from the current owner to connect to this sewer.
 - v. The STW adoption team has been consulted to determine the status of these sewers.

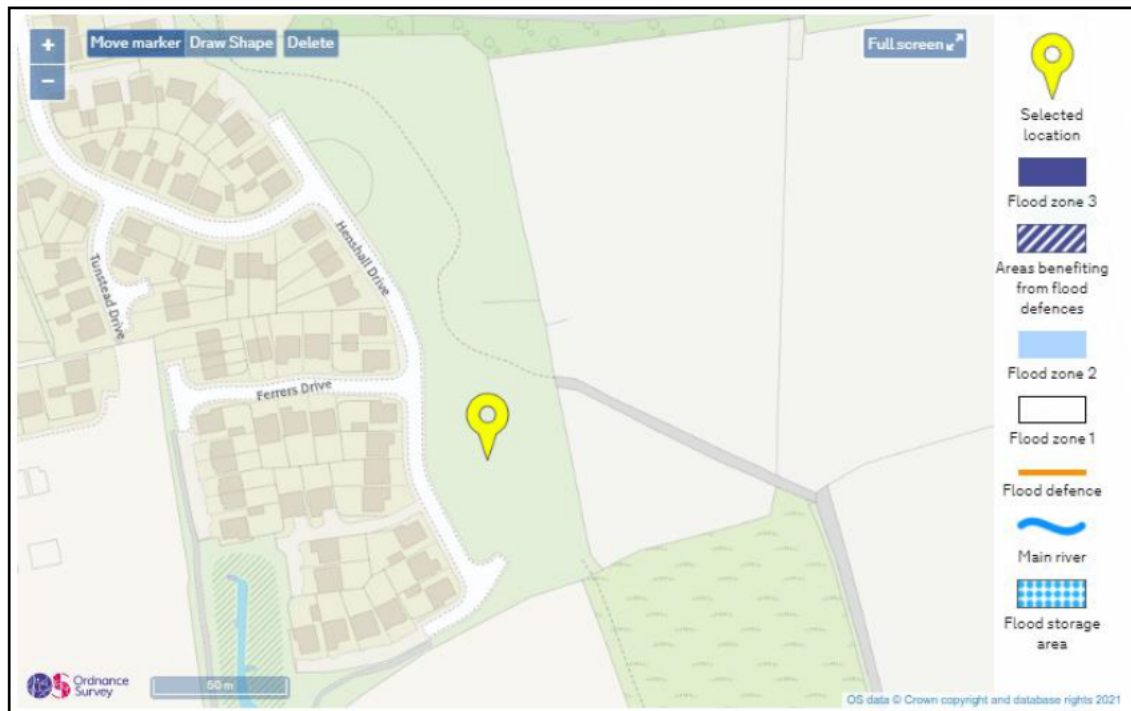
- 2.2.4 A copy of the STW sewer records and developer enquiry response have been included in Appendix 3.

2.3 Proposed Development

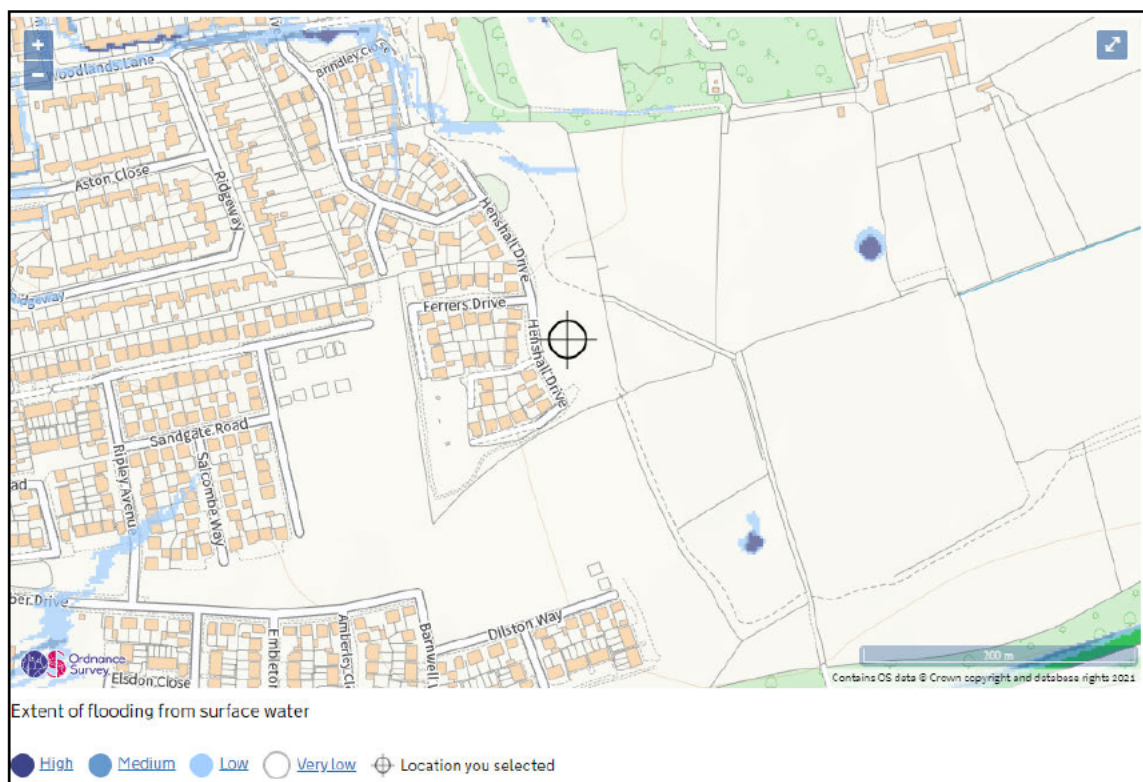
- 2.3.1 The development proposed is understood to comprise of 8 dwellings, with associated drives, paths and a new footway off of Henshall Drive.
- 2.3.2 The prospective development will comprise approximately 1100m² of impermeable area.
- 2.3.3 A copy of the development proposals is included in Appendix 4.

3 Flood Risk

- 3.1.1 Information available from the Environment Agency (EA) website indicates that the development is located within Flood Zone 1, a reproduction has been included below.



3.1.2 Information available from the Environment Agency (EA) website indicates that the development is not located in an area at risk of surface water flooding, a reproduction has been included below.



4 Surface Water Drainage Strategy

4.1 Surface Water Discharge Methodology

4.1.1 Building Regulations (Part H) requires that surface water is disposed according to the following hierarchy:

- i.* Infiltration to the ground (soakaway etc.)
- ii.* Discharge to a local watercourse
- iii.* Discharge to the local sewerage network

4.1.2 The limited area of the site and the density of proposed structures indicate that there is insufficient space at the site to locate soakaways appropriately in accordance with building regulation guidance; thus, precluding the use of infiltration drainage within the proposed development site.

4.1.3 Furthermore, a site investigation undertaken for the adjacent residential development indicates that the underlying strata comprises Firm/stiff CLAY between approximately 1.4-4.5m below existing ground level. Therefore, the underlying soils are inferred to preclude the use of infiltration systems within the development, the basis that they will not achieve the required permeability rates to render such systems feasible.

4.1.4 There are no known watercourses within close vicinity of the development site.

4.1.5 As discussed in Section 2.2, there are existing sewers located immediately outside of the development perimeter.

4.1.6 It is understood that the developer has an agreement with the current owners of these sewers to construct new connections from the proposed development.

4.1.7 Therefore, connections to the existing sewerage systems are proposed.

4.2 Surface Water Discharge Rate

4.2.1 In accordance with best practice and current design guidance, all new surface water flows are proposed to be restricted to existing greenfield discharge rates for and up to the 100 year + 40% CC storm event.

4.2.2 Greenfield discharge rates have been calculated using the UK SuDS online tool (available at <https://www.uksuds.com>), the results have been tabulated below.

Period	Greenfield Rate (l/s)*
Qbar	0.82
1 year	0.68
30 year	1.65
100 year	2.12
*Based on developable site area of 1900m ²	

4.2.3 A copy of the existing greenfield runoff calculations has been reproduced within Appendix 5.

4.2.4 As the greenfield rates fall below 5 l/s, it is proposed that a minimum discharge rate of 5 l/s is utilised, to prevent use of small diameter pipework/flow controls, and thus mitigate against and potential future blockages and associated maintenance risks.

4.2.5 It is proposed that all prospective surface water flows are restricted to a maximum of 5l/s for storms and up to the 100 year + 40% CC event.

4.3 Water Quality Treatment

4.3.1 The development site will include areas subject to trafficking; such areas will generally comprise parking areas.

4.3.2 Therefore, pollution mitigation (through the use of sustainable drainage systems or proprietary systems) is envisaged to be required as part of the new surface water drainage systems.

4.4 Sustainable Drainage Systems

4.4.1 As discussed in Section 4.1.2, the prospective use of infiltration drainage within the site is precluded by the limited site area, and subsequent inability to provide required offsets between proposed structures and infiltration systems.

4.4.2 Furthermore, as stated within Section 4.1.3, the presence of clays identified within adjacent intrusive site investigation works suggest that the underlying soils are not conducive to infiltration drainage.

4.4.3 Due to site layout constraints, above ground features such as swales, ponds or detention basins are not feasible due to the lack of available space within the proposed layout.

4.4.4 The proposed building will likely comprise pitched roofs, which preclude the use of green or blue roofs.

4.4.5 As some vehicular trafficking is envisaged, the use of permeable paving is envisaged to provide the required water quality treatment; these systems are therefore proposed within private drive areas.

4.4.6 Surface water collection features (i.e. gullies and linear drains etc.), where required, will be provided with silt traps, to mitigate silts entering the downstream drainage network.

4.4.7 It is proposed that any required surface attenuation will be provided within below ground geo-cellular crate systems.

4.5 Urban Creep

4.5.1 An allowance of 10% for prospective urban creep has been made at this stage – the 10% figure is provided as an increase of the anticipated development impermeable area.

4.6 Surface Water Attenuation

4.6.1 Based on 1100m² (plus 10% allowance for urban creep) of impermeable area, and a discharge rate of 5 l/s, approximately 61m³ of attenuation is required to accommodate storm events up to the 1in100yr+40% climate change.

4.6.2 Attenuation is proposed in the form of below ground geo-cellular crates. A proportion of the total storage volume required may be included within the permeable paving porous sub-base, subject to detailed design.

4.6.3 The attenuation estimate is based upon Flood Studies Report (FSR) inputs. Where the site is to be designed with reference to Flood Estimation Handbook (FEH) derived storm events the attenuation is typically in the range of 10% to 20% greater than those for FSR events. However, during detailed design it is often found that FEH attenuation provisions are typically at the upper range of the generic FSR estimates.

4.6.4 A copy of the Causeway Flow calculations has been reproduced within Appendix 6.

4.7 Surface Water Strategy

4.7.1 External drive areas will be drained by permeable paving.

4.7.2 Attenuation systems will be located within soft landscaped areas and drive areas, subject to detailed design.

4.7.3 A vortex flow control device will be provided to restrict flows to 5 l/s maximum.

4.7.4 A new connection will be made into the existing sewers within Henshall Drive. The method of connection will be confirmed at detailed design stage. Approval may be required within STW, via Section 106 of the Water Industry Act.

4.7.5 A copy of the indicative drainage strategy for the site has been included within Appendix 7.

5 Foul Water Drainage Strategy

- 5.1.1 It is anticipated that proposed foul water drainage emanating from the development site will discharge to the existing sewerage network within Ferrers Drive.
- 5.1.2 Based on the STW developer enquiry response and associated sewer records, it is anticipated that a length of 'off-site' sewer will be required to connect to the existing foul sewerage network.
- 5.1.3 The invert levels of the existing foul systems should be clarified, to determine if a gravity outfall is achievable. Pumping may be required, subject to final detailed design and confirmation of the existing sewer details.
- 5.1.4 A copy of the indicative drainage strategy for the site has been included within Appendix 7.

6 Operation and Maintenance

- 6.1.1 The long-term efficacy of any installed drainage system will be compromised by a lack of maintenance.
- 6.1.2 During the detailed design stage, consideration should be given to the maintenance of any proposed system. It is recommended that a drainage maintenance regime is developed and provided in an "Operation and Maintenance Manual" for the scheme.
- 6.1.3 The maintenance regime should conform to the requirements set out within CIRIA C753 The SuDS Manual.
- 6.1.4 Refer to Appendix 8 for typical inclusions.
- 6.1.5 A full maintenance regime should be drawn up and confirmed at detailed design stage.

7 Summary & Conclusions

7.1 Flood Risk

- 7.1.1 Based on publicly available EA information, the site is not at risk of flooding from fluvial or pluvial sources.

7.2 Surface Water Drainage

- 7.2.1 Surface water will discharge to the existing surface water sewer within Henshall Drive, at a restricted discharge rate of 5 l/s.
- 7.2.2 Attenuation will be provided within the development boundary, in the form of below ground geo-cellular crates and potentially within the permeable paving sub-base.

7.2.3 Pollution mitigation will be provided to surface water from trafficked areas in the form of permeable paving.

7.3 Foul Water Drainage

7.3.1 Foul water will discharge to the existing foul water sewer within Ferrers Drive.

7.4 South Derbyshire Local Plan Part 1 – Policy SD2 and SD3

7.4.1 Policy SD2 states:

- i.* Suitable measures to deal with surface water will be required on all sites in order to minimise the likelihood of new development increasing flood risk locally. Any developments that could lead to changes in surface water flows or increase flood risk should be managed through the incorporation of Sustainable Drainage Systems (SUDS), which mimic natural drainage patterns, unless this is not technically feasible, or where it can be demonstrated that ground conditions are unsuitable for such measures.
- ii.* Surface water from new development will be expected to be managed using SUDS; discharge to watercourse; or connection to surface water mains sewer. Only where these options are not technically feasible and in consultation with Water Companies, will surface water discharges to a combined sewer be permitted.
- iii.* Foul flows generated by new development will be expected to connect to the mains sewer. Only where a connection to the mains sewer is not technically feasible (given the nature and scale of proposals) will discharges to package treatment works, septic tanks or cess pits be permitted. Developments that utilise non-mains drainage will only be permitted where proposals do not give rise to unacceptable environmental impacts.

7.4.2 As demonstrated within Section 4.4, the use of infiltration drainage is not technically feasible within this development site.

7.4.3 Surface water drainage will be restricted to practicable greenfield rates.

7.4.4 Additional flows will be attenuated within the development boundary.

7.4.5 SuDS will be implemented within the development in the form of permeable paving, below ground storage crates and flow control devices.

7.4.6 Surface water drainage will discharge to existing surface water mains sewers.

7.4.7 Foul water drainage will discharge to existing foul water mains sewers.

7.4.8 On this basis, the current proposals conform to local plan policies SD2 and SD3.

8 Further Work

8.1.1 Further drainage survey information will clarify:

- i.* The existing sewer levels for surface and foul water drainage outfalls, this will inform detailed design and clarify suitable methods of connection and feasibility of gravity outfalls.

8.1.2 A Section 106 (Water Industry Act) application to STW may be required for new connections proposed to the existing sewer network.

8.1.3 Any existing public sewers draining through the site not identified on the available public sewer records located within the development site may require diversion under Section 185 of the Water Industry Act.

Appendix 1 ■ Site Location Plan

Henshall Drive, Chellaston

Site Location Plan

Legend

 Site Location



Google Earth

© 2021 Google



200 m

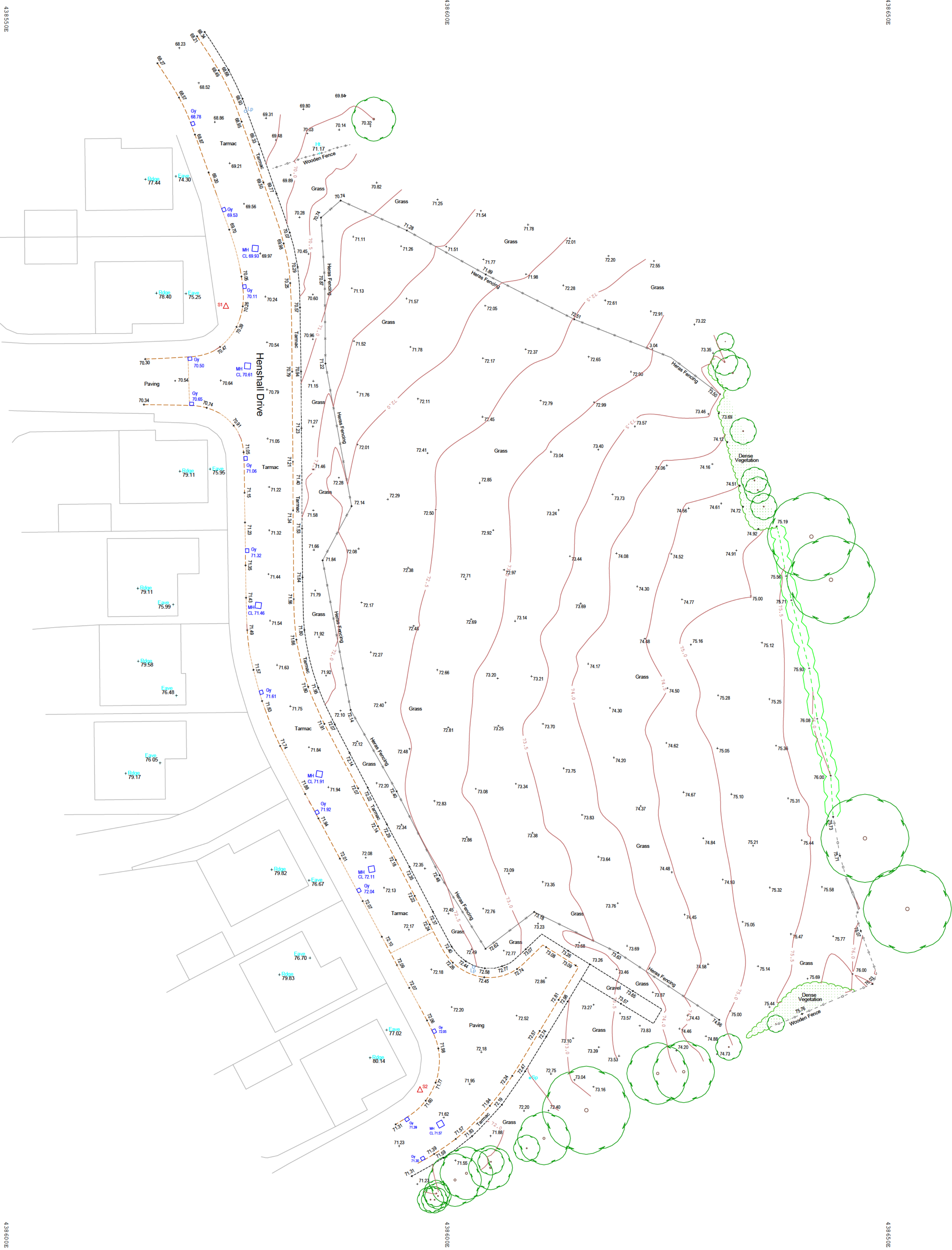
Appendix 2 ▪ Topographical Survey



329750N

329700N

329650N



329750N

329700N

329650N



SCAN SOLUTIONS
1st Floor, 35 Iron Gate, Derby, DE1 3GA
info@3dscansolutions.co.uk 01332 346404

LEGEND

POINT FEATURES:

- | | |
|---------------------------------|-----------------------------|
| Av AIR VALVE | Lp LAMP POST |
| BB BELISHA BEACON | MH MANHOLE |
| BH BOREHOLE | MH MANHOLE |
| BHgt BUILDING HEIGHT | MH MANHOLE |
| BM BENCH MARK | Mkr MARKER POST |
| Bol BOLLARD | PIW PIPE INVERT |
| Bdy BOUNDARY POST | PM PARKING METER |
| Bs BUS STOP | Post UNDEFINED POST |
| BT BRITISH TELECOM | Piez PIEZOMETER PIPE |
| Cam CAMERA | Rubb RUBBISH BIN |
| Cbox CONTROL BOX | Re RODING EYE |
| Cctv CCTV | Ridge RIDGE HEIGHT |
| Pipe PIPE | SC SPEED CAMERA |
| Cable CABLE TV | So SOFFIT LEVEL |
| Down DOWN PIPE | Sp SIGN POST |
| Eaves EAVES HEIGHT | St STOP TAP |
| Ebox ELECTRIC BOX | Sill SILL |
| EP ELECTRIC POST | Stn SURVEY STATION |
| Er EARTH ROD | Stump TREE STUMP |
| Fh FIRE HYDRANT | Sv STOP VALVE |
| FI FLOODLIGHT | Sy STAY |
| Flat FLAT ROOF | TCB TELEPHONE BOX |
| Flag FLAG STAFF | THL THRESHOLD LEVEL |
| MP MARKER POST | TL TRIAL PIT |
| Gy CIRCULAR GULLY | TL TRAFFIC LIGHT |
| Gp GATE POST | TL TELEGRAPH POST |
| Gv GAS VALVE | TrHt TREE HEIGHT |
| Gy GULLY | TS TRAFFIC SIGNAL |
| IB ILLUMINATED BOLLARD | Tw TOP OF WALL |
| IC INSPECTION COVER | Va VALVE |
| IC INSPECTION COVER | VC VIDEO CAMERA |
| ICU UNDEFINED COVER | Vp VENT PIPE |
| IFL INTERNAL FLOOR LEVEL | WL WATER LEVEL |
| Invt INVERT LEVEL | Wm WATER METER |
| KO KERB OUTLET | Wo WASH OUT |
| LBox LETTERBOX | Peg PEG |

LINE FEATURES & UTILITIES:

- | | |
|--------------------|--------------------|
| TELECOM & CABLE | OVERHEAD UTILITIES |
| DRAINAGE UTILITIES | IRON RAILINGS |
| GENERAL UTILITIES | WIRE / MESH FENCE |
| TRAFFIC & LIGHTING | PANEL FENCE |
| ELECTRIC UTILITIES | SECURITY FENCE |

Station	Easting	Northing	Level (m)
S1	438575.364	329729.666	70.457
S2	438597.364	329640.822	71.819
S3	438614.475	329684.185	73.584

Client
Chevin Homes

Location
Henshall Drive
Chellaston

Title
0970 - Henshall Drive - Chellaston
Topographical Survey

Level Datum
Ordnance Survey

Grid Datum
Ordnance Survey

Project Number
0970

Drawing Reference
0970

Surveyor
JS

Checked
EP

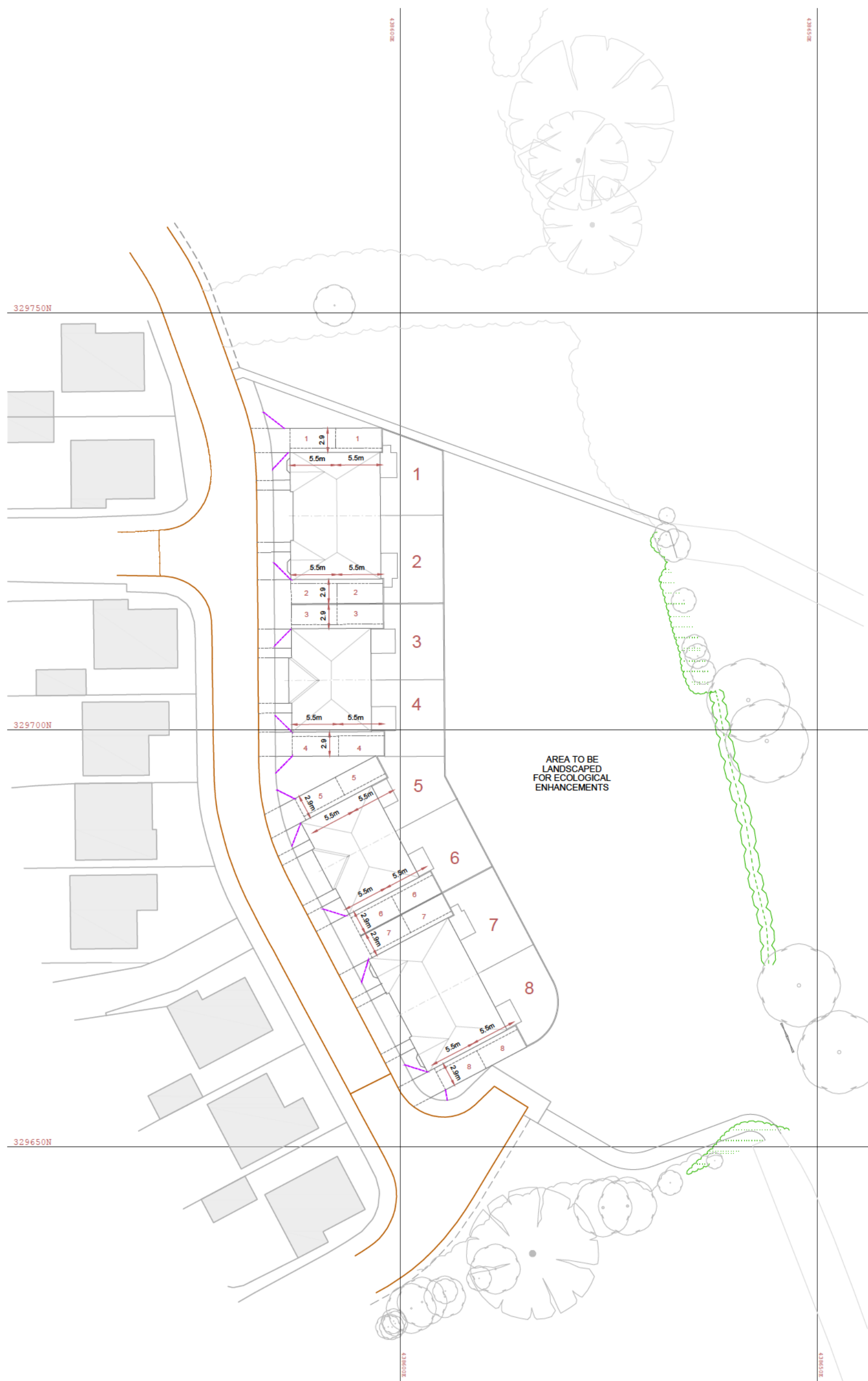
Date
18.02.21

Scale
1:250 @ A1

Comments:
The plan and digital data should only be used for its original intended purpose at the defined survey scale.
It is for the use only of the party to whom it has been addressed and no responsibility is accepted to any third party for the whole or part of its contents.
This survey has been prepared on the basis that all information and facts, which affect the survey, have been disclosed to us by the parties concerned and no liability nor responsibility can be accepted, unless full disclosure has been made.
All ground features that were visible at the time of the survey have been located, however there may have been items obscured.
Pipe sizes and flow direction have been visually assessed from the surface and should be considered as approximate only.



Appendix 3 ■ Development Proposals



DATE	SCALE	REV	DRAWN BY
MAR 2021	1:500 @ A3	C	DL

CHEVIN HOMES LTD
44 FRIAR GATE DERBY DE1 1DA 01332 366873 INFO@CHEVINHOMES.COM

Appendix 4 ▪ Severn Trent Water Developer Enquiry and Sewer Records

WONDERFUL ON TAP



Severn Trent Water Ltd
Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

Chevin Homes Derby,
44 Friar Gate,
Derby,
DE1 1DA.

FAO: Rory Morrissey,

Tel: 0345 266 7930
www.stwater.co.uk

14th July 2021

Email:
Net.Dev.East@SevernTrent.co.uk

Our ref: 1010938

Dear Mr Morrissey,

Proposed Residential Development (8 Houses) at: Hensall Drive, Chellaston, Derbyshire, DE73 6WT.

X: 438603 / Y: 329697

I refer to your Development Enquiry Request submitted in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

Public Sewers in Site – Required Protection

There are no public sewers crossing the proposed development site.

Please Note: On 1st October 2011 many private sewers were transferred into the ownership of Severn Trent Water as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.

Foul Water Drainage

Sewer Records show the closest point of connection for gravity foul flows is at MH4713 on the 150mm foul sewer west of the site off Ferrers Drive. This sewer is currently under a 104 adoption agreement and it is not clear if the network has been fully adopted by Severn Trent at present. I have consulted our adoptions team to determine the current status of this sewer. Please note that it is likely

that the network is still under an adoption agreement and would therefore be classed as a private sewer. To connect to this sewer you would need to seek approval from the current owner.

Preferably, our records show a 150mm public foul sewer north of the site on Parkland Drive at MH4903. Topography levels show that a gravity connection would be viable at this location subject to 106 approval. However, a sewer requisition may be needed in which you must apply via a S98 application. You can download an application form from our website, or alternatively you can apply online via the following link: - <https://www.stwater.co.uk/building-and-developing/regulations-and-forms/application-forms-and-guidance/sewer-requisition-application/>. If you wish to discuss this option further, please contact our Developer Services department on 0800 707 6600.

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

If these are found to be unsuitable, satisfactory evidence will need to be submitted. The evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter).

Subject to the above, the site drainage should be discussed with the Local Lead Flood Authority with a view to implement suitable SUDs techniques to land soakaways or other land drainage systems prior to any consideration of discharges to public sewers being accepted. Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA.

Similar to above, sewer records show the closest point of connection to be at the 225mm surface water sewers west of the site, adjacent to the site boundary at MH5609. The adoptions team have been consulted to determine the current status of the sewer. If the sewer is under private ownership, consent must be sought from the owner. It is advised to seek alternative methods of SW disposal stated

above, and which follow the surface water drainage hierarchy before considering a connection to the sewerage network.

New Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the net.dev.east@severntrent.co.uk email inbox address, a response will be made within 15 days.

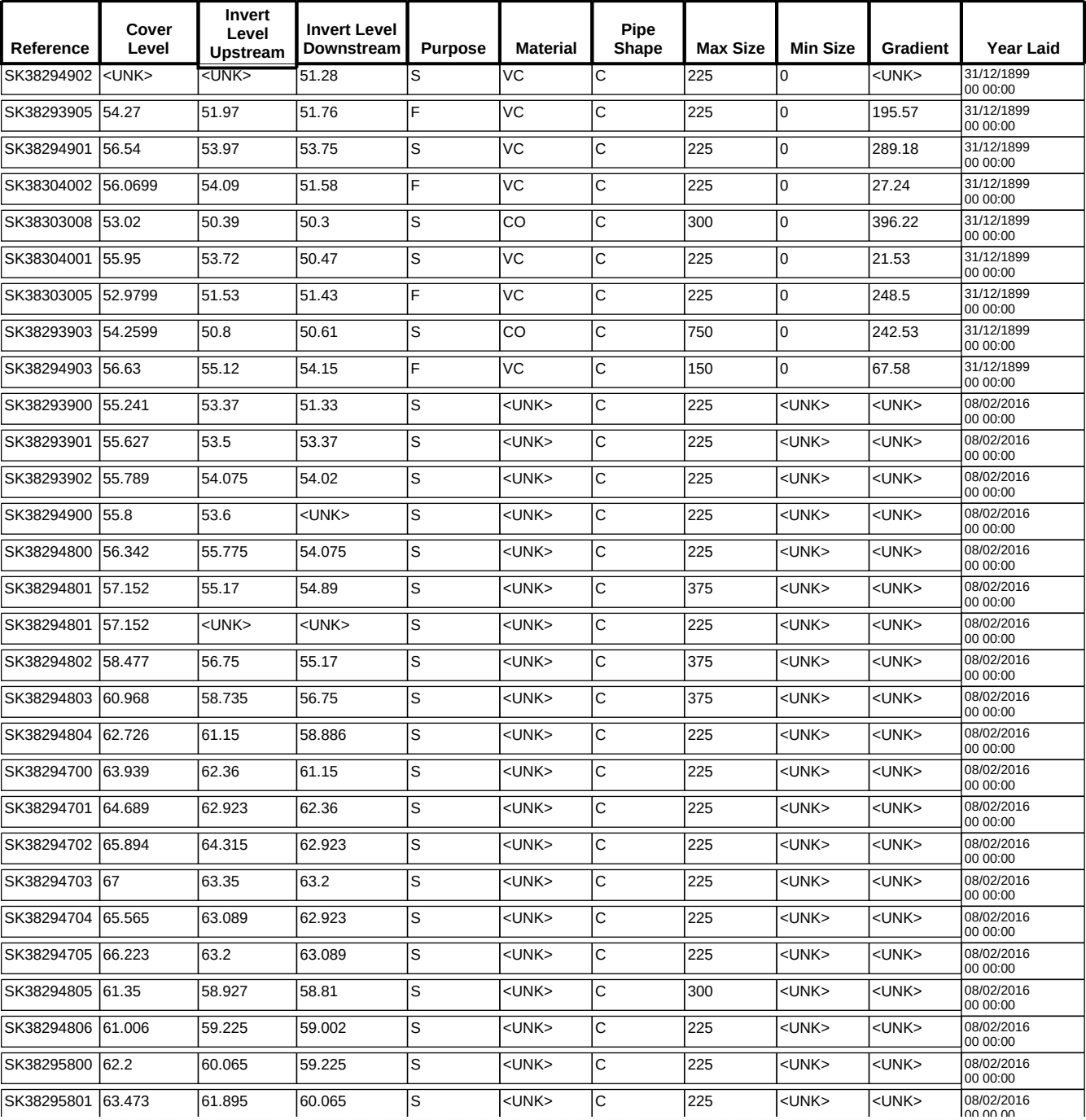
If you require a VAT receipt for the application fee please email MISCINCOME.NC@SEVERNTRENT.CO.UK quoting the above Reference Number.

Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely,



Emma Nowak.
Asset Protection East.
Asset Management.
Wholesale Operations.



of issue and no warranty as
be relied upon in the event
T WATER assets or for the
is.
area, which were connected
public sewers and public
part of these sewers or
ent Water does not possess
right 2004. All rights
provided for
it.

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK38294902	<UNK>	<UNK>	51.28	S	VC	C	225	0	<UNK>	31/12/1899 00 00:00
SK38293905	54.27	51.97	51.76	F	VC	C	225	0	195.57	31/12/1899 00 00:00
SK38294901	56.54	53.97	53.75	S	VC	C	225	0	289.18	31/12/1899 00 00:00
SK38304002	56.0699	54.09	51.58	F	VC	C	225	0	27.24	31/12/1899 00 00:00
SK38303008	53.02	50.39	50.3	S	CO	C	300	0	396.22	31/12/1899 00 00:00
SK38304001	55.95	53.72	50.47	S	VC	C	225	0	21.53	31/12/1899 00 00:00
SK38303005	52.9799	51.53	51.43	F	VC	C	225	0	248.5	31/12/1899 00 00:00
SK38293903	54.2599	50.8	50.61	S	CO	C	750	0	242.53	31/12/1899 00 00:00
SK38294903	56.63	55.12	54.15	F	VC	C	150	0	67.58	31/12/1899 00 00:00
SK38293900	55.241	53.37	51.33	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38293901	55.627	53.5	53.37	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38293902	55.789	54.075	54.02	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294900	55.8	53.6	<UNK>	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294800	56.342	55.775	54.075	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294801	57.152	55.17	54.89	S	<UNK>	C	375	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294801	57.152	<UNK>	<UNK>	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294802	58.477	56.75	55.17	S	<UNK>	C	375	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294803	60.968	58.735	56.75	S	<UNK>	C	375	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294804	62.726	61.15	58.886	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294700	63.939	62.36	61.15	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294701	64.689	62.923	62.36	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294702	65.894	64.315	62.923	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294703	67	63.35	63.2	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294704	65.565	63.089	62.923	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294705	66.223	63.2	63.089	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294805	61.35	58.927	58.81	S	<UNK>	C	300	<UNK>	<UNK>	08/02/2016 00 00:00
SK38294806	61.006	59.225	59.002	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38295800	62.2	60.065	59.225	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00
SK38295801	63.473	61.895	60.065	S	<UNK>	C	225	<UNK>	<UNK>	08/02/2016 00 00:00

Appendix 5 ■ Existing Greenfield Runoff Calculations

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach**Site characteristics**

Total site area (ha):

MethodologyQ_{BAR} estimation method:

SPR estimation method:

Soil characteristics

SOIL type:

Default	Edited
4	4

HOST class:

N/A	N/A
----------------------------------	----------------------------------

SPR/SPRHOST:

0.47	0.47
-----------------------------------	-----------------------------------

Hydrological characteristics

SAAR (mm):

Default	Edited
638	638

Hydrological region:

4	4
--------------------------------	--------------------------------

Growth curve factor 1 year:

0.83	0.83
-----------------------------------	-----------------------------------

Growth curve factor 30 years:

2	2
--------------------------------	--------------------------------

Growth curve factor 100 years:

2.57	2.57
-----------------------------------	-----------------------------------

Growth curve factor 200 years:

3.04	3.04
-----------------------------------	-----------------------------------

Notes**(1) Is Q_{BAR} < 2.0 l/s/ha?**

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.82	0.82
1 in 1 year (l/s):	0.68	0.68
1 in 30 years (l/s):	1.65	1.65
1 in 100 year (l/s):	2.12	2.12
1 in 200 years (l/s):	2.5	2.5

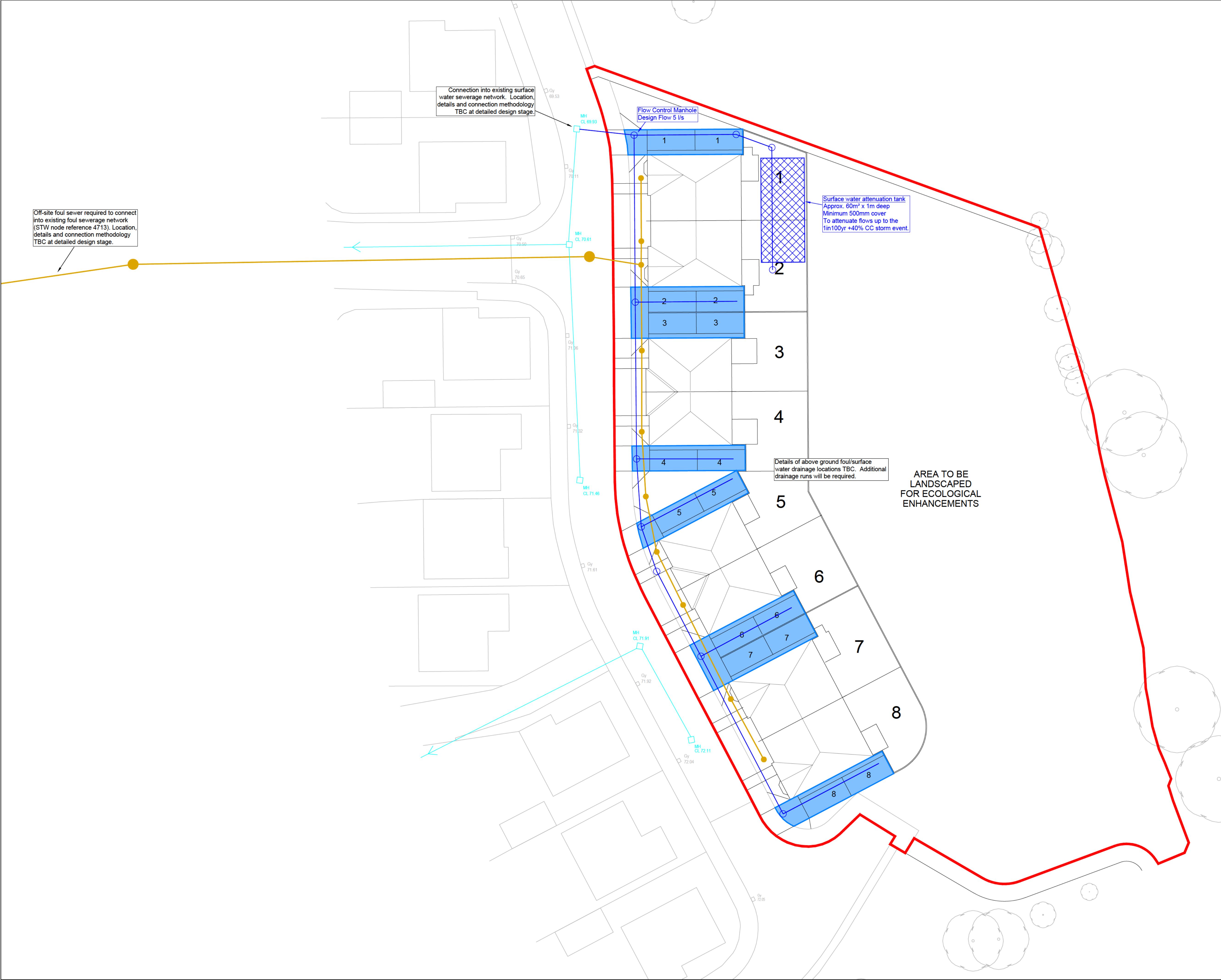
This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix 6 Causeway Flow Quick Storage Estimate

Storage Estimate

Return Period (years)	100	OK
Climate Change (%)	40	Cancel
Impermeable Area (ha)	0.121	Update
Peak Discharge (l/s)	5.000	
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	0.00000	Calc
Required Storage (m ³)	Calc	
	from 40	
	to 61	
With infiltration (m ³)		
	from 40	
	to 61	

Appendix 7 ■ Indicative Drainage Strategy



- General Notes
1. This drawing is based on Chevin drawing Number, CH_20-02_001 Rev C, dated 19.07.21.
 2. All survey information is provided by the surveying company and HSP cannot accept any liability for any discrepancies there in. All survey information to be verified on site by contractor. Should discrepancies be identified, HSP to be notified immediately.
 3. It is assumed that the Owner or Occupier of the development will provide notice to the local sewerage undertaker of the intention to communicate flows to the public sewer, as required by The Water Industry Act (1991) as amended.
 4. This drawing is for preliminary purposes only and should not be used for construction.
 5. All RWP and SVP locations are to be confirmed.
 6. All proposed levels and landform are to be confirmed, cover levels and drainage locations are shown for indicative purposes only.
 7. All drainage discharge rate and methodology are subject to approval from the local planning authority and local sewerage undertaker.
 8. Additional survey work is required to clarify existing sewer levels for the proposed outfalls.

Key to Proposals

- Foul Drainage
- Surface Water Drainage
- Permeable Paving
- Existing Surface Water Drainage

REV	BY	DATE	DETAILS	CKD
			STATUS	Indicative

CLIENT

Chevin Homes

PROJECT

Henshall Drive
Chellaston

TITLE

Drainage Strategy

h

s

p

consulting

Lawrence House, 4 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

SCALE	SHEET SIZE A1		
1:200			
DATE	DRAWN	CHECKED	
19.07.21	SA		
PROJECT NO.	DRAWING NO.	REV	
C3728	DS001	-	

Appendix 8 ▪ SuDS Maintenance Requirements

Manholes and Inspection Chambers

Description

Manholes providing rodding and jetting access to pipe work.

Typically manholes, in distinction to inspection chambers, are designed to allow for operatives to access. Manholes should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Maintenance Issues

Manholes are unlikely to present maintenance issues in themselves. However, they provide access to the drainage infrastructure and allow visual inspection from the surface of any major maintenance issues.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Lift covers and ensure that there are no blockages. Inspect and identify any parts that are not operating correctly and remediate.	For 3 months following installation
	Ensure covers are in a good state of repair.	Monthly
	Inspect manholes, and inspection chambers, to ensure that the drainage is running freely.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Suction sweeping and cleansing (to WRC Jetting Code of Practice) and CCTV where necessary.	Every 2 – 4 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Manhole Cover Replacement. • Repairs to brickwork or concrete. • Chanel repair.	As required (tasks to repair problems due to wear, damage or vandalism).

Catchpits

Description

Catchpits are similar to manholes but include a sump to the base which is designed to capture silt and prevent it reaching other parts of the drainage network. Catchpits provide a convenient location to remove silt for drainage networks. Catchpits should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Maintenance Issues

If the silt captured in catchpits is not removed regularly it will cause silt to migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Lift manhole covers and ensure that there are no blockages.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly and remediate.	
	Inspect silt storage in sump. Remove silt as required using subcontractor with vacuum extraction plant.	
	Ensure covers are in a good state of repair. Repair/replace as necessary.	Monthly
	Inspect catchpits to ensure that the drainage is running freely, and free of debris.	Six Monthly and every autumn after leaf fall
	Inspect silt storage in sump. Remove silt as required using subcontractor with vacuum extraction plant.	
Occasional maintenance	Suction sweeping and cleansing (to WRC Jetting Code of Practice) and CCTV where necessary.	Every 2 – 4 Years
	Remediate any chamber structural defects, or any defects that may reduce the free flow of water.	
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Manhole Cover Replacement. • Repairs to brickwork or concrete.	As required (tasks to repair problems due to wear, damage or vandalism).

Linear Drains

Description

Surface Water is drained over impermeable areas towards grated, or slot-type linear drains at low points and water is conveyed to below ground pipework.

Maintenance Issues

Linear drains can become blocked by silt or debris, causing flooding.

Linear drains often include silts traps at outlets which can cause siltation of downstream drainage infrastructure if not maintained adequately.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect linear drains to ensure that there are no blockages at surface level.	For 3 months following installation
	Lift covers to outflow boxes and check for blockages or siltation.	
	Inspect and identify any parts that are not operating correctly and remediate.	
	Inspect linear drains to ensure that there are no blockages at surface level.	Monthly
	Lift covers to outflow boxes and check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Jetting of linear drains and suction vacuuming of outlet boxes (to WRC Jetting Code of Practice). CCTV where necessary.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Linear drain cover replacement. • Chancel repair. • Ensure that impermeable surfaces surrounding linear drains have not settled below top of linear drain level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Gullies

Description

Surface Water is drained over impermeable areas towards grated gullies at low points, from where water is conveyed to below ground pipework.

Maintenance Issues

Gullies can become blocked by silt or debris, causing flooding.

Gullies include integral silt traps which can cause siltation of downstream drainage infrastructure if not adequality maintained.

Gullies often include a trapped outlet which prevents liquids lighter than water (ie oil and fuel) leaving the gully. If silt and light liquids are not removed regularly silt and oil will migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect to ensure that there are no blockages at surface level, and that the outfall is operating effectively.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly and remediate.	
	Ensure that there are no blockages at surface level.	Monthly
	Lift covers to check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Remove oil and silt using specialist vacuum extraction plant.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Cover replacement. • Structural failure of gully pot. • Ensure that impermeable surfaces surrounding linear drains have not settled below top of gully cover level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Pipework

Description

Below ground drainage pipework connects drainage inlets (gullies, linear drains etc) to manholes and also provides connections between manholes.

Maintenance Issues

Pipes can become blocked by silt, debris fat, grease, or suffer structural collapse. It is also possible for pipe joints to become displaced or for roots to grow from the surrounding ground into pipes.

These factors cause a reduction in, or loss of, the hydraulic capacity of the pipes which can in turn cause flooding to land and buildings.

Defects in pipes can also cause a reduction in stability to ground underlying foundations, which can cause settlement and damage to buildings and external surfaces.

The material of pipes and associated couplings can be degraded if aggressive liquids are passed through the pipes.

It is recommended that trees are not planted within 3m of pipes to minimise the risk of root ingress.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect and identify any parts that are not operating correctly and remediate.	For 3 months following installation
	Monitor working of drainage at ground level. Evidence of damage to pipework may include localised flooding or emission of smells.	Monthly
	Lift manholes covers to check for blockages.	Six Monthly
Occasional maintenance	CCTV pipework, clean to WRC Sewer Jetting Code of Practice. Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Fat and Grease removal. • Erosion repairs. • Joint displacement. • Structural failure, cracking or collapse. • System rehabilitation following a pollution event.	As required (tasks to repair problems due to wear, damage or vandalism).

Vortex Controls

Description

Vortex controls, often called Hydrobrakes, are installed in some manholes to restrict the rate of flow. Vortex controls are usually constructed in steel and are installed in a manhole with a sump.

Maintenance Issues

Vortex controls can become blocked by debris, plastic bags or other sheet material. If silt is allowed build up in the sump the operation of the device can be hampered causing flooding upstream.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Refer to manufacturer's specification.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly, consult supplier and remediate as required.	
	Monitor working of drainage at ground level.	Monthly
	If there is localised flooding check the condition of all system elements.	
	Lift manholes covers to check for blockages.	Six Monthly and every autumn after leaf fall
	Remove sediment from pre-treatment structures, gullies, catchpits etc.	
Occasional maintenance	Clean to WRC Sewer Jetting Code of Practice. Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	Inspect, and carry out remediation works to ensure that the features are in fully working order.	As required (tasks to repair problems due to wear, damage or vandalism).

Geocellular Attenuation Storage

Description

Geocellular storage systems are modular plastic units with a high porosity that can be used to efficiently create a below-ground structure for the temporary storage of surface water before being released.

Maintenance Issues

The main maintenance issue with geocellular attenuation storage is the prospective build up of silt within the units. It is imperative that the upstream and downstream catchpits are inspected and emptied regularly to prevent the ingress of silt into the system.

Maintenance Regime

Schedule	Action Required	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	For 3 months following installation, then annually.
	Remove debris from the catchment surface (where it may cause a risk to performance)	Monthly
	For systems where rainfall infiltrate 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.	Annual, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, 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 five years or as required

Pervious Pavements

Description

Pervious pavements, together with their associated substructures, are an efficient means of managing surface water runoff close to its source – intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium.

Maintenance Issues

Pervious pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Typically sweeping once a year should be sufficient to maintain an acceptable infiltration rate on most sites. However, the frequency should be adjusted to suit site specific circumstances and should be informed by inspection reports.

Maintenance Regime

Activity	Action Required	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 mow 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 of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	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	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hrs after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually



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