

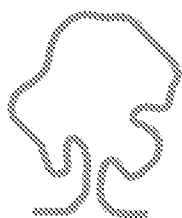
SPRINGFIELD GOSPEL TRUST



GOSPEL HALL CAR PARK EXTENSION, NYTON ROAD, ALDINGBOURNE

Drainage Design

September 2017
(Revised April 2018)

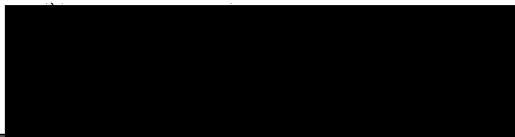


eas ltd

Environmental Assessment Services Ltd

London Road, Hickstead, Haywards Heath, West Sussex RH17 5LZ UK

REPORT DATA SHEET

Requirement	Data
Report Reference	SGT/Aldingbourne/DA
Date	September 2017
Client	Springfield Gospel Trust
Report type	Drainage Design
Purpose	Planning Application
Revisions	April 2018
Prepared by	Hannah Biggs BSc (Hons), GradCIWEM Signed 
Approved by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEEnvSc Signed 

SPRINGFIELD GOSPEL TRUST

GOSPEL HALL CAR PARK EXTENSION, NYTON ROAD, ALDINGBOURNE

Drainage Design

September 2017
(Revised April 2018)

CONTENTS

1. EXISTING SITE AND PROPOSED DEVELOPMENT
2. FLOOD RISK ASSESSMENT
3. EXISTING DRAINAGE
4. PROPOSED DRAINAGE
5. CONCLUSIONS
6. RECOMMENDATIONS

APPENDICES

APPENDIX A: FIGURES

Figure 1: Site Location Plan
Figure 2: The Site as Existing
Figure 3: Proposed Drainage Design

APPENDIX B: Site Photographs

APPENDIX C: Southern Water Sewer Plans

APPENDIX D: UK Sustainable Drainage Calculations (Greenfield Runoff Rate and Storage Volumes)

SPRINGFIELD GOSPEL TRUST

GOSPEL HALL CAR PARK EXTENSION, NYTON ROAD, ALDINGBOURNE

Drainage Design

September 2017
(Revised April 2018)

1 EXISTING SITE & PROPOSED DEVELOPMENT

- 1.1 Environmental Assessment Services (EAS) Limited has been instructed to prepare a Drainage Scheme for the development of additional hardstanding car parking at the Gospel Hall, Aldingbourne.
- 1.2 The proposed area to be paved and drained (the site) currently comprises an overflow car park area, presently laid to grass with plastic grid reinforcement, located to the north of the existing car park and an area presently laid to grass, located to the west of the existing car park. The Ordnance Survey (OS) map reference for the site is SU 9241 0619. The site elevation is approximately +11 m OD. See Appendix A, Figure 1: Site Location Plan and Figure 2: The Site as Existing.
- 1.3 According to the British Geological Survey (available online), the site lies on Pleistocene Valley Gravel over Eocene bedrock of Lambeth Group (Reading Beds - clay, silt and sand). Online Environment Agency (EA) groundwater mapping identifies the site to lie on a secondary A aquifer (the gravel). The site lies within Zone 1C (inner zone, subsurface activity only) of a groundwater source protection zone.
- 1.4 The site is largely surrounded by horticultural nurseries, some of which are active and some of which are partly derelict.
- 1.5 The nearest significant watercourse to the site is a tributary of the Aldingbourne Rife, which lies some 200 m to the west. There is a relict ditch located immediately to the south of the site, which would appear to drain west towards the watercourse.

2. FLOOD RISK ASSESSMENT

- 1.5 According to the EA online Flood Map for Planning, the site lies within Flood Zone 1 (low risk of flooding). The nearest area within Flood Zones 2 and 3 are located some 217 m west of the site, associated with the Aldingbourne Rife.
- 1.6 The EA online Risk of Flooding from Surface Water map shows that the site is not at risk of surface water flooding.

- 1.7 As the site is less than 1 ha in area and lies within Flood Zone 1, there is no requirement for a flood risk assessment under the National Planning Policy Framework (NPPF) and associated guidance documents.

3. EXISTING DRAINAGE

- 3.1 The site was visited on 31 July 2017 in order to examine the existing drainage. See Appendix B: Site Photographs.
- 3.2 Formal surface water drainage at the existing car parking area comprises kerbs and gullies drained to an oil interceptor located in the grassed area on the west side of the site and thence to a 10 m x 5 m x 0.8 m soakaway in the southeast corner of the site. The soakaway is formed of Wavin Aquacell units. No inspection chamber to permit examination of the internal condition of the soakaway appears to have been provided. Roof water from the Gospel Hall drains directly to the soakaway without passing through the interceptor. The type and capacity of the existing interceptor is not known.
- 3.4 The soakaway has been provided with an overflow to the relict ditch lying to the south of the site. As far as can be ascertained, the overflow has never discharged and it does not appear as though there has been any flow in the ditch in recent years.

4. PROPOSED DRAINAGE

- 4.1 The total hardcover area (including the Gospel Hall roof) presently drained to the soakaway appears to be approximately 4100 m². The proposed additional car park area requiring drainage is approximately 1600 m². This represents a 40% increase in area to be drained.
- 4.2 The additional car parking area will be drained by kerbs and gullies, with falls arranged towards the gullies. To minimise the volume of soil to be removed from the site, only the topsoil (and plastic grid reinforcement for the northern section) should be removed. The topsoil may be stored on site as bunds around the site boundary or taken off site. This means that the elevation of the finished additional car parking will be higher than the existing car parking areas. Entry points will have to be ramped accordingly.
- 4.3 The existing soakaway would need to be enlarged (or a new soakaway provided) to accommodate the additional area to be drained. The size of the enlargement cannot be a simple pro-rata of the area to be drained, as the following assumptions will have to be made:
- The evidence is that the existing soakaway is working well and it is therefore assumed that it, at least, achieves the basic requirement of half emptying within 24 hours.
 - An infiltration rate (f) derived from the above would be 1.29×10^{-5} m/s.

- Where the proposed enlargement is to abut the existing, allowance would need to be made for the loss of percolation on the abutted face.
- 4.4 However, percolation testing carried out at the site revealed the best infiltration rate in the west corner of the site, where the soil was found to be free draining. The estimated infiltration rate was 2.0×10^{-4} m/s.
- 4.5 The capacity and type of the existing oil interceptor on site is not known, and it cannot be assumed that adequate spare capacity is available for the new drained area. In this case, a Class 1 bypass separator (interceptor) would be suitable for the proposed car park extension, as recommended in the Environment Agency's previous Pollution Prevention Guidance '3: Use and design of oil separators in surface water drainage systems'. Suitable interceptors for this application would include the Cowans NSB 3.5 or the Klargester NSB P003.
- 4.6 An interceptor may not be necessary where sustainable drainage systems (SuDS) are adopted. Drainage to soakaway is considered to be a SuDS system. However, as the stratum into which the drainage is to be discharged is a Secondary A Aquifer within Zone 1C of a groundwater source protection zone, discharge via an interceptor would be recommended.
- 4.7 Using the Infiltration Systems Design software, based on the infiltration rate of 2.0×10^{-4} m/s and including current factors of safety and 40% climate change allowance, the required soakaway size to cater for the additional car parking space is given as 4 m x 6 m x 2 m deep.
- 4.8 The invert level at the outlet of the existing overflow has been measured at +11.71 m OD.
- 4.9 The proposed soakaway should be constructed of Wavin Aquacell Core units (or similar approved) with external soakaway surfaces wrapped in permeable geotextile. It is recommended that the soakaway should have an access chamber to enable occasional inspections and maintenance.
- 4.10 See Figure 3 for proposed drainage design layout.
- 4.10 **Other Sustainable Urban Drainage System (SUDS) Options**
- 4.10.1 Additional SUDS options could include the use of permeable paving in the parking areas. Permeable paving will permit surface water to infiltrate into the underlying structure, delay discharge and reduce peak flows following a rainfall event. The permeable paving should be underlain by a shallow drainage blanket connected to the surface water drainage system. However, this would represent only limited benefit for sustainability where surface water drainage discharges to soakaway.

4.11 Extreme event

- 4.11.1 If an extreme storm event overwhelmed the surface water drainage system at the site and/or if the drainage system were to fail, ground levels would indicate that surface water would run off site to the SSW, as per the present situation.

5. CONCLUSIONS

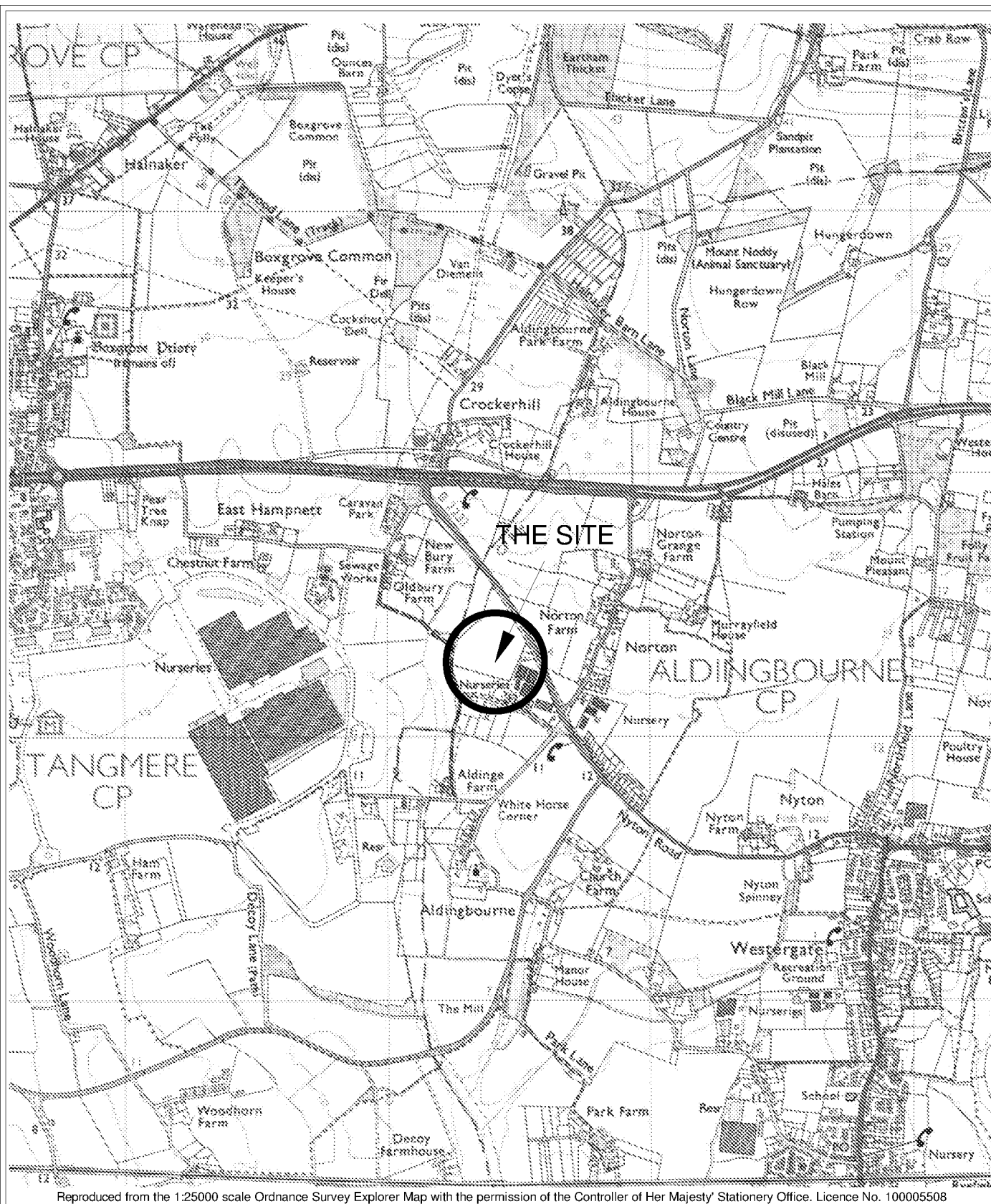
- 5.1 It is proposed to provide additional car parking area at the site by hard paving the existing reinforced grass overflow area on the north side and paving the grassed area on the west side. The proposed additional car park area will require sustainable drainage. The site lies within a groundwater source protection zone.
- 5.2 The existing car park, access roads and Gospel Hall roof is drained to a soakaway located in the southwest corner of the site. The existing car park area is drained via an interceptor to prevent pollution of groundwater.
- 5.3 The existing soakaway comprises a 10 m x 5 m x 0.8 m deep construction of Wavin Aquacell units, with an overflow to a relict ditch to the south of the site. The invert level of the soakaway is given as +10.75 m OD. The model and capacity of the interceptor are uncertain. It cannot be assumed that there is adequate capacity in the existing soakaway and interceptor for the additional car park area.
- 5.4 Percolation testing carried out on site revealed free-draining soils in the western corner of the site. The estimated infiltration factor was 2×10^{-4} m/s. Using this infiltration factor, and a 40% climate change allowance, within soakaway design software, the size of additional soakaway required to provide drainage for the additional car park has been calculated as 6 m x 4 m x 2 m deep. See Figure 3 for proposed drainage layout.
- 5.5 A new interceptor will also be required for the additional car parking area, for which a Class 1 bypass separator will be suitable.
- 5.6 It is proposed that surface water will be collected by kerbs and gullies, with falls arranged towards the gullies, within the new car parking area

6. RECOMMENDATIONS

- 6.1 It is recommended that the invert level of the existing soakaway should be confirmed by excavation.

☆☆☆☆☆☆

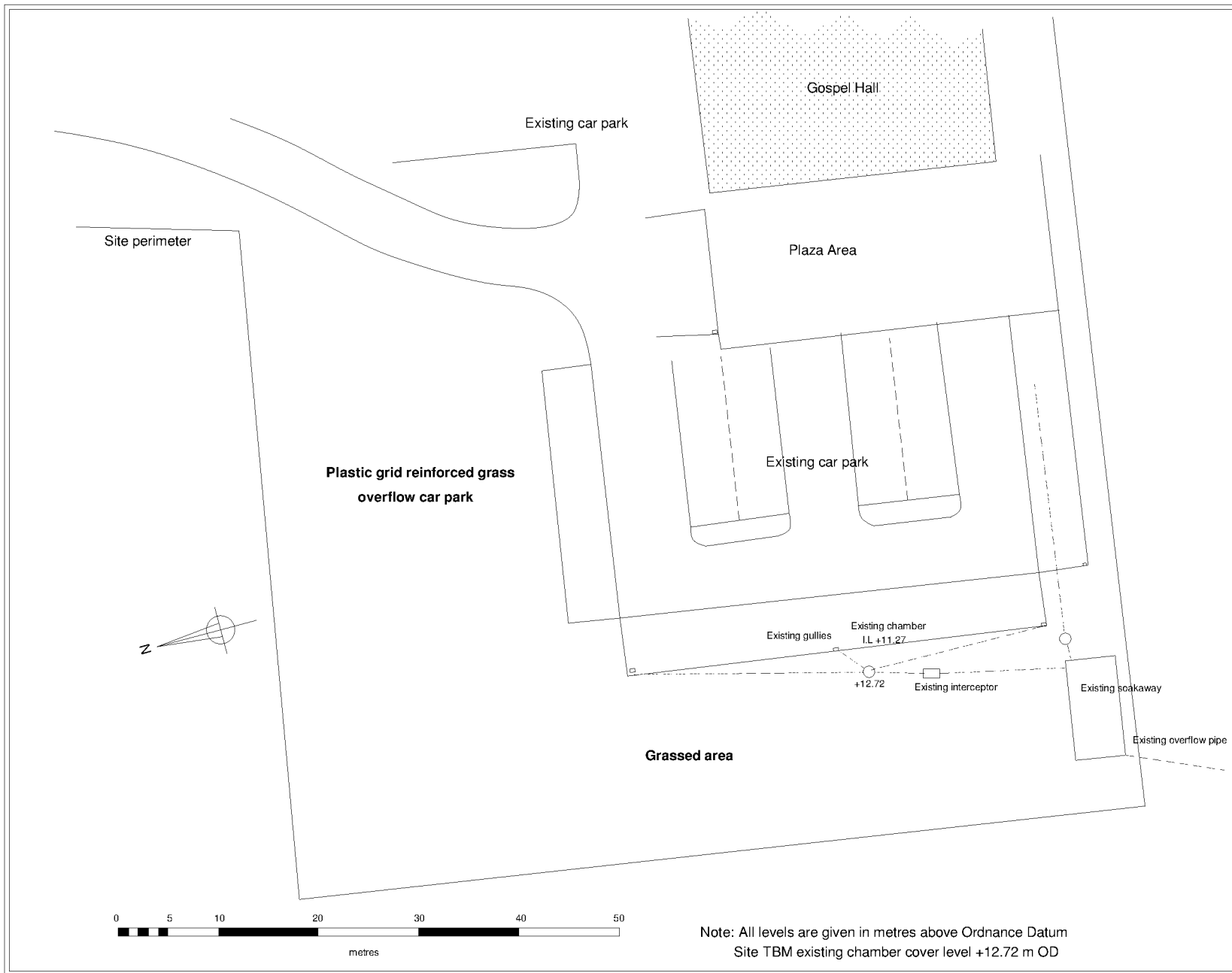
APPENDIX A: FIGURES
Figure 1: Site Location Plan
Figure 2: The Site as Existing
Figure 3: Proposed Drainage Design



SPRINGFIELD GOSPEL TRUST
CAR PARK EXTENSION, GOSPEL HALL
NYTON ROAD, ALDINGBOURNE
Figure 1: Site Location Plan

Scale 1:25000

September 2017



Note: All levels are given in metres above Ordnance Datum
Site TBM existing chamber cover level +12.72 m OD

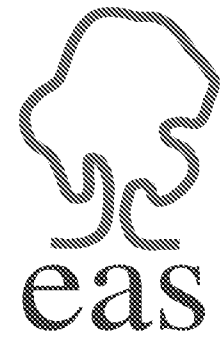


SPRINGFIELD GOSPEL TRUST
CAR PARK EXTENSION
NYTON ROAD
ALDINGBOURNE

Figure 2: Site as existing

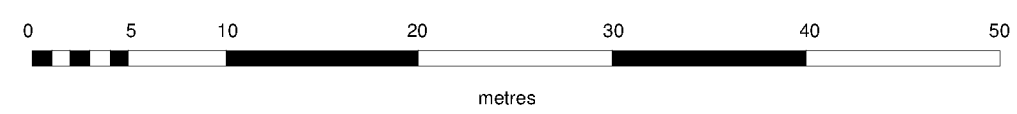
Scale as shown

September 2017



SPRINGFIELD GOSPEL TRUST
CAR PARK EXTENSION
NYTON ROAD
ALDINGBOURNE

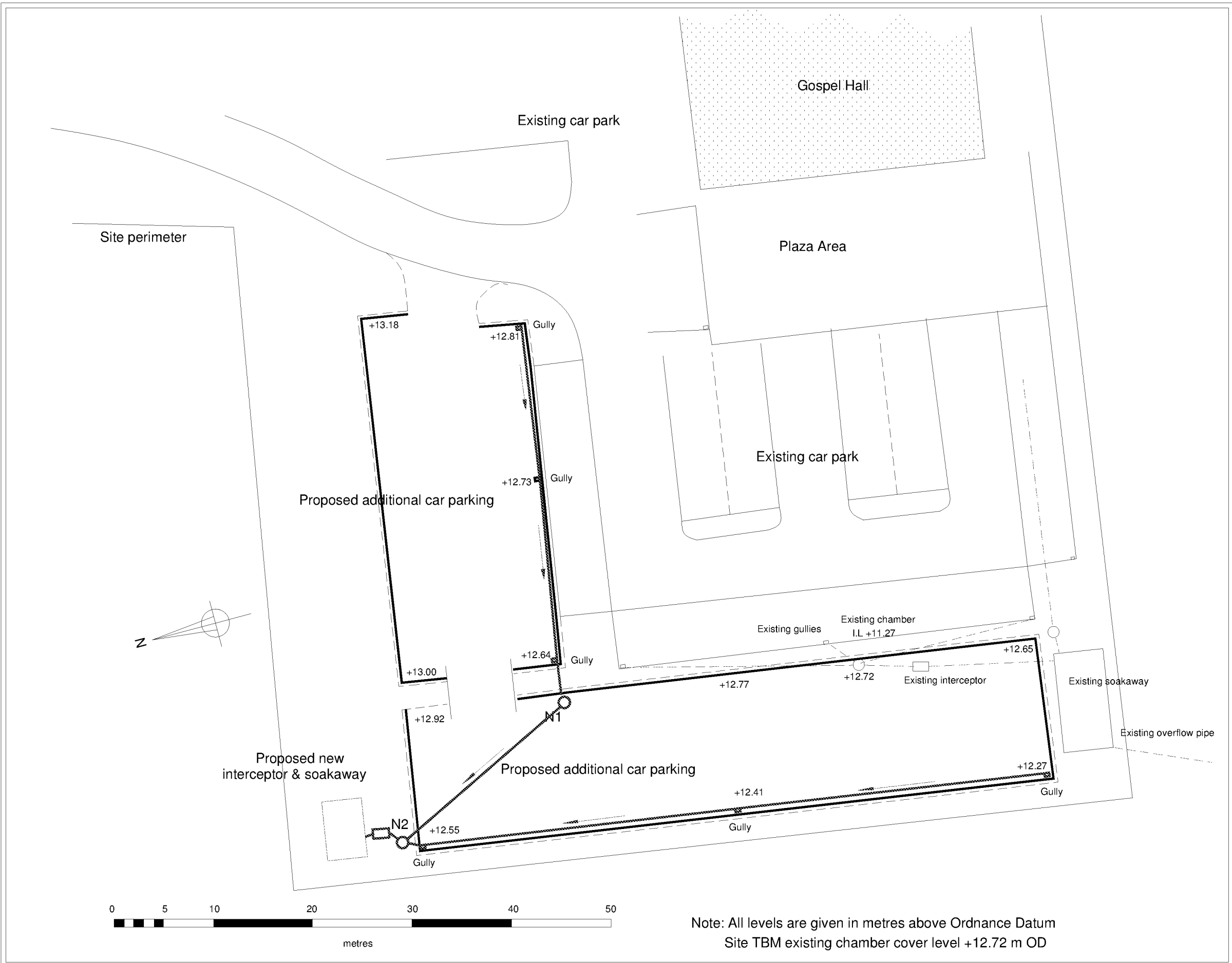
Figure 3: Proposed Drainage



Note: All levels are given in metres above Ordnance Datum
Site TBM existing chamber cover level +12.72 m OD

Scale as shown

April 2018



APPENDIX B **Site Photographs**

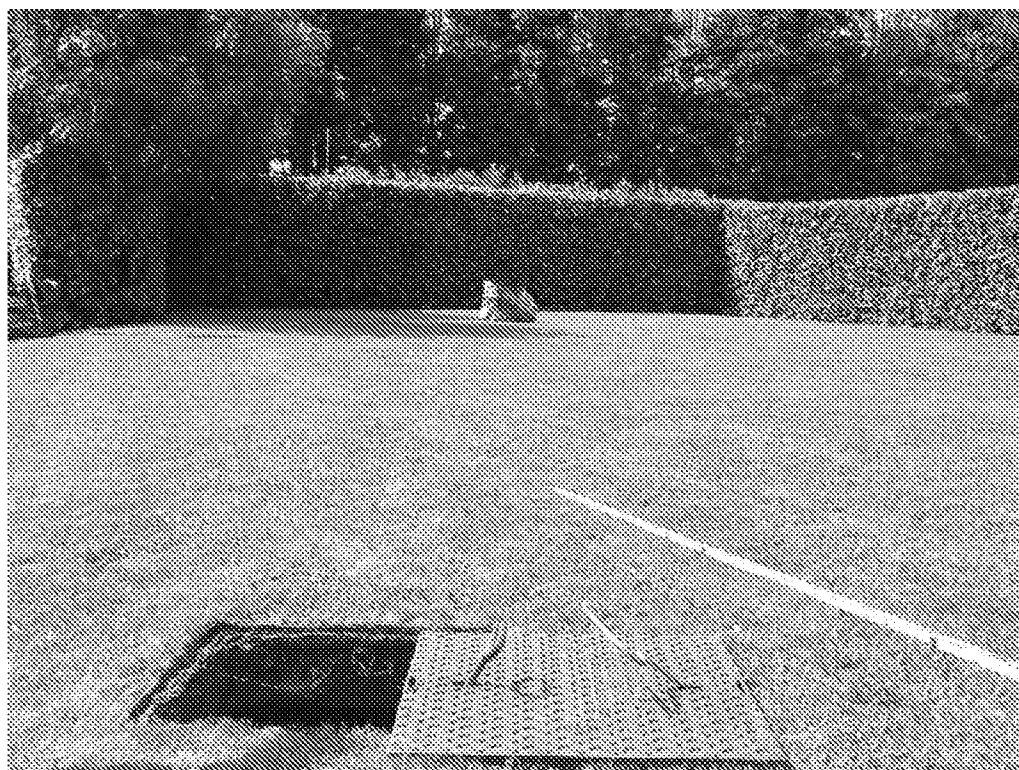


Photo 1. Grassed area to the west of the site proposed for additional car parking. Drainage chamber (open) with interceptor cover in background.



Photo 2. Plastic grid reinforced grass overflow car park, to be formally paved and drained.

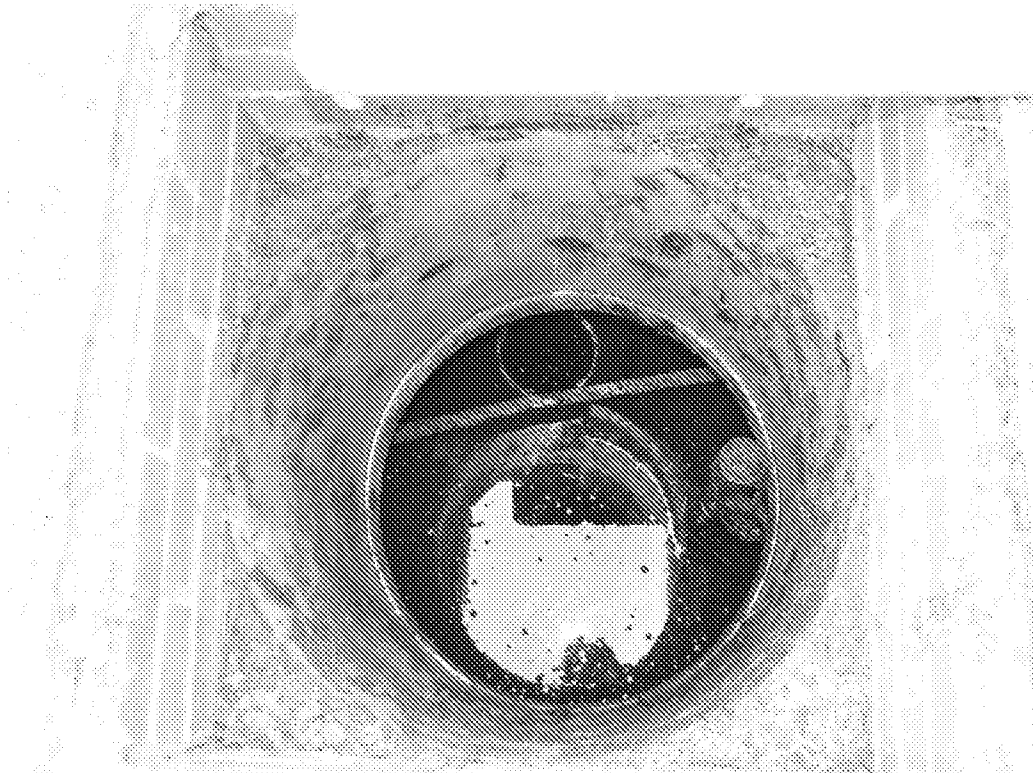


Photo 3. Existing interceptor.



Photo 4. Existing overflow outfall in overgrown relict ditch.

APPENDIX C

Southern Water Sewer Plans



Environmental Assessment Services Limited
London Road
Haywards Heath
West Sussex
RH12 5LZ

Your ref SpringfieldGospelTrust/GospelHallDrainage

Our ref 254586

Date 28 July 2017

Attention: Hannah Biggs

Dear Customer

Re: Provision of public sewer record extract

Location: The Gospel Hall, Nyton Road, Aldingbourne, PO20 3TX

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

Southern Water Southern House Capstone Road Chatham Kent ME5 7QA www.southernwater.co.uk

Southern Water Services Ltd Registered Office: Southern House Yeoman Road Worthing BN13 3NX Registered in England No. 2366670

106514



103084

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
4101X	13.23	11.49	150	VC	CIRC																		
5001X	13.52	11.12	150	VC	CIRC																		
5002X			150	VC	CIRC																		
6001X	13.51	10.02	150	VC	CIRC																		
6002X	13.36	10.69	150	VC	CIRC																		
6003X	12.37	10.08	150	VC	CIRC																		
6004X	13.3	9.64	150	VC	CIRC																		
7101X	13.08	10.59	150	VC	CIRC																		
7201X	14.18	11.66	150	VC	CIRC																		
7202X	13.32	11.1	150	VC	CIRC																		
7901X	13.03	9.33	150	VC	CIRC																		
8201X	14.41	12.84	150	VC	CIRC																		
8301X	15.01	12.52	150	VC	CIRC																		
8302X	14.53	12.06	150	VC	CIRC																		
8401X	15.41	13.05	150	VC	CIRC																		
8501X	15.8	14.16	150	VC	CIRC																		

LINE STYLES / COLOURS

Brown	-----	Foul
	-----	Foul Syphon Sewer
	-----	Foul Vacuum Main
	-----	Foul Rising Main
Red	-----	Combined
	-----	Combined Syphon Sewer
	-----	Combined Rising Main
	-----	Lateral Drain
Orange	-----	Building Over Agreement Area
Dark Blue	-----	Treated Effluent
Purple	-----	Sludge
	-----	Sewer Catchment
	-----	Section 104 Area
Light Blue	-----	Surface Water
	-----	Surface Water Rising Main
Yellow	-----	Private
Green	-----	Access Shaft
	-----	Decommissioned

MATERIALS

AK	Alkaline
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRG	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RFW	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vertified Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)
Manhole (F&C)
Lamp hole (SW)
Lamp hole (F&C)
Pumping Station (SW)
Pumping Station (F&C)
Side entry manhole (SW)
Side entry manhole (F&C)
Blind shaft (SW)
Blind shaft (F&C)
Ejector station (SW)
Ejector station (F&C)
Watertight door (SW)
Watertight door (F&C)
Flushing ch. Min-e (SW)
Flushing ch. Min-e (F&C)
Flushing ch. No-e (SW)
Flushing ch. No-e (F&C)
Demonstration Chamber

LEGEND - SEWERS

Washout (SW)
Washout (F&C)
Rodding Eye (SW)
Rodding Eye (F&C)
Gauging point (SW)
Gauging point (F&C)
Intercept chamber (SW)
Intercept chamber (F&C)
Storm Tank (SW)
Storm Tank (F&C)
Vortex chamber (SW)
Vortex chamber (F&C)
Label ellipse
Dummy/S24 manhole
Outfall
Penstock chamber
Demiboards
Storm Overflow
Backdrop manhole

Other (s)
Other
Change In sewer (s)
Change In sewer
Rafflux valve
Flap valve
Cascade
Anode
Valve
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (F&C)
Direction arrow
Emptying valve
Catchpit
Soakaway
Inlet
Balancing Pond

Wastewater treatment works
Marine treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Blank end
Head of Public Sewer
Micro Pumping Station
SHAPES (S)
A Arched
B Barrel
C Circular
E Egg
H Horseshoe
R Rectangular
S Square
T Trapezoidal
U U Shape
X Other

NODE REFERENCING SYSTEM
1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
3rd digit: sewer type identifier
4th digit: next sequential node

Drawn by: yadavs	
Title: 254586_ The Gospel Hall, Nyton	
Date: 28/07/2017	

APPENDIX D
UK Sustainable Drainage (UKSUDS) Calculations
(Greenfield Runoff Rate and Attenuation Storage Volumes)

Calculated by: **Malcolm McKemey**

Site name: **Gospel Hall, Aldingbourne**

Site location: **Additional Car Park**

Site coordinates

Latitude: **50.84447° N**

Longitude: **0.69221° W**

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", WS-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: **6104403**

Date: **2017-09-14T12:39:02**

Methodology	IH124
-------------	-------

Site characteristics

Total site area (ha)	0.16
----------------------	------

Methodology

Qbar estimation method	Calculate from SPR and SAAR	
SPR estimation method	Calculate from SOIL type	
	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	759	759
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

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

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

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.32	0.32
1 in 1 year (l/s)	0.27	0.27
1 in 30 years (l/s)	0.74	0.74
1 in 100 years (l/s)	1.02	1.02

Calculated by: **Malcolm McKemey**

Site name: **Gospel Hall, Aldingbourne**

Site location: **Additional Parking Area**

Site coordinates

Latitude: **50.84442° N**

Longitude: **0.69238° W**

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the drainage scheme.

Reference: **6104406**

Date: **2017-09-14T12:44:57**

Methodology	IH124
-------------	-------

Site characteristics

Total site area (ha)	0.16
Significant public open space (ha)	0
Area positively drained (ha)	0.16
Pervious area contribution (%)	30
Impermeable area (ha)	0.16
Percentage of drained area that is impermeable (%)	100
Impervious area drained via infiltration (ha)	0
Return period for infiltration system design (year)	100
Impervious area drained to rainwater harvesting systems (ha)	0
Return period for rainwater harvesting system design (year)	100
Compliance factor for rainwater harvesting system design (%)	66
Net site area for storage volume design (ha)	0.16
Net impermeable area for storage volume design (ha)	0.16

* Where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50 % of the 'area positively drained', the 'net site area' and the estimates of Qbar and other flow rates will have been reduced accordingly.

Design criteria

Volume control approach	Use long term storage	
	Default	Edited
Climate change allowance factor	1.4	1.4
Urban creep allowance factor	1.1	1.1
Interception rainfall depth (mm)	5	5
Minimum flow rate (l/s)	5	5
Qbar estimation method	Calculate from SPR and SAAR	
SPR estimation method	Calculate from SOIL type	
	Default	Edited
Qbar total site area (l/s)	0.32	—
SOIL type	2	2
HOST class	N/A	N/A
SPR	0.3	0.3

Hydrology

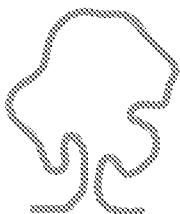
	Default	Edited
SAAR (mm)	759	759
M5-60 Rainfall Depth (mm)	20	20
'r' Ratio M5-60/M5-2 day	0.4	0.4
Rainfall 100 yrs 6 hrs	63	
Rainfall 100 yrs 12 hrs	91.63	
FEH/FSR conversion factor	1.19	1.19
Hydrological region	7	
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 10 year	1.62	1.62
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Site discharge rates

	Default	Edited
Qbar total site area (l/s)	0.32	0.32
Qbar net site area (l/s)	0.32	0.32
1 in 1 year (l/s)	5	5
1 in 30 years (l/s)	5	5
1 in 100 years (l/s)	5	5

Estimated storage volumes

	Default	Edited
Interception storage (m³)	6	6
Attenuation storage (m³)	71	71
Long term storage (m³)	0	0
Treatment storage (m³)	19	19
Total storage (excluding treatment) (m³)	78	78



eas ltd

Environmental Assessment Services Ltd

London Road, Hickstead, Haywards Heath, West Sussex RH17 5LZ UK