

NYMNPA

07/08/2019

From: Glenn McGill
Sent: 07 August 2019 10:56
To: Hilary Saunders
Subject: Faceby Lodge Fram

Hilary,

Please see package of drainage information attached.

Please advise if you have any queries.

We have a landscape drawing to send also, which I need to be signed off.

Best wishes,

Glenn

Glenn McGill
Director

Head Office and Registered Address:

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CRN: 08263372

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NYMNP

07/08/2019

Drainage Philosophy

18T1486 – Rural Conversion at Faceby Lodge Farm

Billingham George & Partners
Civil & Structural Engineers, Building Surveyors
Wellington House, Wellington Court, Preston Farm, Stockton-on-Tees, TS18 3TA
 @BGPconsulting



Drainage Philosophy

Project: Rural Conversion at Faceby Lodge Farm

Client: Jomast

LLFA: North Yorkshire County Council

BGP Job No: 18T1486

Document Checking:

Prepared By: S Ramshaw – Associate Director

Signed:

Checked By: J Conway – Director

Signed:

Issue	Date	Status	Checked By
001	11/2018	Planning	SR
002	02/08/2019	Planning	SR

This document has been prepared solely as a Drainage Strategy for JoMast Developments. Billinghurst George & Partners accepts no responsibility or liability for any use that is made of this document other than by the Client for which it was originally commissioned and prepared.

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1. Executive Summary / Project Background

- 1.1. MD² Consulting have appointed Billinghurst George & Partners (BGP) on behalf of Jomast to prepare a Drainage Strategy for the conversion of outbuildings at Faceby Lodge Farm, North Yorkshire, see Appendix A.
- 1.2. This Drainage Philosophy has been prepared to supplement the Proposed planning application.
- 1.3. The planning application is for the conversion of existing farm buildings into 11 residential units.
- 1.4. A hierarchy for the appropriate disposal of surface water is included within Building Regulations Part H3 which states the following:

“Rainwater from a system provided ... shall discharge to one of the following, listed in order of priority:

 - 1) *An adequate soakaway or some other adequate infiltration system; or, where this is not reasonably practicable,*
 - 2) *A watercourse; or, where that is not reasonably practicable,*
 - 3) *A sewer.”*
- 1.5. The following Drainage Philosophy addresses each element of the above hierarchy and details how the surface water and foul water will be discharged and attenuated for the site.
- 1.6. BGP have prepared this report based on current information available. This report is subject to change should the information change or new information be presented.

2. Existing Site & Drainage

2.1. SITE LOCATION

- 2.1.1 Site Name: Faceby Lodge Farm
- 2.1.2 Site Address: Faceby Lodge Farm, Carlton-In-Cleveland, Middlesbrough TS9 7DP
- 2.1.3 OS Grid Reference: 449677, 504053
- 2.1.4 National Grid Reference: NZ496040

2.2. SITE DESCRIPTION

- 2.2.1 Gross Site Area: 0.99ha
- 2.2.2 Existing Land Use: former agricultural buildings, sheds and yards
- 2.2.3 Proposed Land Use: Residential Development.
- 2.2.4 Local Planning Authority: North Yorkshire
- 2.2.5 Sewer Undertaker: Northumbrian Water LTD (NWL)
- 2.2.6 The site is to the East of Faceby Manor and to the south of A172. Faceby beck lies approximately 190m south of the site

2.3. SITE LEVELS

- 2.3.1 A topographical survey was carried out in April and can be viewed in appendix B.
- 2.3.2 The site sits at a higher level in relation the surrounding. The site is approximately 20m higher than the A172 to the North. The site also sits higher than Faceby Beck to the South by roughly 7m.

2.4. EXISTING WATERCOURSES

- 2.4.1 There are no known watercourses on or adjacent to the site boundaries.
- 2.3.1 The closest Watercourse known as "Faceby Beck" Lies approximately 190m South of the site at an elevation of 93m A.O.D. (taken from Lidar data)
- 2.3.2 The flood maps have been examined and the site is not affected by this watercourse.

2.5. EXISTING PUBLIC AND PRIVATE DRAINAGE

- 2.5.1 See Appendix C for locations of existing NWL public drains.
- 2.5.2 The majority of the private drainage network from the existing site seems to flow North towards the A172.
- 2.5.3 There are a number of soakaways picked up on the topographic towards the South of the site. The suitability of these are unknown.

2.6. EXISTING GROUND CONDITIONS

- 2.6.1 No Site investigation has currently been carried out.
- 2.6.2 A review of the "British Geological Society" Website has been reviewed for nearby boreholes. A Borehole located approximately 30m North along the access lane is present. This identifies firm clay to a depth of 18m.
- 2.6.3 No groundwater was encountered within the nearby borehole.
- 2.6.4 Based on the above, the likelihood of any infiltration occurring is minimal.

2.7. FLOOD RISK ASSESSMENT

- 2.7.1 The EA flood Maps have been reviewed and the site lies within a flood zone 1. Zone 1 is suitable for More Vulnerable developments and therefore the proposed housing is acceptable within this. As the site is elevated significantly higher than the surrounding land, risk of flooding is very Low.
- 2.7.2 The EA surface water flood maps have also been examined and confirm no local surface water flooding of the site.
- 2.7.3 Based on the above, the site is not at risk from flooding.
- 2.7.4 See Appendix H for flood maps.

2 Proposed Site Details

3.1 DEVELOPMENT PROPOSALS

- 3.1.1 The proposals are to convert existing buildings to create 11 dwellings.
- 3.1.2 Access to the site will be gained via the existing road to the North which leads to the A172.
- 3.1.3 The proposed site plan developed by SP&A Architects can be found within appendix D.

3 Proposed Surface Water Drainage

4.1 Existing Drainage Regime

- 4.1.1 The existing site is classified as Brownfield and existing drainage networks exist around the buildings and hardstanding areas. Gullies and rain water pipes are visible through the development.
- 4.1.2 The existing hardstanding drained area equates to approximately 6000m²
- 4.1.3 The exact outfall for this drainage is currently unknown.
- 4.1.4 Based on a conservative discharge rate of 50mm/hr, the existing site discharges approximately **83.4l/s**.

4.2 Current Guidelines

- 4.2.1 In accordance with Building Regulations and NPPF the disposal of surface water has been considered in the following order of priority; discharge to ground, where not reasonably practicable, a watercourse, or where not reasonably practicable a sewer.
- 4.2.2 NYCC Suds Design Guidance has been reviewed. Within chapter 4.3 it states "For a whole or part brownfield site; greenfield runoff rate and/or 70% of demonstrable existing positively drained runoff rate for those rainfall events will be permitted however greenfield runoff rate should be achieved where possible."

4.3 Discharge to Ground

- 4.3.1 Discharge of the surface water to ground via infiltration is suited to sites which have ground conditions made up of gravel, sand or a mixture of the two. Sands and gravels permit rapid dispersion and infiltration of surface water which is necessary to ensure that overland flooding does not occur during intense rainfall periods.
- 4.3.2 No Site investigation is currently available but a review of the British geological society borehole maps identifies a borehole just North of the site which indicates firm clay.
- 4.3.3 Due to the presence of firm clay, it is unlikely that any water will soakaway. Plus, the presence of drainage on site indicates that infiltration to the ground is not achievable.
- 4.3.4 Further ground testing should be undertaken.

4.4 Discharge to a Watercourse

- 4.4.1 The nearest existing watercourse is Faceby Beck located approximately 190m south. And sits approximately 6m lower in elevation than the site level.
- 4.4.2 Based on the above, it is deemed viable to discharge surface water from the site to this watercourse.
- 4.4.3 It is also understood that a proportion of the site already flows toward the watercourse.
- 4.4.4 Dialogue with the Lead Local flood authority will need to take place to determine flow rates.

4.5 Discharge to Sewer

- 4.5.1 As discharge to a watercourse is viable, discharge to a sewer is not considered.
- 4.5.2 The nearest sewer is located in the village of Faceby some 800m to the South.

5.0 Surface Water Proposals

- 5.1.1 The total impermeable area of the proposed site equates to 0.3199ha, see Appendix E for Impermeable Areas plans.
- 5.1.2 It is proposed to upgrade the existing surface water drainage from the scheme and route it towards the watercourse to the south.
- 5.1.3 The discharge rate is to be set at 5 l/sec as it is generally accepted that it is not practical to control the discharge rate to below 5 l/sec due to blockages and maintenance issues of the sewer network. This is also an improvement on the existing regime.
- 5.1.4 Flows above this restricted discharge rate are to be attenuated on site for up to and including the 1 in 100yr + 40% storm event.
- 5.1.5 A 40% increase in rainfall due to climate change has been considered in line with the LLFA SuDs design Guidance document, to determine exceedance flow routes and attenuation capacity.
- 5.2.1 Exceedance flows above the restricted rate are to be attenuated on site via either a crate or tank system.
- 5.2.2 It is proposed to create the attenuation requirement from oversized pipes or tanks located around the development.
- 5.1.6 It is proposed to discharge surface water into the Faceby Beck to the south of the scheme at a restricted rate of 5l/s.
- 5.1.7 All proposed sewer infrastructure including the attenuation systems will be managed and maintained privately by a management company.
- 5.1.8 Please see Appendix G for a copy for the Proposed Drainage Layout.

5.2. Attenuation Requirements

- 5.2.3 The estimated storage volumes required to achieve the restricted surface water runoff of 5.0 l/sec are indicated below. The storage volume are approximate only and may be revised during detailed design.

Storage Estimates		
Return Period	Micro Drainage Output (m ³)	Estimated Storage Volume (m ³)
1 year	15m ³ to 29m ³	20m ³
30 year	58m ³ to 93m ³	68m ³
100 year + 40% CC	139m ³ to 205m ³	155m ³

- 5.2.4 A total approximate storage volume of 155m³ of attenuation is required based on the 1 in 100 year + 40% climate change event. Further analysis within the detailed model indicated a requirement of 133m³ surface water storage.
- 5.2.5 See Appendix F for the Windes Source Control attenuation calculations and Surface Water Model.

5.3. Water Quality

5.3.1. Water quality will be assessed and mitigated following the index approach outlined within the Suds Manual C753 and in accordance with the LLFA. Discussions with the LLFA were carried out due to site constraints and nature of the development and the following approach has been agreed:

- Pervious paving should be utilised in the parking bay areas to provide a level of rainwater treatment.
- A Silt Trap will be installed before the inlet and outlet to the attenuation system to prevent sediment build up and provide a further level of treatment.
- Production of a SuDs management plan will be provided to maintain the water treatment throughout the development life of the project.

5.4. Flow Paths

5.4.1. Assessments of overland flow paths as a result of surcharging during extreme storm events will be undertaken during the detailed drainage design. This will ensure exceedance flooding does not pose a risk to existing or proposed dwellings.

5.4.2. It is anticipated that any exceedance flows will fall towards the surrounding agricultural fields owned by the developer and therefore no issue.

6. Proposed Foul Water Drainage

- 6.2. Due to the lack of adoptable drainage systems in the area, a sewerage treatment plant will be required. The overflow soakaway will be a shallow herringbone system in the surrounding field.
- 6.3. Drainage will fall via gravity to the sewerage treatment plant and be kept separate from the surface water drainage.
- 6.4. A discharge agreement with the EA will be required for "Discharge to ground".

7. Conclusion

- 7.1. From the above assessment, we conclude that the proposed development can cater for the disposal of both foul and surface water.
- 7.2. Surface water discharge will be restricted in accordance with the LLFA comments.
- 7.3. Storage is to attenuate on site via create or tank system up to and including the 1 in 100yr + 40% climate change event and is to be privately maintained and managed.
- 7.4. A SuDs management plan should be prepared due to the private ownership of the SuDs system to ensure it continues to operate as designed.
- 7.5. A proposed drainage strategy is shown in Appendix G.
- 7.6. This statement has been prepared with reference to the information available at the time of writing. The details of the report may be revised upon receipt of additional or further information.



Appendix A
Site Location Plan



Issued for Planning	JJH	P1	SR	02/08/2019
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AMENDMENT	BY	REV	CHK	DATE
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Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

In instances where this drawing completes or partly completes a contract, Billingham George & Partners will consider that it's product has been validated, unless in a period not exceeding 90 working days, the client advises to the contrary.

DO NOT SCALE

Client Jomast

Title Faceby Lodge Farm
Conversion of Existing Buildings
Site Location Plan

Drawn: J. Herbert


Date: August 2019

Original Size A3

Checked: S. Ramshaw

Date: August 2019

Scale: 1:5000



Billingham George & Partners
Civil & Structural Engineers & Building Surveyors
1st Floor, Wellington House, Wellington Court
Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-903** Rev. **P1**

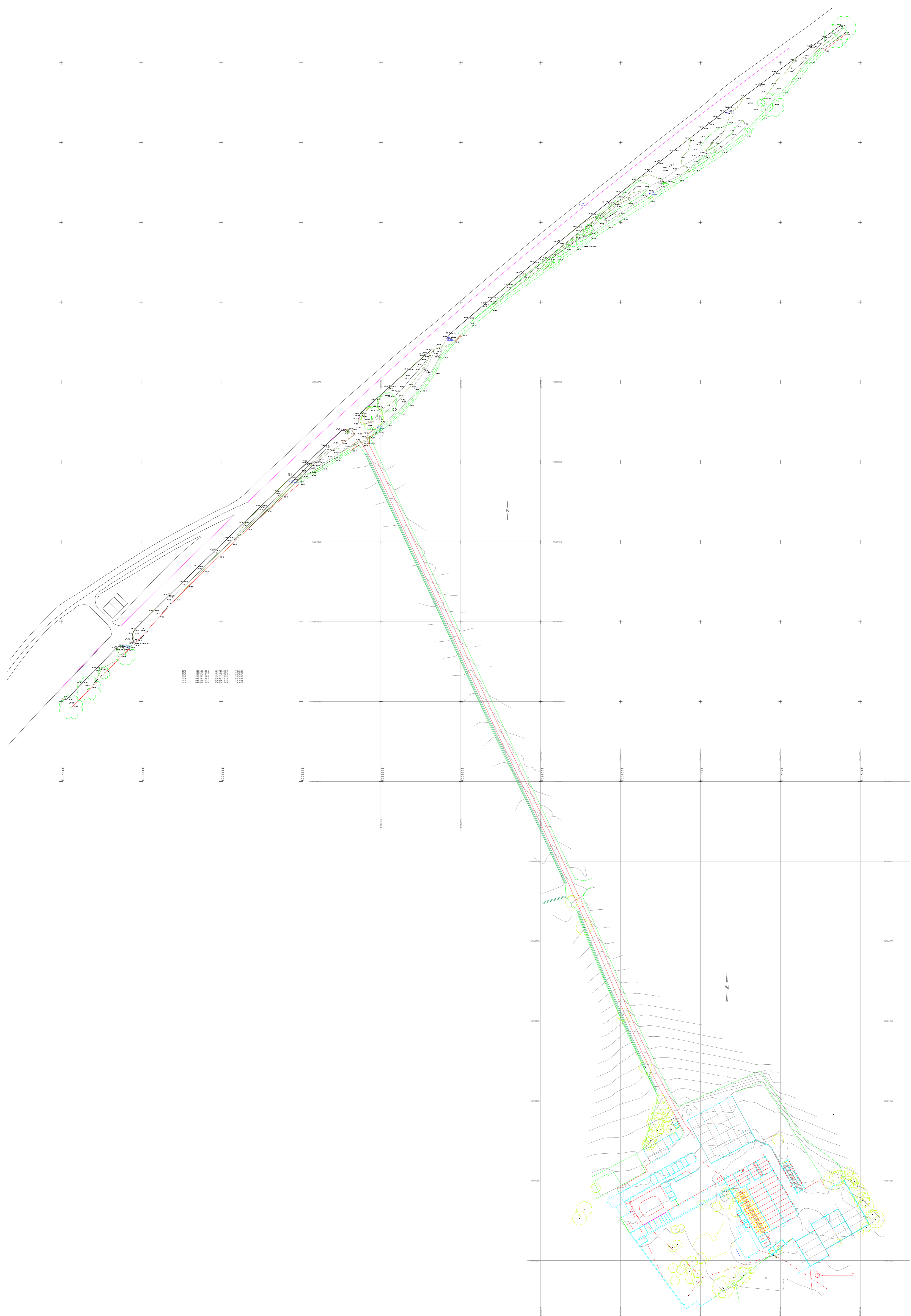


Appendix B

Topographical Survey

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LEGENDA

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- 2. BATAS AWAL
- 3. BATAS AKHIR
- 4. BATAS PERSEKUTUAN
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Appendix C

NWL Records



Appendix D

Proposed Site Layout



P1 Redrawn after meeting NYMNP 27.06.19 djh

REVISIONS:



Client:

SJ & J Monk

Project:
 Faceby Lodge Farm
 Proposed Conversion

Drawing:
 Proposed Site Layout
 Planning Application

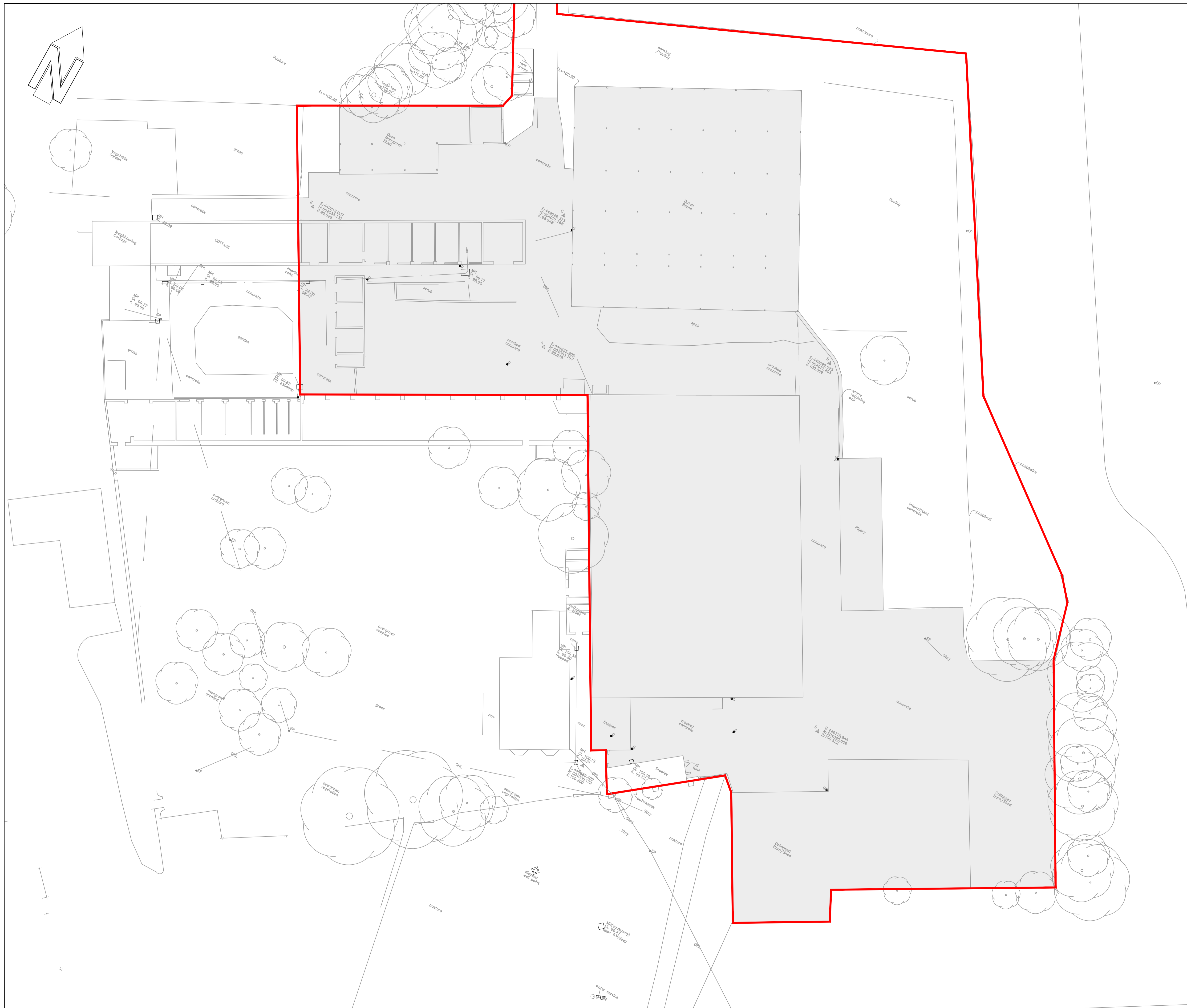
Drawn by: djh Checked by: djh Scale: 1:200@A1

Project No	Originator	Volume / System	Level / Location	Type	Rev	Dwg No
18030	SPA	ZZ	00	DR	A	P104
Purpose of Issue		Date	Subsity	Rev		
Comment/Review		29 Nov 19	S3	P1		



Appendix E

Impermeable Areas Plan



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Key

- Existing Impermeable Area = 6073m² (0.607ha)
Hence (0.607 x 2.78 x 50mm/hr) = 83.4 l/s.
- Site Boundary Line

Issued for Planning	JJH	P2	SR	02/08/2019
Issued for Information	ZW	P1	SR	20/11/2018
AMENDMENT	BY	REV	CHK	DATE
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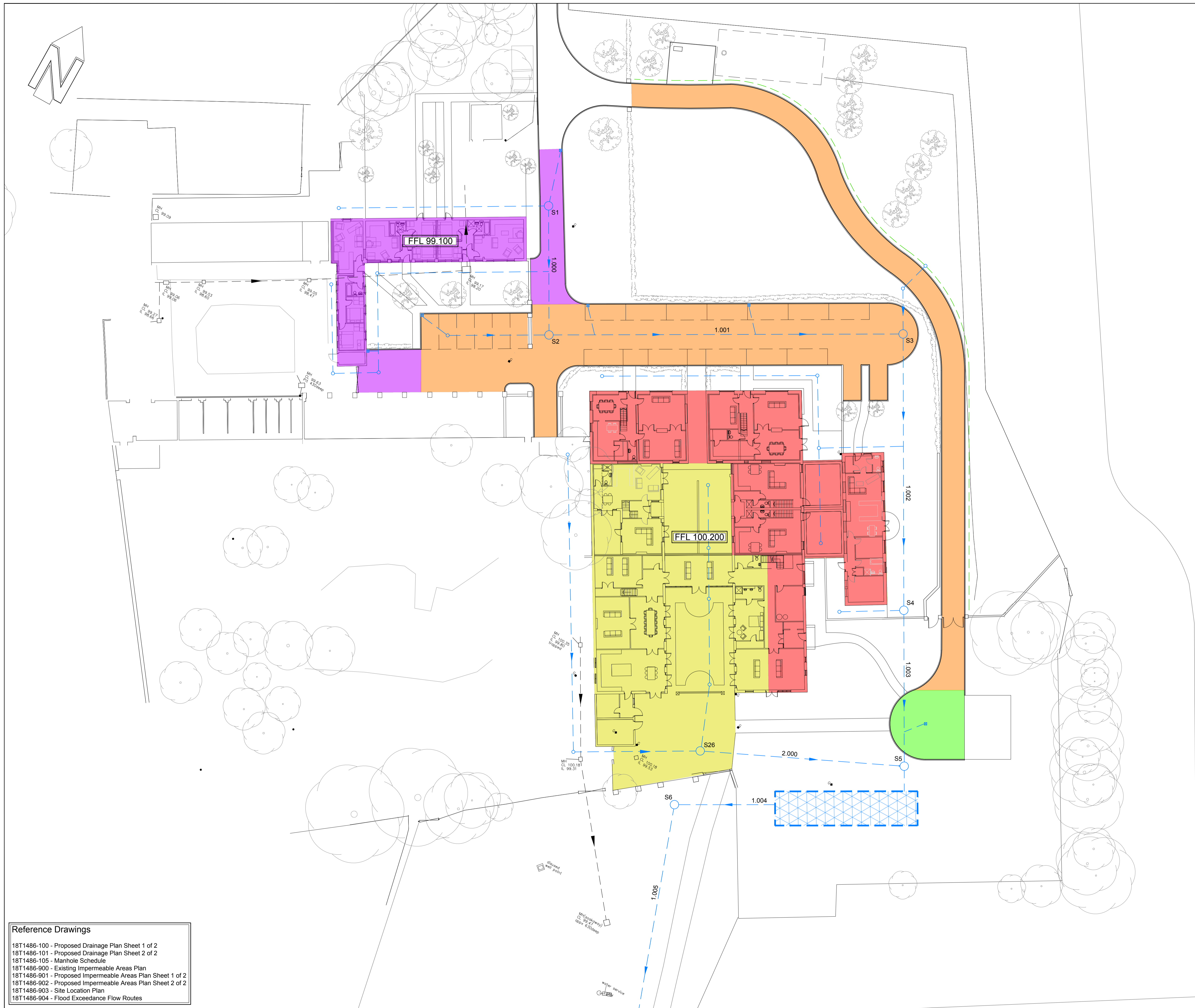
Client
Jomast

Project
**Faceby Lodge Farm
conversion of existing buildings**

Drawing Title
Existing Impermeable Areas Plan

Drawn	Z.Waller	Date	14.11.2018
Checked	S.Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

bgp Billinghurst George & Partners
CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,
Stockton-on-Tees, TS18 3TA



DO NOT SCALE

Legend:

	Pipe 1.000 Area = 365m ² = (0.0365ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.001 Area = 1048m ² = (0.1048ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.002 Area = 740m ² = (0.0740ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.003 Area = 92m ² = (0.0092ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.004 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.005 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.006 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.007 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 2.000 Area = 954m ² = (0.0954ha) Fall = 0.0m / Length = 00.000m

Total Impermeable Area = 3199m²

Issued for Planning	JJH	P2	SR	02/08/2019
Issued for Information	ZW	P1	SR	20/11/2018
AMENDMENT	BY	REV	CHK	DATE

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

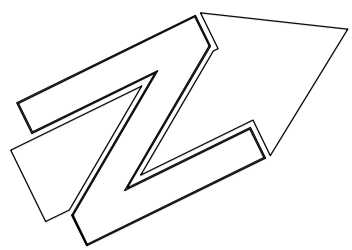
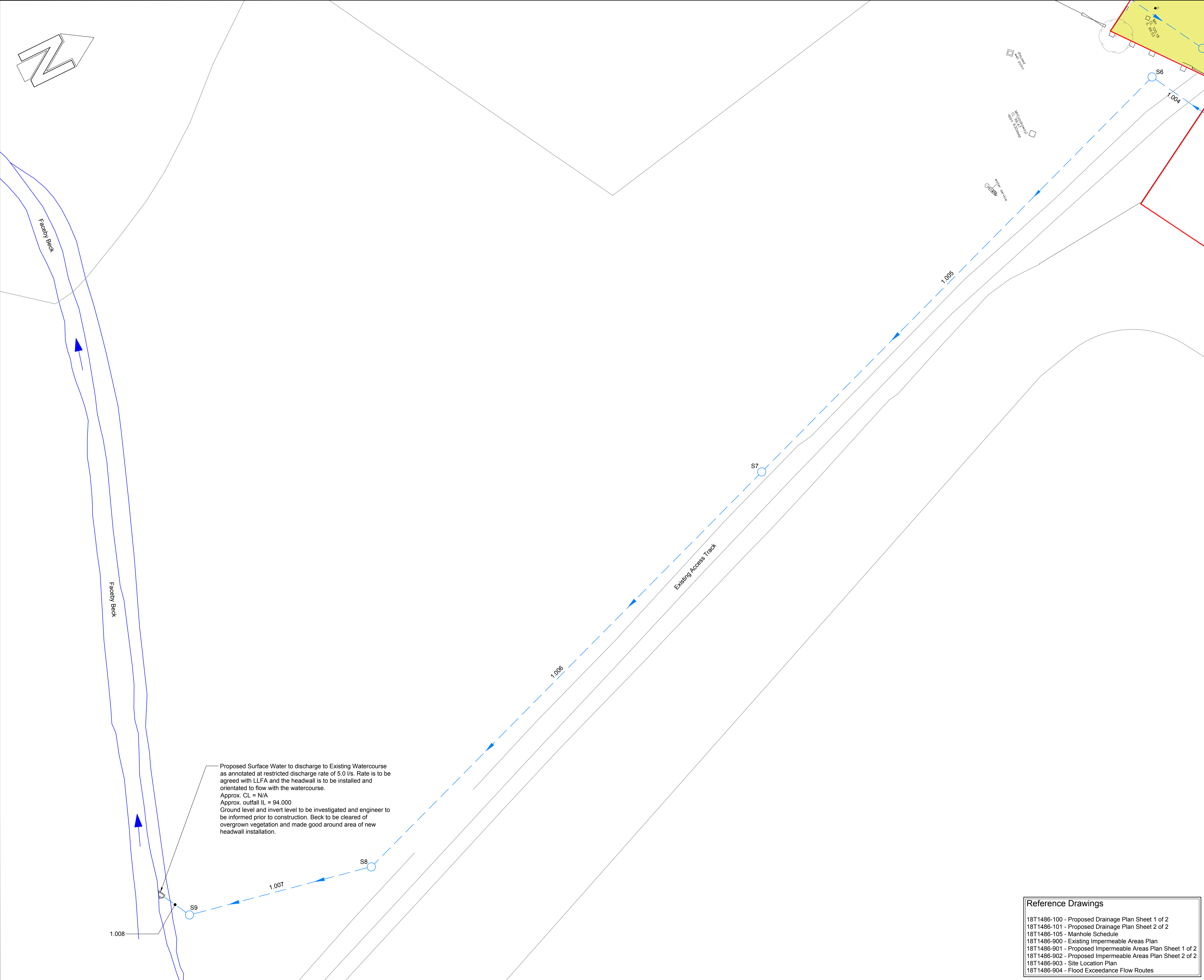
Drawing Title
**Impermeable Areas Plan
Sheet 1 of 2**

Drawn	Z. Waller	Date	14.11.2018
Checked	S. Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

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1st Floor, Wellington House, Wellington Court,
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Drg. No. **18T1486-901** Rev. **P2**

- Reference Drawings**
- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
 - 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
 - 18T1486-105 - Manhole Schedule
 - 18T1486-900 - Existing Impermeable Areas Plan
 - 18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
 - 18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
 - 18T1486-903 - Site Location Plan
 - 18T1486-904 - Flood Exceedance Flow Routes



DO NOT SCALE

Legend:

	Pipe 1.000 Area = 365m ² = (0.0365ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.001 Area = 1048m ² = (0.1048ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.002 Area = 740m ² = (0.0740ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.003 Area = 92m ² = (0.0092ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.004 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.005 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.006 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.007 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 2.000 Area = 954m ² = (0.0954ha) Fall = 0.0m / Length = 00.000m

Total Impermeable Area = 3199m²

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Impermeable Areas Plan
Sheet 2 of 2**

Drawn	J. Herbert	Date	August 2019
Checked	S. Ramshaw	Date	August 2019
Scale	1:250	Original Size	A1

Reference Drawings

18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
18T1486-105 - Manhole Schedule
18T1486-900 - Existing Impermeable Areas Plan
18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
18T1486-903 - Site Location Plan
18T1486-904 - Flood Exceedance Flow Routes

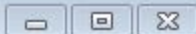
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 Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-902** Rev. **P1**



Appendix F

Windes Calculations

**Results**

Global Variables require approximate storage of between 15 m³ and 29 m³.

These values are estimates only and should not be used for design purposes.

Variables

Results

Design

Overview 2D

Overview 3D

Vt

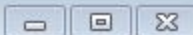
Analyse

OK

Cancel

Help

Enter Climate Change between -100 and 600



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

1

Region

England and Wales

Map

M5-60 (mm)

18.100

Ratio R

0.350

Cv (Summer)

0.750

Cv (Winter)

0.840

Impervious Area (ha)

0.320

Maximum Allowable Discharge (l/s)

5.0

Infiltration Coefficient (m/hr)

0.00000

Safety Factor

2.0

Climate Change (%)

0



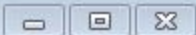
Analyse

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Enter Climate Change between -100 and 600



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 58 m³ and 93 m³.

These values are estimates only and should not be used for design purposes.

Analyse

OK

Cancel

Help

Enter Return Period between 1 and 1000



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

30

Region

England and Wales

Map

M5-60 (mm)

18.100

Ratio R

0.350

Cv (Summer)

0.750

Cv (Winter)

0.840

Impermeable Area (ha)

0.320

Maximum Allowable Discharge (l/s)

5.0

Infiltration Coefficient (m/hr)

0.00000

Safety Factor

2.0

Climate Change (%)

0

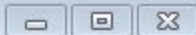
Analyse

OK

Cancel

Help

Enter Return Period between 1 and 1000

**Results**

Global Variables require approximate storage of between 139 m³ and 205 m³.

These values are estimates only and should not be used for design purposes.

Variables

Results

Design

Overview 2D

Overview 3D

Vt

Analyse

OK

Cancel

Help

Enter Climate Change between -100 and 600



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

100

Region

England and Wales

Map

M5-60 (mm)

18.100

Ratio R

0.350

Cv (Summer)

0.750

Cv (Winter)

0.840

Impermeable Area (ha)

0.320

Maximum Allowable Discharge (l/s)

5.0

Infiltration Coefficient (m/hr)

0.00000

Safety Factor

2.0

Climate Change (%)

40


Analyse

OK

Cancel

Help

Enter Climate Change between -100 and 600

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm





Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.000	4-8	0.277	8-12	0.043

Total Area Contributing (ha) = 0.320

Total Pipe Volume (m³) = 12.793

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.125	0.202	89.7	0.037	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	49.712	0.621	80.1	0.105	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	38.806	0.463	83.8	0.074	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	21.900	0.219	100.0	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.28	97.778	0.037	0.0	0.0	0.0	1.06	18.8	5.0
1.001	50.00	4.85	97.501	0.142	0.0	0.0	0.0	1.46	58.2	19.2
1.002	50.00	5.23	96.805	0.216	0.0	0.0	0.0	1.72	121.5	29.2
1.003	50.00	5.46	96.342	0.225	0.0	0.0	0.0	1.57	111.1	30.5

Wellington House, Wellington Court
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Faceby Lodge Farm



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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	28.720	1.297	22.1	0.095	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	32.714	0.327	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	79.988	0.640	125.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	79.988	0.640	125.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	27.099	0.320	84.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	4.510	0.196	23.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	4.22	98.650	0.095	0.0	0.0	0.0	2.15	38.0	12.9
1.004	50.00	5.81	96.123	0.320	0.0	0.0	0.0	1.57	111.1	43.3
1.005	50.00	7.29	95.796	0.320	0.0	0.0	0.0	0.90	15.9«	43.3
1.006	50.00	8.78	95.156	0.320	0.0	0.0	0.0	0.90	15.9«	43.3
1.007	50.00	9.19	94.516	0.320	0.0	0.0	0.0	1.09	19.3«	43.3
1.008	50.00	9.23	94.196	0.320	0.0	0.0	0.0	2.11	37.3«	43.3

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In			Backdrop (mm)
					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	
S1	98.900	1.122	Open Manhole	1200	1.000	97.778	150			
S2	99.900	2.399	Open Manhole	1200	1.001	97.501	225	1.000	97.576	150
S3	100.000	3.195	Open Manhole	1200	1.002	96.805	300	1.001	96.880	225
S4	100.000	3.658	Open Manhole	1200	1.003	96.342	300	1.002	96.342	300
S10	100.000	1.350	Open Manhole	1200	2.000	98.650	150			
S5	100.250	4.127	Open Manhole	1200	1.004	96.123	300	1.003	96.123	300
								2.000	97.353	150
S6	100.000	4.204	Open Manhole	2100	1.005	95.796	150	1.004	95.796	300
S7	98.120	2.964	Open Manhole	1200	1.006	95.156	150	1.005	95.156	150
S8	96.864	2.348	Open Manhole	1200	1.007	94.516	150	1.006	94.516	150
S9	94.855	0.659	Open Manhole	1200	1.008	94.196	150	1.007	94.196	150
Headwall	94.600	0.600	Open Manhole	1200		OUTFALL		1.008	94.000	150

1080

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	-----------	--------

1.008 Headwall 94.600 94.000 0.000 1200 0


Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000
 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 0.000
 Hot Start (mins) 0 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000
 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60
 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1

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

Synthetic Rainfall Details

Rainfall Model FSR Profile Type Summer
 Return Period (years) 100 Cv (Summer) 0.750
 Region England and Wales Cv (Winter) 0.840
 M5-60 (mm) 18.000 Storm Duration (mins) 30
 Ratio R 0.350

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: 1.005, Volume (m³): 16.8

Unit Reference	MD-SHE-0095-5000-1750-5000
Design Head (m)	1.750
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	95
Invert Level (m)	95.796
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	5.0	Kick-Flo®	0.847	3.6
Flush-Flo™	0.415	4.5	Mean Flow over Head Range	-	4.1

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)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.8	2.000	5.3	4.000	7.4	7.000	9.6
0.200	4.1	1.000	3.9	2.200	5.6	4.500	7.8	7.500	9.9
0.300	4.4	1.200	4.2	2.400	5.8	5.000	8.2	8.000	10.2
0.400	4.5	1.400	4.5	2.600	6.0	5.500	8.6	8.500	10.5
0.500	4.4	1.600	4.8	3.000	6.4	6.000	8.9	9.000	10.8
0.600	4.3	1.800	5.1	3.500	6.9	6.500	9.3	9.500	11.1

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Storage Structures for Storm

Tank or Pond Manhole: S6, DS/PN: 1.005

Invert Level (m) 96.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	83.0	1.600	83.0	1.601	0.0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.000	S1	15 Winter	1	+0%	100/15	Summer			97.831	-0.097	0.000
1.001	S2	15 Winter	1	+0%	100/15	Summer			97.581	-0.145	0.000
1.002	S3	15 Winter	1	+0%	100/15	Summer			96.897	-0.208	0.000
1.003	S4	15 Winter	1	+0%	30/120	Winter			96.441	-0.201	0.000
2.000	S10	15 Winter	1	+0%	100/15	Summer			98.710	-0.090	0.000
1.004	S5	15 Winter	1	+0%	30/15	Summer			96.244	-0.179	0.000
1.005	S6	60 Winter	1	+0%	1/15	Summer			96.182	0.236	0.000
1.006	S7	480 Winter	1	+0%					95.208	-0.098	0.000
1.007	S8	960 Summer	1	+0%					94.563	-0.103	0.000
1.008	S9	960 Summer	1	+0%					94.234	-0.112	0.000

PN	US/MH Name	Pipe		Status	Level Exceeded
		Flow / Cap.	Overflow (l/s)		
1.000	S1	0.27	4.7	OK	
1.001	S2	0.28	15.4	OK	
1.002	S3	0.20	22.8	OK	
1.003	S4	0.24	23.5	OK	
2.000	S10	0.33	12.2	OK	
1.004	S5	0.34	34.3	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flow / Cap.	Overflow (1/s)	Pipe	Status	Level
				Flow (1/s)		Exceeded
1.005	S6	0.26		4.0	SURCHARGED	
1.006	S7	0.26		4.0	OK	
1.007	S8	0.22		4.0	OK	
1.008	S9	0.15		4.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales	Ratio R 0.350 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m ³)
1.000	S1	15 Winter	30	+0%	100/15	Summer			97.867	-0.061	0.000
1.001	S2	15 Winter	30	+0%	100/15	Summer			97.653	-0.073	0.000
1.002	S3	15 Winter	30	+0%	100/15	Summer			96.972	-0.133	0.000
1.003	S4	120 Winter	30	+0%	30/120	Winter			96.697	0.055	0.000
2.000	S10	15 Winter	30	+0%	100/15	Summer			98.753	-0.047	0.000
1.004	S5	120 Winter	30	+0%	30/15	Summer			96.693	0.270	0.000
1.005	S6	120 Winter	30	+0%	1/15	Summer			96.688	0.742	0.000
1.006	S7	480 Summer	30	+0%					95.210	-0.096	0.000
1.007	S8	480 Summer	30	+0%					94.565	-0.101	0.000
1.008	S9	480 Summer	30	+0%					94.235	-0.111	0.000

PN	US/MH Name	Pipe		Status	Level Exceeded
		Flow / Cap.	Overflow (l/s)		
1.000	S1	0.66	11.6	OK	
1.001	S2	0.78	43.5	OK	
1.002	S3	0.58	65.0	OK	
1.003	S4	0.23	22.5	SURCHARGED	
2.000	S10	0.82	29.7	OK	
1.004	S5	0.29	29.6	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

	US/MH		Pipe			Level
PN	Name	Flow / Cap.	Overflow (1/s)	Flow (1/s)	Status	Exceeded
1.005	S6	0.28		4.3	SURCHARGED	
1.006	S7	0.28		4.3	OK	
1.007	S8	0.24		4.3	OK	
1.008	S9	0.16		4.3	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.000	S1	15 Winter	100	+40%	100/15 Summer				98.528	0.600	0.000
1.001	S2	15 Winter	100	+40%	100/15 Summer				98.351	0.625	0.000
1.002	S3	240 Winter	100	+40%	100/15 Summer				97.556	0.451	0.000
1.003	S4	240 Winter	100	+40%	30/120 Winter				97.551	0.909	0.000
2.000	S10	15 Winter	100	+40%	100/15 Summer				99.806	1.006	0.000
1.004	S5	240 Winter	100	+40%	30/15 Summer				97.547	1.124	0.000
1.005	S6	240 Winter	100	+40%	1/15 Summer				97.541	1.595	0.000
1.006	S7	240 Winter	100	+40%					95.214	-0.092	0.000
1.007	S8	240 Winter	100	+40%					94.569	-0.097	0.000
1.008	S9	240 Winter	100	+40%					94.239	-0.107	0.000

PN	US/MH Name	Flow Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	1.00		17.6	SURCHARGED	
1.001	S2	1.24		68.9	SURCHARGED	
1.002	S3	0.21		24.0	SURCHARGED	
1.003	S4	0.24		23.1	SURCHARGED	
2.000	S10	1.32		48.1	FLOOD RISK	
1.004	S5	0.33		33.3	SURCHARGED	

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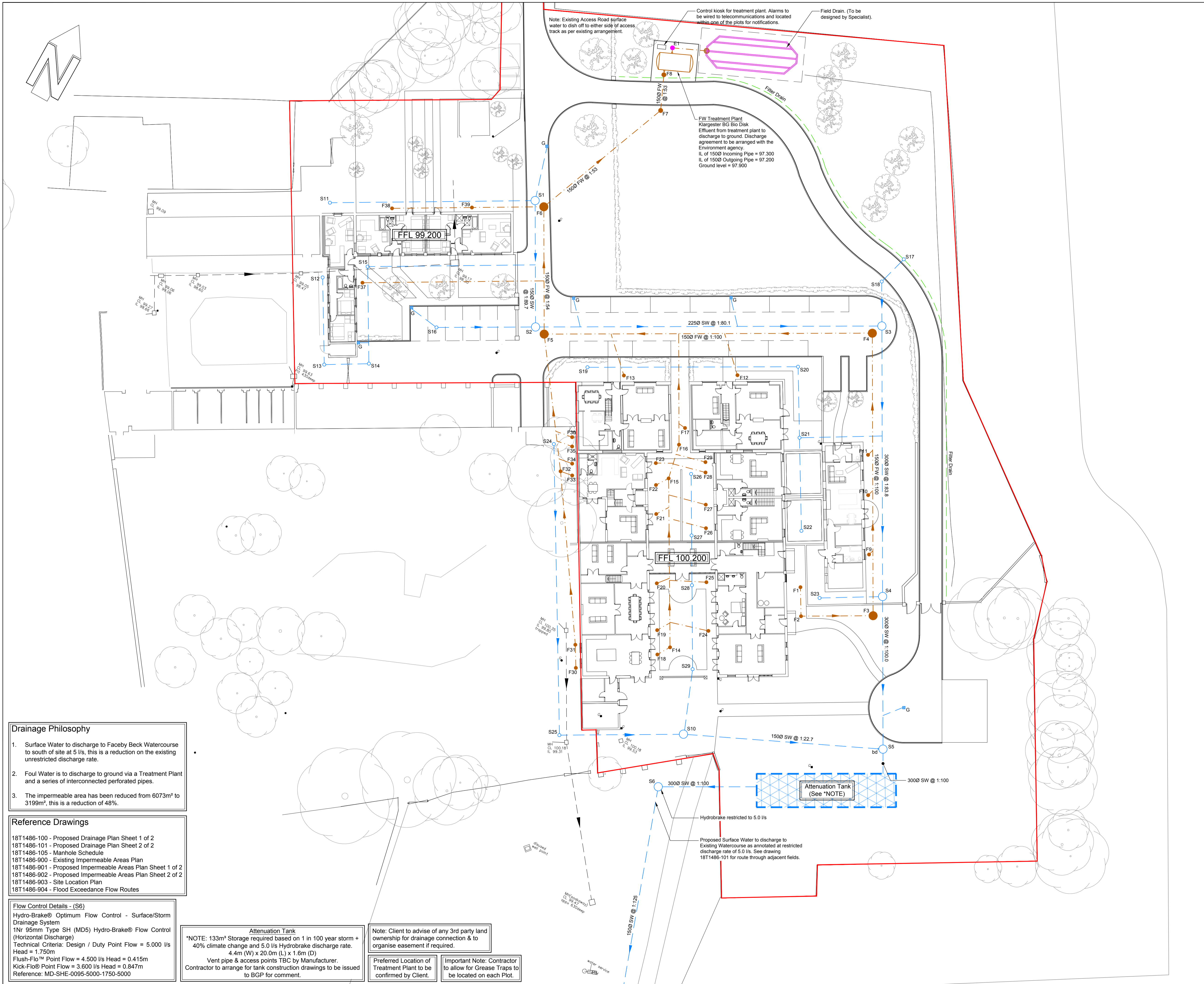
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flow / Cap.	Overflow (1/s)	Pipe Flow (1/s)	Status	Level Exceeded
1.005	S6	0.32		5.0	SURCHARGED	
1.006	S7	0.32		5.0	OK	
1.007	S8	0.27		5.0	OK	
1.008	S9	0.18		5.0	OK	



Appendix G

Proposed Drainage Layout



- Notes**
- All works to be carried out in accordance with:
 - "Sewers for Adoption" The contractor should note the new changes regarding adoption of sewers and construction methods.
 - BS EN 752 "Drain and sewer system outside buildings".
 - All levels shown are in metres and are relative to ordnance datum (m AOD).
 - Invert levels of all existing chambers and connection points are to be confirmed and engineer advised prior to commencement of any Drainage Works.
 - Concrete bed and surround is required to all gully leads and to all pipes in highways/hardstanding where cover to pipe <1200mm
 - All pipes to be either extra strength V.C. to BS 65 or PVC to BS 4660 or BS 5481 'UPONOR ULTRARIB' or concrete pipes Class 120 to BS 5911
 - All RWP & PU locations are indicative and accurate positions should be taken from the Architects drawings.
 - Existing sewer positions are indicative and are not to be used in conjunction with design. Contractor to confirm location.
 - All RWP connections to proposed manholes to be 100Ø. All Surface water sewers between manholes to be 150Ø unless noted otherwise.
 - All FW drains to be 100Ø UNO.
 - Contractor is responsible for positioning of MHs so they do not sit between two surface materials.

S.H.E.
Do not excavate until all underground services have been identified and marked out. Refer to service providers drawings and to the utilities survey drawings. Unknown underground services may exist. Check for services by carrying out a scan with a cable avoidance tool.

Legend

Proposed SW Sewer	---
Proposed FW Sewer	---
Proposed Filter Drain	---
Perforated Effluent Drain	---
Existing Drainage	---
Site Boundary	---
Highway Gully	G ---
Rainwater Pipe	RWP ---
Rodding Eye	RE ---
Backdrop Manhole	bd ---
Linear Drain with Outlet Unit	---

Issued for Planning	JJH	P2	SR	02/08/2019
Issued for Information	ZW	P1	SR	20/11/2018
AMENDMENT	BY	REV	CHK	DATE

Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

In instances where this drawing completes or partly completes a contract, Billingham George & Partners will consider that its product has been validated, unless in a period not exceeding 90 working days, the client advises to the contrary.

Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Proposed Drainage Plan
Sheet 1 of 2**

Drawn	Z. Waller	Date	14.11.2018
Checked	S. Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

Billingham George & Partners
CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,
Stockton-on-Tees, TS18 3TA

Drainage Philosophy

- Surface Water to discharge to Faceby Beck Watercourse to south of site at 5 l/s, this is a reduction on the existing unrestricted discharge rate.
- Foul Water is to discharge to ground via a Treatment Plant and a series of interconnected perforated pipes.
- The impermeable area has been reduced from 6073m² to 3199m², this is a reduction of 48%.

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
- 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
- 18T1486-105 - Manhole Schedule
- 18T1486-900 - Existing Impermeable Areas Plan
- 18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
- 18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
- 18T1486-903 - Site Location Plan
- 18T1486-904 - Flood Exceedance Flow Routes

Flow Control Details - (S6)
Hydro-Brake® Optimum Flow Control - Surface/Storm Drainage System
1Nr 95mm Type SH (MD5) Hydro-Brake® Flow Control (Horizontal Discharge)
Technical Criteria: Design / Duty Point Flow = 5.000 l/s Head = 1.750m
Flush-Flo™ Point Flow = 4.500 l/s Head = 0.415m
Kick-Flo® Point Flow = 3.600 l/s Head = 0.847m
Reference: MD-SHE-0095-5000-1750-5000

Attenuation Tank
*NOTE: 133m³ Storage required based on 1 in 100 year storm + 40% climate change and 5.0 l/s Hydrobrake discharge rate.
4.4m (W) x 20.0m (L) x 1.6m (D)
Vent pipe & access points TBC by Manufacturer.
Contractor to arrange for tank construction drawings to be issued to BGP for comment.

Note: Client to advise of any 3rd party land ownership for drainage connection & to organise easement if required.
Preferred Location of Treatment Plant to be confirmed by Client.
Important Note: Contractor to allow for Grease Traps to be located on each Plot.

Note: Existing Access Road surface water to dish off to either side of access track as per existing arrangement.

Control kiosk for treatment plant. Alarms to be wired to telecommunications and located within one of the plots for notifications.

Field Drain. (To be designed by Specialist).

FW Treatment Plant Klargestor BG Bio Disk Effluent from treatment plant to discharge to ground. Discharge agreement to be arranged with the Environment agency.
IL of 150Ø Incoming Pipe = 97.300
IL of 150Ø Outgoing Pipe = 97.200
Ground level = 97.900

Hydrobrake restricted to 5.0 l/s
Proposed Surface Water to discharge to Existing Watercourse as annotated at restricted discharge rate of 5.0 l/s. See drawing 18T1486-101 for route through adjacent fields.

DO NOT SCALE

Notes

- All works to be carried out in accordance with:
 - "Sewers for Adoption" The contractor should note the new changes regarding adoption of sewers and construction methods.
 - BS EN 752 "Drain and sewer system outside buildings".
- All levels shown are in metres and are relative to ordnance datum (m AOD).
- Invert levels of all existing chambers and connection points are to be confirmed and engineer advised prior to commencement of any Drainage Works.
- Concrete bed and surround is required to all gully leads and to all pipes in highways/hardstanding where cover to pipe <1200mm
- All pipes to be either extra strength V.C. to BS 65 or PVC to BS 4660 or BS 5481 'UPONOR ULTRARIB' or concrete pipes Class 120 to BS 5911
- All RWP & PU locations are indicative and accurate positions should be taken from the Architects drawings.
- Existing sewer positions are indicative and are not to be used in conjunction with design. Contractor to confirm location.
- All RWP connections to proposed manholes to be 100Ø. All Surface water sewers between manholes to be 150Ø unless noted otherwise.
- All FW drains to be 100Ø UNO.
- Contractor is responsible for positioning of MHs so they do not sit between two surface materials.

S.H.E.

Do not excavate until all underground services have been identified and marked out. Refer to service providers drawings and to the utilities survey drawings. Unknown underground services may exist. Check for services by carrying out a scan with a cable avoidance tool.

Legend

- Proposed SW Sewer ---
- Proposed FW Sewer ---
- Proposed Filter Drain ---
- Perforated Effluent Drain ---
- Existing Drainage ---
- Site Boundary ---
- Highway Gully G
- Rainwater Pipe RWP
- Rodding Eye RE
- Backdrop Manhole bd
- Linear Drain with Outlet Unit ---

Issued for Planning	JJH	P1	SR	02/08/2019
---------------------	-----	----	----	------------

AMENDMENT	BY	REV	CHK	DATE
-----------	----	-----	-----	------

Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

In instances where this drawing completes or partly completes a contract, Billinghurst George & Partners will consider that its product has been validated, unless in a period not exceeding 90 working days, the client advises to the contrary.

Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Proposed Drainage Plan
Sheet 2 of 2**

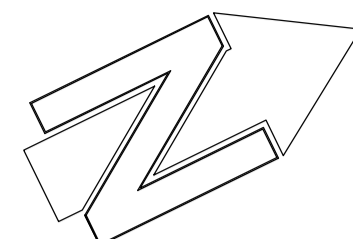
Drawn **J. Herbert** Date **August 2019**

Checked **S. Ramshaw** Date **August 2019**

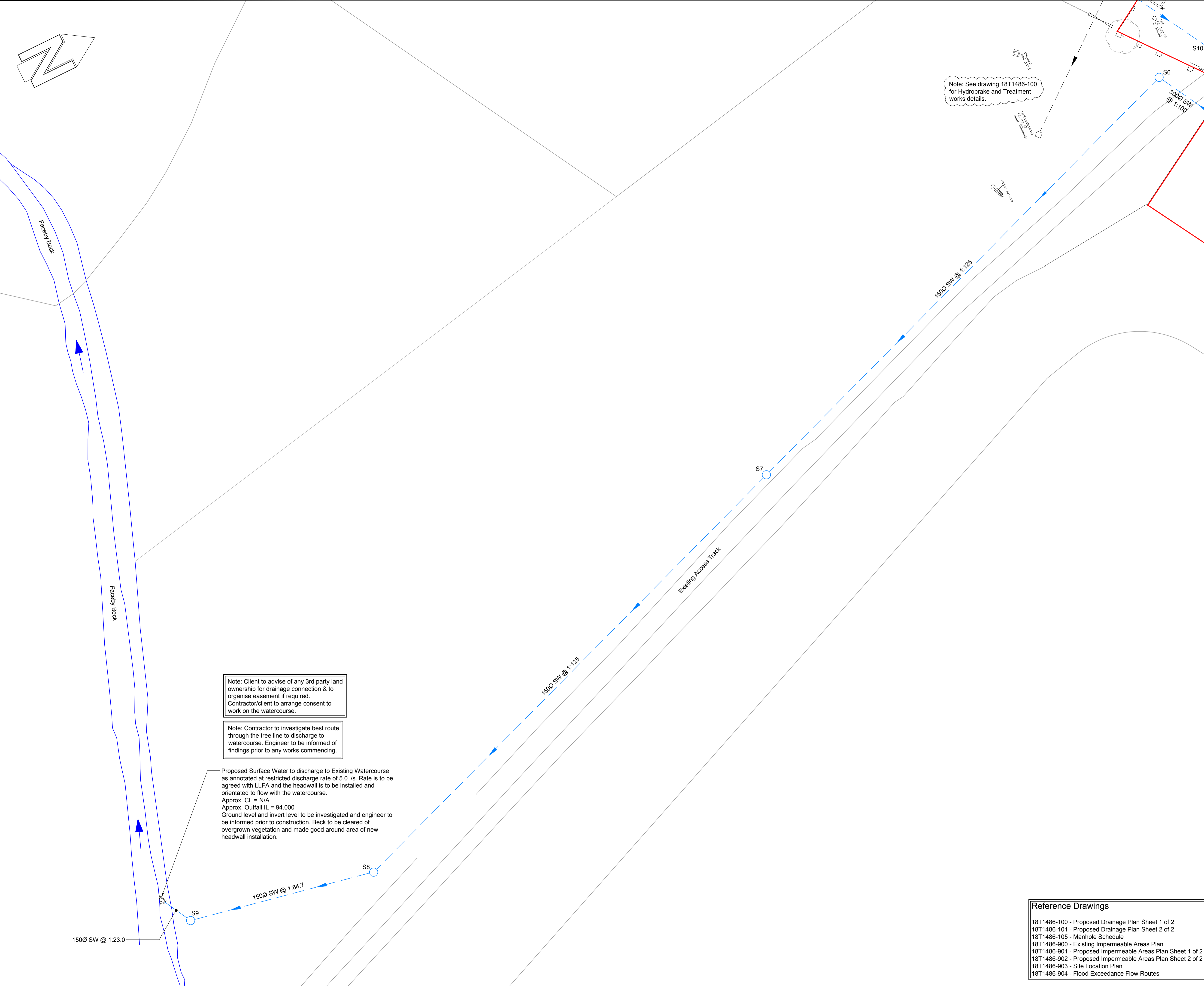
Scale **1:250** Original Size **A1**

bgp Billinghurst George & Partners
CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,
Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-101** Rev. **P1**



Note: See drawing 18T1486-100 for Hydrobrake and Treatment works details.



Note: Client to advise of any 3rd party land ownership for drainage connection & to organise easement if required. Contractor/client to arrange consent to work on the watercourse.

Note: Contractor to investigate best route through the tree line to discharge to watercourse. Engineer to be informed of findings prior to any works commencing.

Proposed Surface Water to discharge to Existing Watercourse as annotated at restricted discharge rate of 5.0 l/s. Rate is to be agreed with LLFA and the headwall is to be installed and orientated to flow with the watercourse.
Approx. CL = N/A
Approx. Outfall IL = 94.000
Ground level and invert level to be investigated and engineer to be informed prior to construction. Beck to be cleared of overgrown vegetation and made good around area of new headwall installation.

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
- 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
- 18T1486-105 - Manhole Schedule
- 18T1486-900 - Existing Impermeable Areas Plan
- 18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
- 18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
- 18T1486-903 - Site Location Plan
- 18T1486-904 - Flood Exceedance Flow Routes



Appendix H

EA Flood Maps

Flood map for planning

Your reference
Faceby lodge

Location (easting/northing)
449663/504064

Created
14 Sep 2018 10:19

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Flood map for planning

Your reference

Faceby lodge

Location (easting/northing)

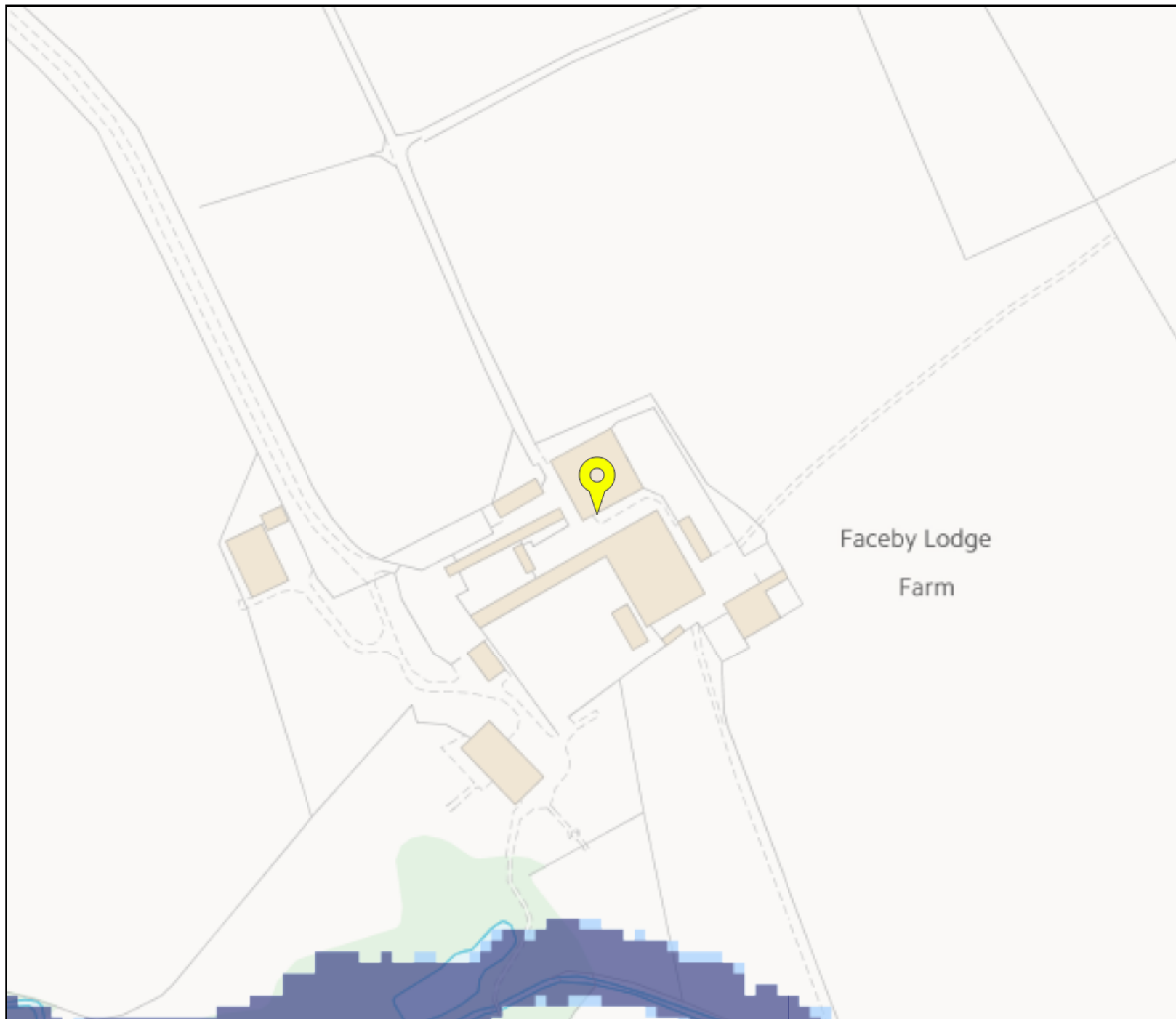
449663/504064









Scale

1:2500

Created


14 Sep 2018 10:19




-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 20 40 60m




 Flood risk from rivers or the sea

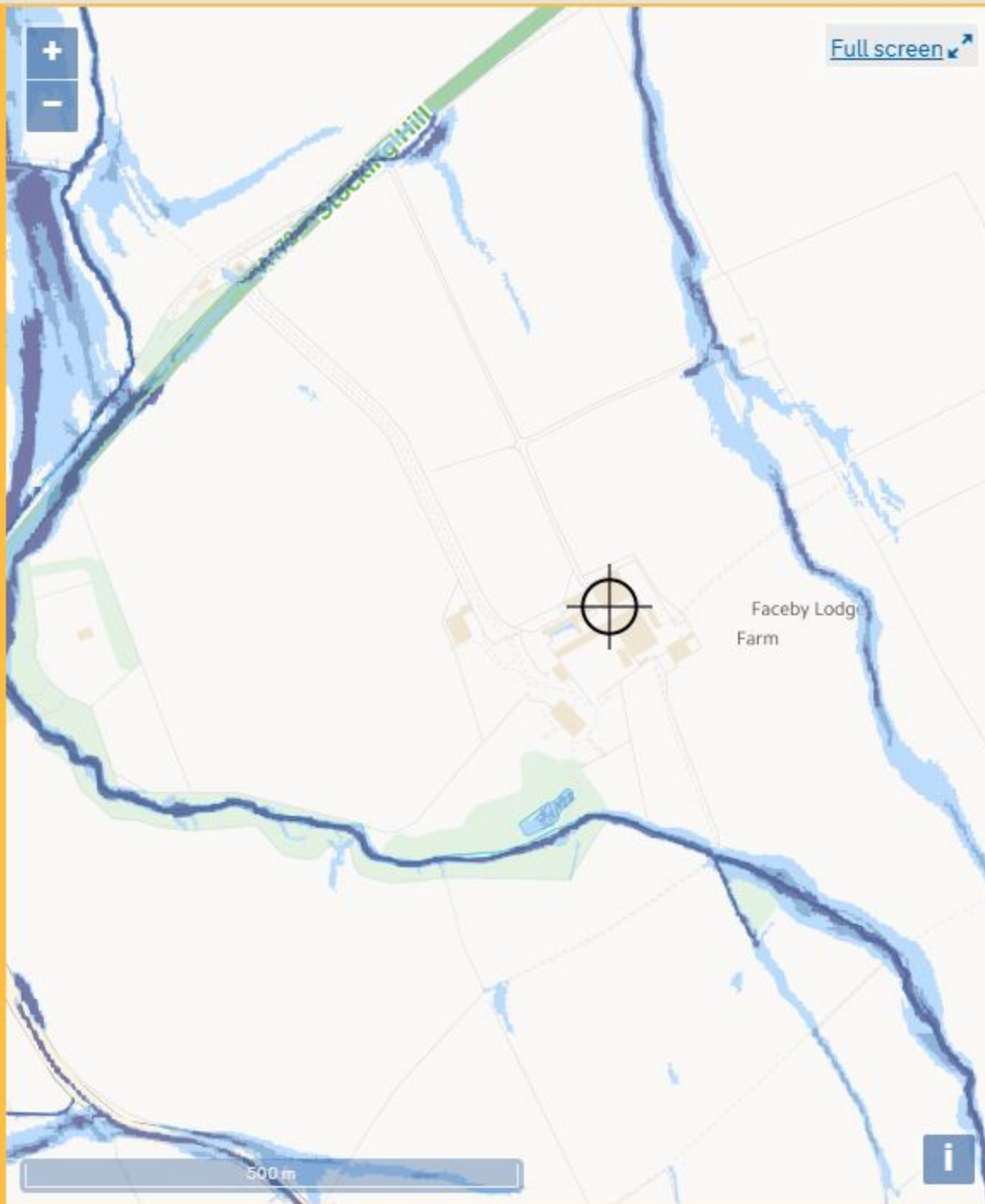
- Extent of flooding
- Depth and flow estimates at monitoring stations

 Flood risk from surface water

- Extent of flooding
- High risk: depth
- High risk: velocity
- Medium risk: depth
- Medium risk: velocity
- Low risk: depth
- Low risk: velocity

 Flood risk from reservoirs

- Extent of flooding
- Flood depth
- Flood speed



Flood risk



High



Medium



Low



Very low



Location you selected



NYMNPA

07/08/2019

Flood Risk Assessment

18T1486 – Faceby Lodge, Faceby, North Yorkshire

Billingham George & Partners

Civil & Structural Engineers, Building Surveyors

Wellington House, Wellington Court, Preston Farm, Stockton-on-Tees, TS18 3TA

 @BGPconsulting



Flood Risk Assessment

Project: Faceby Lodge Farm, Faceby, North Yorkshire, TS9 7DP

Client: Jomast

BGP Job No: 18T1486

Document Checking:

Prepared By: S. Ramshaw – Associate Director

Checked By: J. Conway BSc CEng MICE – Director

Issue	Date	Status	Checked By
001	08/02/2019	Planning	SR
002	02/08/2019	Planning	SR

This document has been prepared solely as a Flood Risk Assessment for Jomast Developments regarding a proposed scheme at Faceby Lodge farm, North Yorkshire. Billinghurst George & Partners accepts no responsibility or liability for any use that is made of this document other than by the Client for which it was originally commissioned and prepared.

CONTENTS

- 1 Introduction
- 2 Development Description and Location
- 3 Definition of the Flood Hazard
- 4 Probability of Flooding
- 5 Climate Change
- 6 Detailed Development Proposals
- 7 Off-Site Impacts and Residual Risks
- 8 Conclusions

APPENDICES

- | | |
|------------|----------------------------------|
| Appendix A | Site Location Plan |
| Appendix B | Proposed Site Layout |
| Appendix C | EA Flood Map |
| Appendix D | Northumbrian Water Sewer Records |
| Appendix E | Topographic Survey |
| Appendix F | Reference Documents List |

1. Introduction

This Flood Risk Assessment has been prepared in accordance with the requirements of The National Planning Policy Framework (Ministry of Housing, Communities and Local Government - July 2018) [The Framework] and the Planning Practice Guidance to the National Planning Policy Framework Website (Launched 6th March 2014) [The Technical Guidance].

This report has been prepared to supplement the planning application for the proposed development at Faceby Lodge Farm, North Yorkshire. See Appendix A for the Site Location Plan.

The proposals are the conversion / renovation / new build to create residential accommodation.

2. Development Description and Location

2.1. Site Location:

- 2.1.1 Site Name: Faceby Lodge Farm
- 2.1.2 Site Address: Faceby Lodge Farm, Faceby, North Yorkshire, TS9 7DP
- 2.1.3 OS Grid Reference: E:449679, 504056
- 2.1.4 National Grid Reference: NZ496040

2.2. Site Description:

- 2.2.1 Site Area: 0.865 Ha
- 2.2.2 Existing Land Use: Agricultural farm stead with associated buildings and dwelling
- 2.2.3 Proposed Land Use: Residential
- 2.2.4 Local Drainage Authority: North Yorkshire county council
- 2.2.5 Sewer Undertaker: Yorkshire Water (YWL)
- 2.2.6 The site is located off the A172 approximately 5.5km South West of Stokesley. The works involve converting / re-building the existing structures to form residential accommodation. The site sits at a higher elevation than the surrounding land. The site sits approximately 20m higher than the A172 to the North and 7m higher than the beck to the South.

2.3. Flood Zone (Table 1 NPPF):

The development lies within Flood Zone 1. (see Appendix C for EA Maps).

2.4. NPPF Site Classification (Table 2 NPPF):

The vulnerability classification for 'Buildings used for ... Hotels' is "More Vulnerable".

2.5. Flood Zone “Compatibility” (Table 3 NPPF):

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	Yes	Yes	Yes	Yes	Yes
Flood Zone 2	Yes	Exception test required	Yes	Yes	Yes
Flood Zone 3a	Exception test required	No	Exception test required	Yes	Yes
Flood Zone 3b	Exception test required	No	No	No	Yes

The residential Proposals are acceptable in terms of flood risk in accordance with Table 3 of the NPPF.

2.6. Sequential Test:

Not applicable.

3. Definition of the Flood Hazard

3.1. Tidal Flood Risk:

The site is 25 km from the sea and located at an elevation of approximately 99m AOD. It is therefore considered that the site will not be affected by flooding from the sea.

The risk of flooding from the sea is categorised as **LOW**.

3.2. Fluvial Flood Risk:

The nearest named watercourse is the “Faceby Beck” that is located approximately 160m South of the site. The Becks bank level is roughly 7.0m lower than the site.

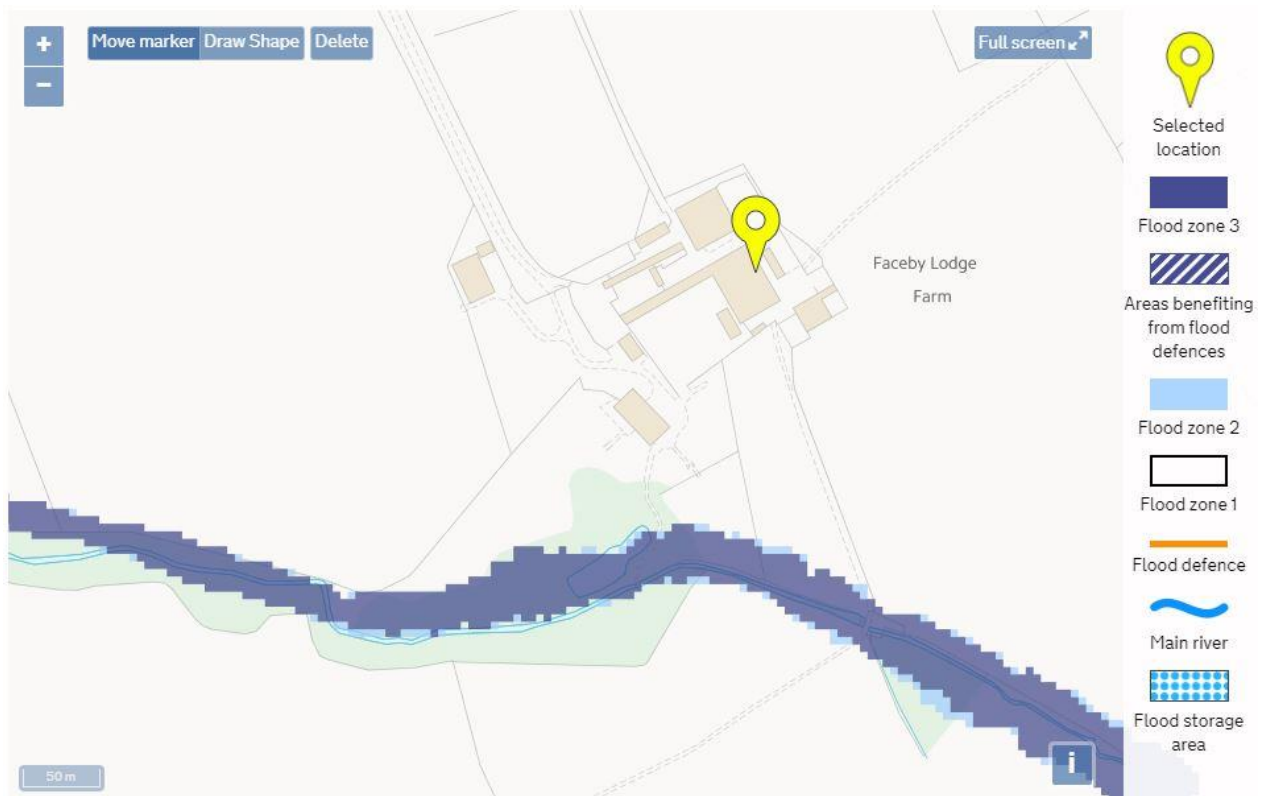


Figure 1 – Environment Agency Flood Map for Planning

The Environment Agency ‘Flood Map for Planning’ (Figure 1 and Appendix C) shows that the proposed site is unaffected by this or any other watercourse and is wholly within Flood Zone 1. Flood Zone 1 is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year.

It is considered that the risk of flooding to the site from fluvial sources is categorised as **LOW**.

3.3. Overland Flood Risk:

Intensive rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in localised flooding.

The current buildings that occupy the site have a positive drainage system which is assumed to run to the beck to the south or underground culverts to the north.

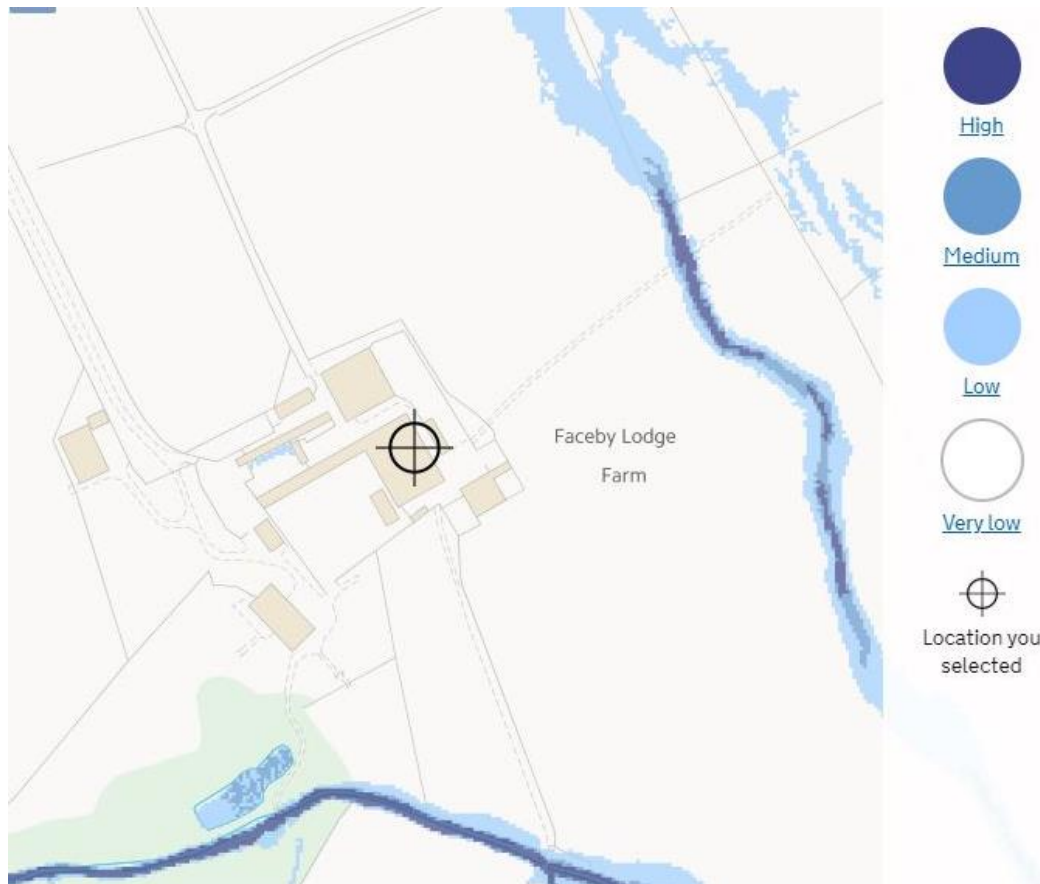


Figure 2 – Environment Agency Surface Water Flooding Map for Planning

As the surrounding land is at a much lower elevation than the site. The possibility of overland flows is minimal.

The above assessment is confirmed by the Environment Agency 'Surface Water Flooding Map for Planning' (Figure 2 above), which shows that the site is at 'Very Low' risk to surface water flooding.

Based on the above, the risk of flooding from overland sources is categorised as **LOW**.

3.4. Groundwater Flood Risk:

Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks.

No Intrusive site investigation works have yet been carried out but based on the BGS website we can see that the site is underlain with "Stoney CLAY" down to a depth of roughly 18m.

As the site is also elevated above the surrounding land, any risk of ground water flooding would occur in the lower surrounding fields and therefore not affect the site.

The risk of flooding from ground water is therefore categorised as **LOW**.

3.5. Flooding from Sewers:

See Appendix E for locations of existing Yorkshire Water public drains. The nearest sewer is located within the village of Faceby approximately 500m South.

Therefore, the risk of flooding to the proposed site from sewers is categorised as **LOW**.

3.6. Flooding from Artificial Sources:

Based on the Environment Agency map 'Flood Risk from Reservoirs' the site is not at risk from any artificial sources such as reservoirs.

The risk of flooding from artificial sources is categorised as **LOW**.

4. Probability of Flooding

The Environment Agency maps have been reviewed (see Appendix C). The entirety of the site is identified as being in Flood Zone 1 as categorised by the National Planning Policy Framework (NPPF) and Technical Guidance.

Flood Zone 1 describes the land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year.

The previous section describes other flood hazards and the risk they pose to this project. A summary of the existing flood risk and the mitigation required is provided below.

Based on the previous section the overall assessment of the probability of flooding to the site is **LOW**.

This may be revised upon receipt of intrusive site investigate works that will inform the level of risk from groundwater flooding.

Flood Risk Source	Current Risk Level	Mitigation Requirement during detailed design	Risk Level following Mitigation
Tidal and Fluvial Flooding	LOW	Development is located in Flood Zone 1.	LOW
Overland Flow	LOW	The site is elevated compared to the surrounding	LOW
Groundwater	LOW	The site is elevated compared to the surrounding and ground conditions are generally Impermeable clay.	LOW
Sewer Flooding	LOW	Nearest sewer is approximately 500m South	LOW
Artificial Sources	LOW	The site is not at risk from any artificial sources according to the EA map 'Flood Risk from Reservoirs'.	LOW

5. Climate Change

NPPF Planning Practice Guidance website provides information on the impacts of climate change, which include sea level changes, river flash flooding and more frequent high intensity, short-duration rainfall.

As concluded previously the risk of flooding from the sea and rivers is low. The risk of flooding from land again is low; both are, therefore unlikely to be affected by climate change.

6. Detailed Development Proposals

The proposals are to convert / renovate / new build residential units at the former Faceby Lodge Farm.

It is understood that the existing surface water drainage runs in both directions. To the South towards the existing Beck and to the North towards underground culverts.

We understand the former site discharged foul to septic tanks.

Any proposed surface water drainage should be restricted to as close as reasonable to existing rates or to a rate agreed with the Lead local flood authority. This may require the use of attenuation tanks or "SuDs" features.

As the nearest foul sewer is over "30m x number of units" away from the site, a sewerage treatment works will be required. Any discharge consents should be agreed with the EA.

7. Off Site Impacts

The proposals for this site should not increase the flood risk elsewhere off site for the following reasons: -

- The proposed surface water discharge rate will be equal to or less than existing.
- The impermeable areas within the site will be positively drained via a proposed drainage network.

8. Conclusions

From the above analysis it can be seen that the risk to the proposed development at Faceby Lodge Farm is **LOW** from all forms of flooding as categorised in the Framework and the Technical Guidance. This confirms the Flood Zone designation for the site.

The proposed uses of land are appropriate in this Flood Zone. (Tables 1, 2 & 3 of the Technical Guidance).

This report has been prepared with reference to the information available at the time of writing. The summary and recommendations may be revised upon receipt of additional or further information.



Appendix A
Site Location Plan



Issued for Planning	JJH	P1	SR	02/08/2019
---------------------	-----	----	----	------------

AMENDMENT	BY	REV	CHK	DATE
-----------	----	-----	-----	------

Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

In instances where this drawing completes or partly completes a contract, Billingham George & Partners will consider that it's product has been validated, unless in a period not exceeding 90 working days, the client advises to the contrary.

DO NOT SCALE

Client **Jomast**

Title **Faceby Lodge Farm
Conversion of Existing Buildings
Site Location Plan**

Drawn: **J. Herbert**


Date: **August 2019**

Original Size **A3**

Checked: **S. Ramshaw**

Date: **August 2019**

Scale: **1:5000**



Billingham George & Partners
Civil & Structural Engineers & Building Surveyors
1st Floor, Wellington House, Wellington Court
Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-903** Rev. **P1**



Appendix B

Proposed Site Layout



P1 Redrawn after meeting NYMNP 27.06.19 djh

REVISIONS:

SPA ARCHITECTS
 incorporating DKS Architects
 1 Burton Way, Stibbald, Business Park, Stibbald, Middleburgh, TD0 6DY

Client:
 SJ & J Monk

Project:
 Faceby Lodge Farm
 Proposed Conversion

Drawing:
 Proposed Site Layout
 Planning Application

Drawn by: djh Checked by: djh Scale: 1:200@A1

Project No.	Originator	Volume / System	Level / Location	Type	Rev	Dwg No.
18030	SPA	ZZ	00	DR	A	P104
Purpose of Issue		Date	Subsity	Rev		
Comment/Review		29 Nov 19	S3	P1		



Appendix C

EA Flood Map

Flood map for planning

Your reference
Faceby lodge

Location (easting/northing)
449663/504064

Created
14 Sep 2018 10:19

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Flood map for planning

Your reference

Faceby lodge

Location (easting/northing)

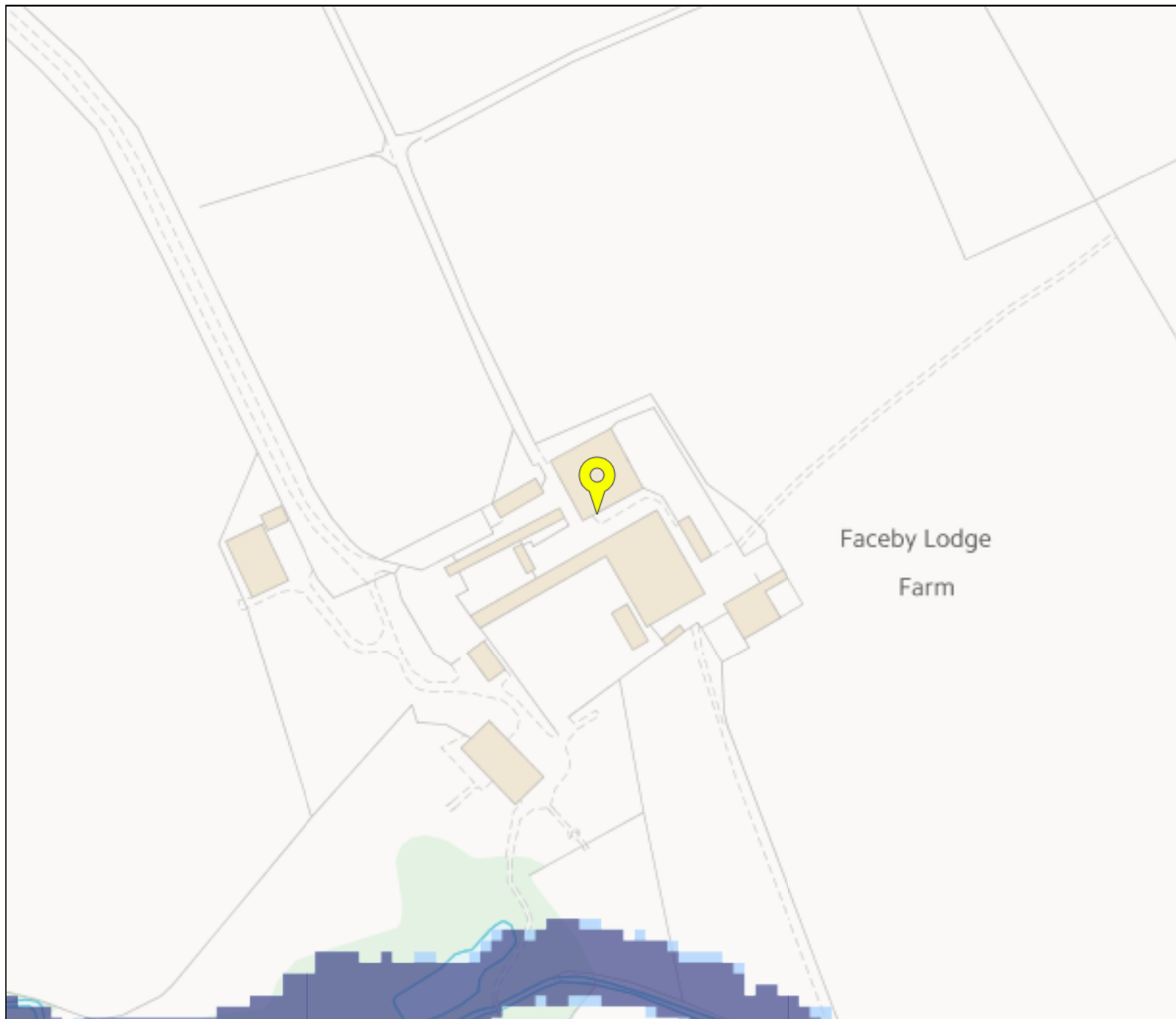
449663/504064









Scale

1:2500

Created


14 Sep 2018 10:19




-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 20 40 60m




 Flood risk from rivers or the sea

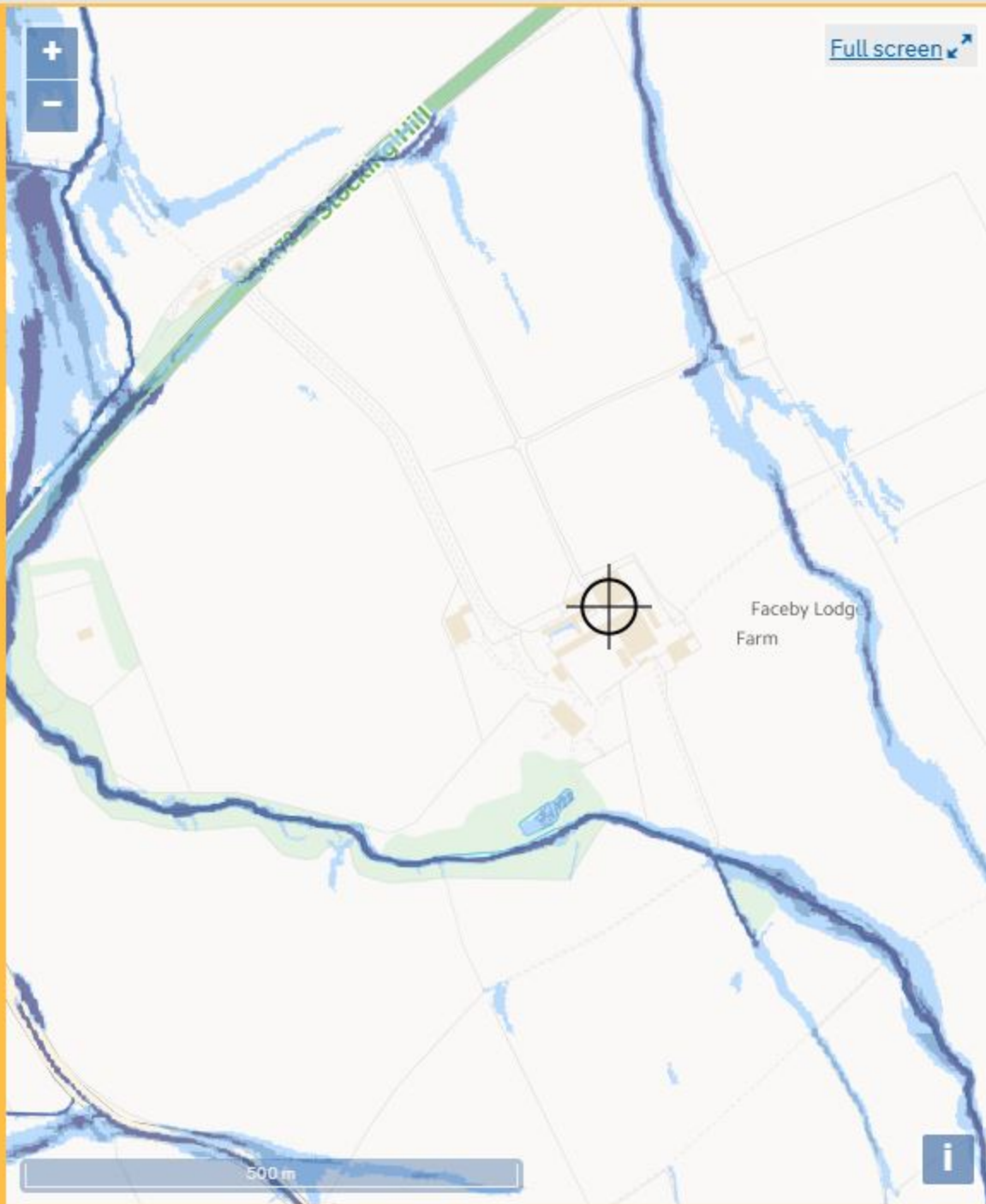
- Extent of flooding
- Depth and flow estimates at monitoring stations

 Flood risk from surface water

- Extent of flooding
- High risk: depth
- High risk: velocity
- Medium risk: depth
- Medium risk: velocity
- Low risk: depth
- Low risk: velocity

 Flood risk from reservoirs

- Extent of flooding
- Flood depth
- Flood speed



Flood risk



High



Medium



Low



Very low

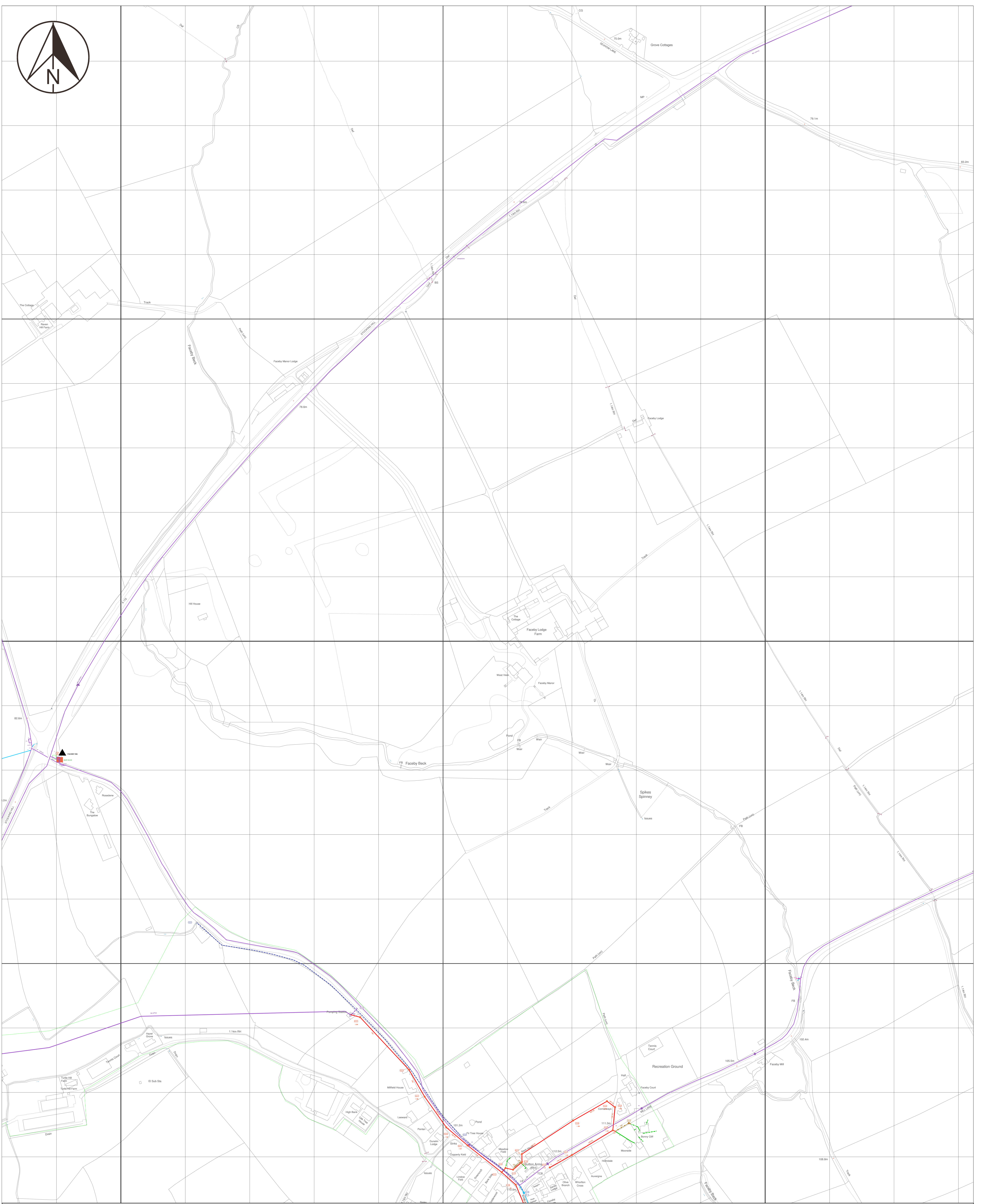
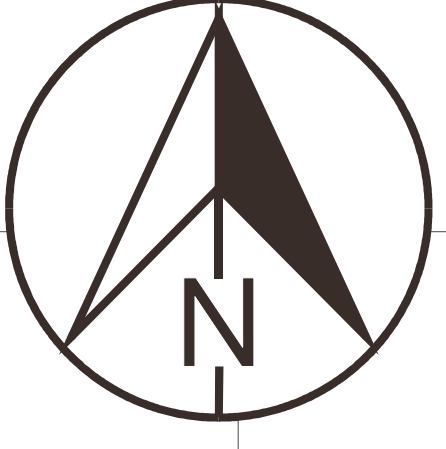


Location you selected



Appendix D

Northumbrian Water Sewer Records

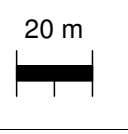


Waste Water -	NWL Responsibility		Private/Non NWL	Proposed	Water Network -	Network Types	
Combined			Combined		Combined		AB Asbestos
Foul			Foul		Foul		Abandoned
Surface			Surface		Surface		Out of Comm
Treated Eff			Treated Eff		Treated		
Untreated Eff			Trade Eff		Raw		
Overflow			Watercourse		Fire		
					Supply		
					Private		

User : CAPEL Date : 20/11/2018 15:18:54 Map Sheet : NZ4904SE
Title : Centre Point : 449569,504057 Paper / Scale : A0@1:2000



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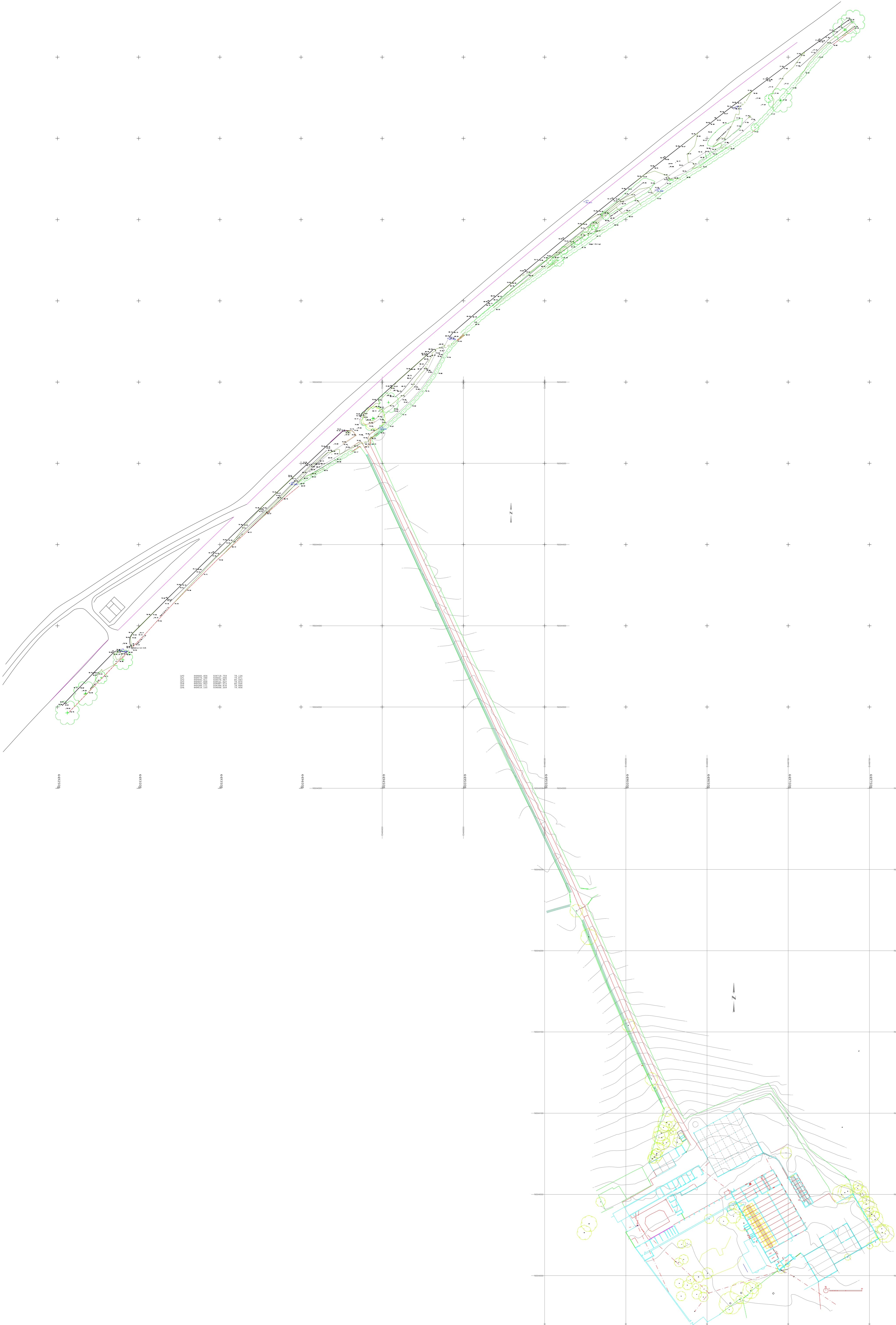


Appendix E

Topographic Survey

5048000
5047500
5047000
5046500
5046000
5045500
5045000
5044500
5044000
5043500
5043000

4485000
4490000
4495000
4500000
4505000
4510000
4515000
4520000
4525000
4530000
4535000
4540000



Appendix F

Reference Documents List

The National Planning Policy Framework (July 2018)	Ministry of Housing, Communities and Local Government
The Technical Guidance to the NPPF (Website)	Communities and Local Government
Flood Risk Assessment Guidance Note 1	Environment Agency



NYMNPA

07/08/2019

SuDs Management Plan

18T1486 – Faceby Lodge, Faceby, North Yorkshire

Billingham George & Partners
Civil & Structural Engineers, Building Surveyors
Wellington House, Wellington Court, Preston Farm, Stockton-on-Tees, TS18
 @BGPconsulting



SuD's Management Plan

Project: Faceby Lodge Farm, Faceby, North Yorkshire, TS9 7DP

Client: Jomast

LLFA: North Yorkshire County Council

BGP Job No: 18T1486

Document Checking:

Prepared By: J Herbert

Checked By: S Ramshaw

Issue	Date	Status	Checked for Issue
001	02/08/2019	Planning	SR

This document has been prepared solely as a SuDs Management Plan for MD² Consulting regarding the proposed scheme at Faceby Lodge farm, North Yorkshire. Billinghurst George & Partners accepts no responsibility or liability for any use that is made of this document other than by the Client for which it was originally commissioned and prepared.



Contents

1. Introduction
2. Site Description
3. Existing Drainage Regime
4. Proposed Surface Water Drainage Solution
5. SuDs Management and Maintenance
6. Pipes
7. Attenuation Tank

1. Introduction

- 1.1 Billinghamurst George and Partners has been commissioned by MD² Consulting to prepare a SuDS Management Plan regarding the proposed residential development at Faceby Lodge Farm, North Yorkshire.
- 1.2 This SuDS Management Plan has been produced to demonstrate how the proposed use of Pipes and an Attenuation Tank will be managed and maintained to satisfy the requirements set out in CIRIA 753 and in accordance with the Sustainable Drainage Systems (SuDS) Adoption Guide 2016 which is North Yorkshire County Council (YCC) criteria for Sustainable Drainage Systems (SuDS).
- 1.3 This report is provided to assist the adopting body/maintaining body in developing an appropriate Maintenance Plan.
- 1.4 The format of the manual will be agreed in advance with the principle designer and end user, and the manual will include relevant information from all designers, suppliers and subcontractors for every element of the project.
- 1.5 This manuals will be reviewed by the principal designer, and handed over to the client on practical completion. Demonstration and Training will also be arranged for the building users and maintenance staff where required.
- 1.6 The operation and maintenance manuals will include the SUDS management plans, as well as any other information required for the operation and maintenance of the site drainage system.

2. Site Description

- 2.1 At approximately 0.99Ha in size the Brownfield site is currently occupied by derelict farmstead including sheds, dwellings and hardstanding yards. It is located approximately 190m east of Faceby Manor and 500m to the south of the A172. The site is bounded by agricultural fields in all directions.
- 2.2 From the topographical it can be noted that the site sits at approximately 100.0m AOD with the site boundaries falling away from site in all directions. The site also sits higher than the A172 to the north by approximately 20.0m. The site sits approximately 7.0m higher than Faceby Beck located to the south of site.
- 2.3 The nearest 'named' watercourse is Faceby Beck, which is located approximately 190m south of the site. The watercourse runs from East to West.

3. Existing Drainage Regime

- 3.1 The majority of the private drainage network from the existing site seems to flow North towards the A172.
- 3.2 A number of soakaways are picked up on the topographic survey towards the South of the site. The suitability of these are unknown.
- 3.3 The existing impermeable area is approximately 6000m² which equates to 83.4 l/s based on 50mm/hr. (0.6 x 2.78 x 50mm/hr).

4. Proposed Surface Water Drainage Solution

- 4.1 The scheme proposes to discharge surface water flows to Faceby Beck to the south of site via a new gravity drain. Flows are to be restricted by a Hydrobrake Optimum unit to 5.0 l/s that will be situated downstream of the attenuation tank.
- 4.2 Exceedance flows above this rate of 5.0 l/s are to be attenuated on the site by an Attenuation Tank. These methods of attenuation are to store flows from the proposed site. Drainage infrastructure onsite will be managed and maintained by a private management company.
- 4.3 All new surface water drainage is to be designed in accordance with local guidelines. A 40% increase in rainfall due to climate change been considered to determine exceedance flow routes and attenuation capacity.
- 4.4 The tank is to be maintained by a private management company, maintenance requirements for the tank are detailed in chapter 7 of this report. Tank is to be installed as per the manufacturer's drawings following detailed development of the design. The tank management is to be read in conjunction with the Landscapes maintenance documents.
- 4.5 The Hydrobrake to be designed/installed to manufacturer's guidance and specification in accordance with relevant guidance and procedures. Hydrobrake to remain private and be maintained by a private management company.
- 4.6 Any manufacturer's maintenance recommendations over and above what is stated on the maintenance tables will also be included in the maintenance plan.
- 4.7 It has been assumed in line with the North Yorkshire County Council guidance that the maximum allowable rate for surface water discharge from the site is 5.0 l/s, this is the restricted rate designed to.

5. SuDS Management and Maintenance

5.1 The proposed storm water system consists of the following SuDS components:

- Pipes
- Attenuation Tank

5.2 There are three categories of maintenance activities referred to in this report:

Regular Maintenance (including inspections and monitoring)

5.3 Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

5.4 Occasional Maintenance

5.5 Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

5.6 Remedial Maintenance

5.7 Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

5.8 Note: The operations contained within this section specific to the maintenance of landscaping, shall be read in conjunction with any development landscape maintenance plan(s).

6. Pipes

- 6.1 Sewer Pipes form the basis of the drainage strategy, also for attenuation purposes, they will hold additional flows in the pipework and manhole chambers when flood exceedance occurs.
- 6.2 See Table regarding Pipes, it provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Table 3- Operation and Maintenance requirements for Pipes

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
	Maintain vegetation to designed limits, within the vicinity of below ground drainage pipes and tanks to avoid damage to system	Annually or as required
	Remove sediment from pre-treatment structures and/or internal fore bays	Annually or as required
Remedial Actions	Repair physical damage if necessary	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 the pipe runs for sediment build up and remove if necessary	Every 5 years or as required

- 6.3 The pipes are installed at gradients which provide self-cleansing, therefore no significant maintenance is required.
- 6.4 Blockages should be removed if they occur.
- 6.5 Manholes/inspection chambers with silt traps should be inspected 6 monthly and emptied of any silt as required.
- 6.6 Back inlet gullies and rainwater pipes should be inspected 6 monthly and any blockages or silting up removed.

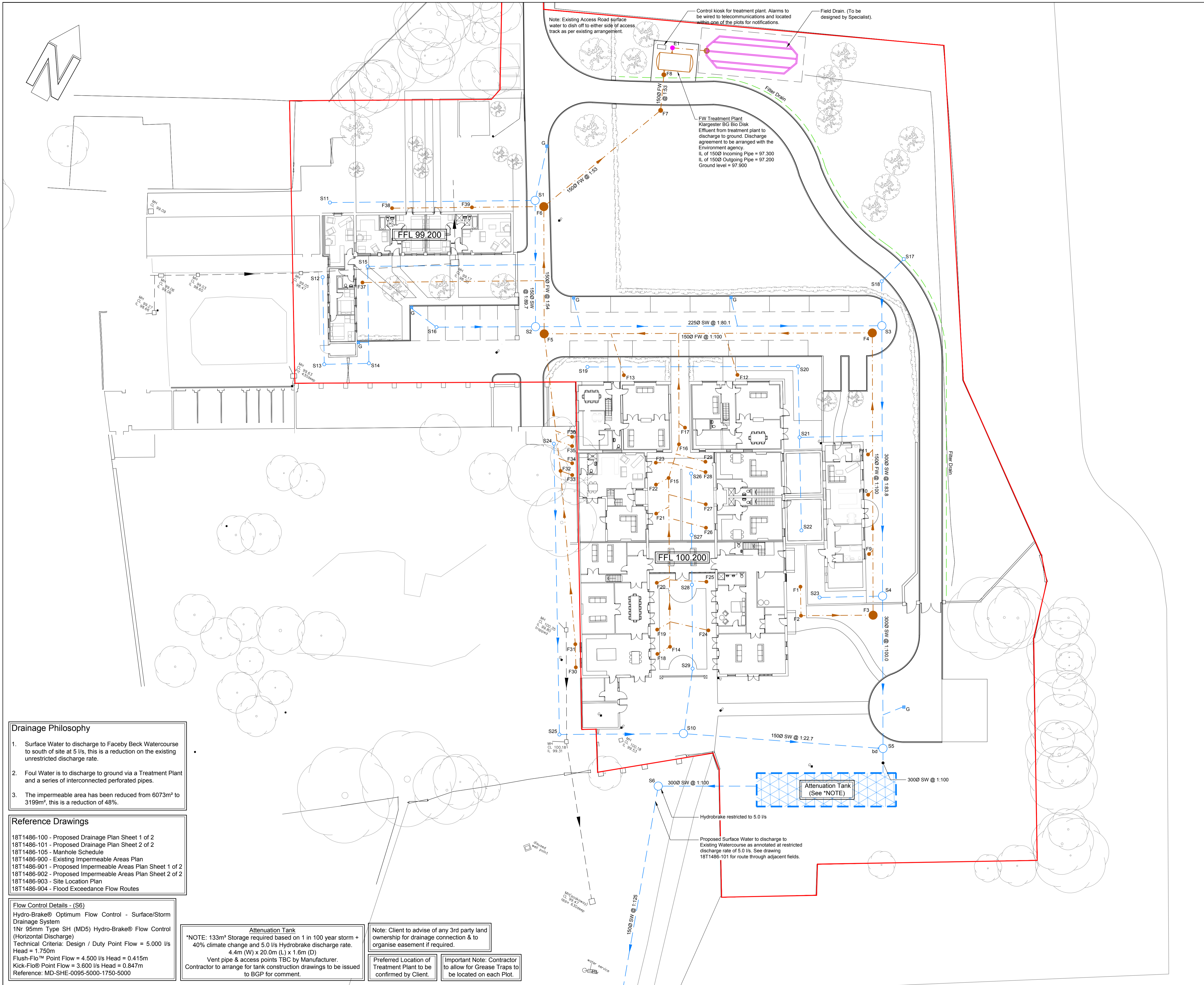
7. Attenuation Tank

- 7.1 The Attenuation Tank is to be located to the southern portion of the site with maintenance access from the access track. The Attenuation Tank is to be managed and maintained by a private maintenance company.
- 7.2 The primary function of the Attenuation is to provide storage through the site during times of severe flood events up to and including 100 year + 40% climate change event.

Table 2- Operation and Maintenance requirements for Crates/Tanks

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
	Catch pits either side of tanks to be regularly inspected and cleared of any silt build up.	Annually
	Remove sediment from pre-treatment structures and/or internal fore bays via jetting or similar approved method.	Annually or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, catch pit chambers and vents.	As Required
Monitoring	Inspect check/ all inlets, outlets, vents and catchpit to ensure that they are in good condition and operating as designed	Annually
	Survey inside of the tank from catchpit chamber for sediment build up and remove via jetting if necessary	Every 5 years or as required

- 7.3 Regular inspection and maintenance is required to ensure the effective long term operation of below ground storage systems. Maintenance responsibility for the system should be placed with a responsible organisation. Crates/Tanks below provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions are not always required.
- 7.4 Maintenance plans and schedules should be developed during the design phase, and will be specific to the type of tank that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements. CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated or reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.



- Notes**
- All works to be carried out in accordance with:
 - "Sewers for Adoption" The contractor should note the new changes regarding adoption of sewers and construction methods.
 - BS EN 752 "Drain and sewer system outside buildings".
 - All levels shown are in metres and are relative to ordnance datum (m AOD).
 - Invert levels of all existing chambers and connection points are to be confirmed and engineer advised prior to commencement of any Drainage Works.
 - Concrete bed and surround is required to all gully leads and to all pipes in highways/hardstanding where cover to pipe <1200mm
 - All pipes to be either extra strength V.C. to BS 65 or PVC to BS 4660 or BS 5481 'UPONOR ULTRARIB' or concrete pipes Class 120 to BS 5911
 - All RWP & PU locations are indicative and accurate positions should be taken from the Architects drawings.
 - Existing sewer positions are indicative and are not to be used in conjunction with design. Contractor to confirm location.
 - All RWP connections to proposed manholes to be 100Ø. All Surface water sewers between manholes to be 150Ø unless noted otherwise.
 - All FW drains to be 100Ø UNO.
 - Contractor is responsible for positioning of MHs so they do not sit between two surface materials.

S.H.E.
Do not excavate until all underground services have been identified and marked out. Refer to service providers drawings and to the utilities survey drawings. Unknown underground services may exist. Check for services by carrying out a scan with a cable avoidance tool.

Legend

Proposed SW Sewer	---
Proposed FW Sewer	---
Proposed Filter Drain	---
Perforated Effluent Drain	---
Existing Drainage	---
Site Boundary	---
Highway Gully	G
Rainwater Pipe	RWP
Rodding Eye	RE
Backdrop Manhole	bd
Linear Drain with Outlet Unit	---

Issued for Planning	JJH	P2	SR	02/08/2019
Issued for Information	ZW	P1	SR	20/11/2018
AMENDMENT	BY	REV	CHK	DATE

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Proposed Drainage Plan
Sheet 1 of 2**

Drawn	Z. Waller	Date	14.11.2018
Checked	S. Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

bgp Billingham George & Partners
CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,
Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-100** Rev. **P2**

Drainage Philosophy

- Surface Water to discharge to Faceby Beck Watercourse to south of site at 5 l/s, this is a reduction on the existing unrestricted discharge rate.
- Foul Water is to discharge to ground via a Treatment Plant and a series of interconnected perforated pipes.
- The impermeable area has been reduced from 6073m² to 3199m², this is a reduction of 48%.

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
- 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
- 18T1486-105 - Manhole Schedule
- 18T1486-900 - Existing Impermeable Areas Plan
- 18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
- 18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
- 18T1486-903 - Site Location Plan
- 18T1486-904 - Flood Exceedance Flow Routes

Flow Control Details - (S6)
Hydro-Brake® Optimum Flow Control - Surface/Storm Drainage System
1Nr 95mm Type SH (MD5) Hydro-Brake® Flow Control (Horizontal Discharge)
Technical Criteria: Design / Duty Point Flow = 5.000 l/s Head = 1.750m
Flush-Flo™ Point Flow = 4.500 l/s Head = 0.415m
Kick-Flo® Point Flow = 3.600 l/s Head = 0.847m
Reference: MD-SHE-0095-5000-1750-5000

Attenuation Tank
*NOTE: 133m³ Storage required based on 1 in 100 year storm + 40% climate change and 5.0 l/s Hydrobrake discharge rate.
4.4m (W) x 20.0m (L) x 1.6m (D)
Vent pipe & access points TBC by Manufacturer.
Contractor to arrange for tank construction drawings to be issued to BGP for comment.

Note: Client to advise of any 3rd party land ownership for drainage connection & to organise easement if required.

Preferred Location of Treatment Plant to be confirmed by Client.

Important Note: Contractor to allow for Grease Traps to be located on each Plot.

Note: Existing Access Road surface water to dish off to either side of access track as per existing arrangement.

FW Treatment Plant Klargestor BG Bio Disk Effluent from treatment plant to discharge to ground. Discharge agreement to be arranged with the Environment agency.
IL of 150Ø Incoming Pipe = 97.300
IL of 150Ø Outgoing Pipe = 97.200
Ground level = 97.900

Proposed Surface Water to discharge to Existing Watercourse as annotated at restricted discharge rate of 5.0 l/s. See drawing 18T1486-101 for route through adjacent fields.

Hydrobrake restricted to 5.0 l/s

DO NOT SCALE

Notes

- All works to be carried out in accordance with:
 - "Sewers for Adoption" The contractor should note the new changes regarding adoption of sewers and construction methods.
 - BS EN 752 "Drain and sewer system outside buildings".
- All levels shown are in metres and are relative to ordnance datum (m AOD).
- Invert levels of all existing chambers and connection points are to be confirmed and engineer advised prior to commencement of any Drainage Works.
- Concrete bed and surround is required to all gully leads and to all pipes in highways/hardstanding where cover to pipe <1200mm
- All pipes to be either extra strength V.C. to BS 65 or PVC to BS 4660 or BS 5481 'UPONOR ULTRARIB' or concrete pipes Class 120 to BS 5911
- All RWP & PU locations are indicative and accurate positions should be taken from the Architects drawings.
- Existing sewer positions are indicative and are not to be used in conjunction with design. Contractor to confirm location.
- All RWP connections to proposed manholes to be 100Ø. All Surface water sewers between manholes to be 150Ø unless noted otherwise.
- All FW drains to be 100Ø UNO.
- Contractor is responsible for positioning of MHs so they do not sit between two surface materials.

S.H.E.

Do not excavate until all underground services have been identified and marked out. Refer to service providers drawings and to the utilities survey drawings. Unknown underground services may exist. Check for services by carrying out a scan with a cable avoidance tool.

Legend

- Proposed SW Sewer ---
- Proposed FW Sewer ---
- Proposed Filter Drain ---
- Perforated Effluent Drain ---
- Existing Drainage ---
- Site Boundary ---
- Highway Gully G
- Rainwater Pipe RWP
- Rodding Eye RE
- Backdrop Manhole bd
- Linear Drain with Outlet Unit ---

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Proposed Drainage Plan
Sheet 2 of 2**

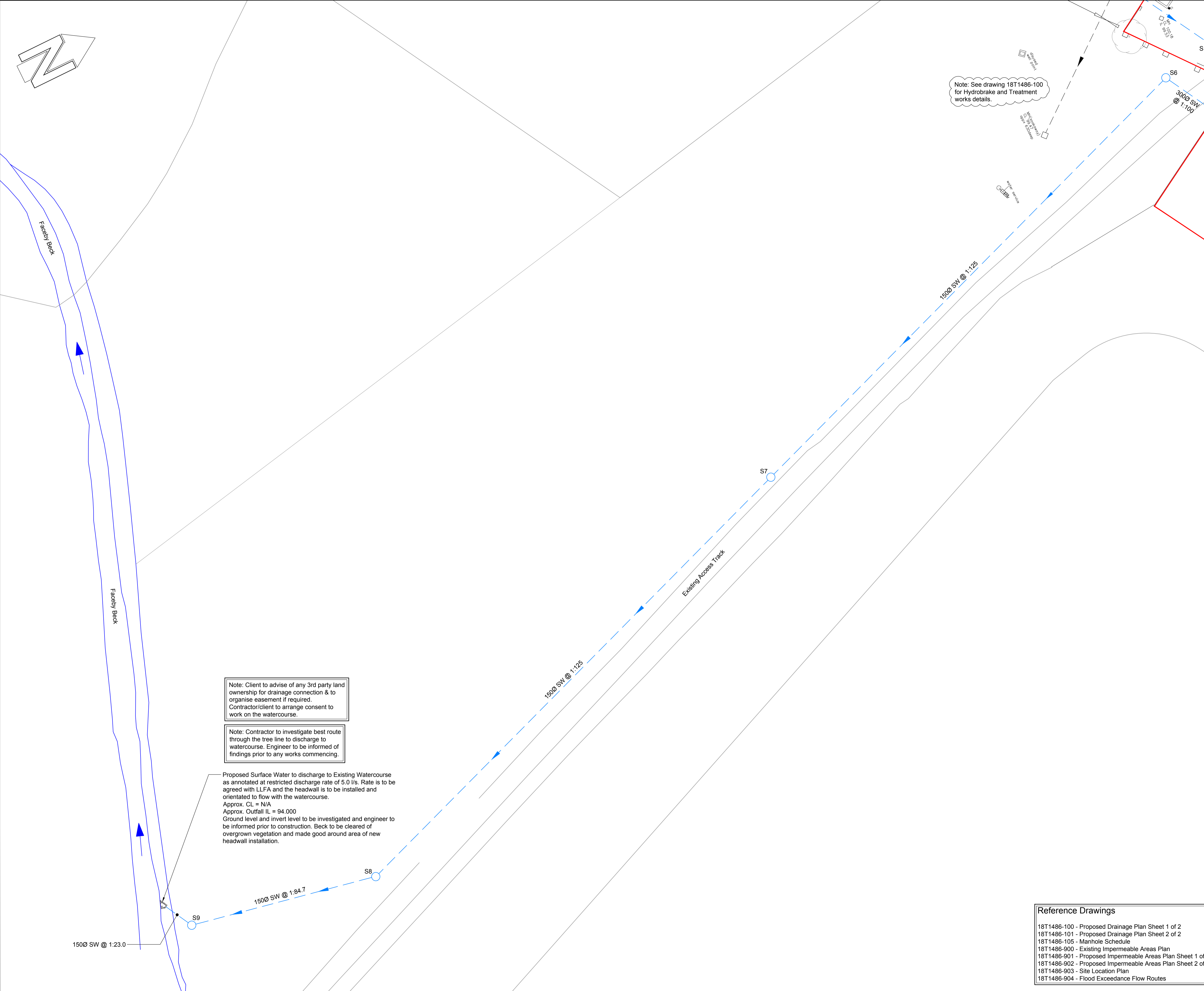
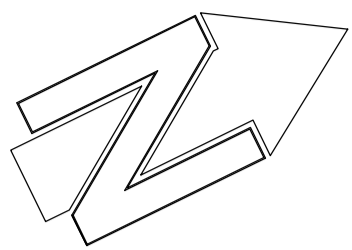
Drawn	J. Herbert	Date	August 2019
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Drg. No. **18T1486-101** Rev. **P1**

Note: See drawing 18T1486-100 for Hydrobrake and Treatment works details.



Note: Client to advise of any 3rd party land ownership for drainage connection & to organise easement if required. Contractor/client to arrange consent to work on the watercourse.

Note: Contractor to investigate best route through the tree line to discharge to watercourse. Engineer to be informed of findings prior to any works commencing.

Proposed Surface Water to discharge to Existing Watercourse as annotated at restricted discharge rate of 5.0 l/s. Rate is to be agreed with LLFA and the headwall is to be installed and orientated to flow with the watercourse.
Approx. CL = N/A
Approx. Outfall IL = 94.000
Ground level and invert level to be investigated and engineer to be informed prior to construction. Beck to be cleared of overgrown vegetation and made good around area of new headwall installation.

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
- 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
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- 18T1486-900 - Existing Impermeable Areas Plan
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- 18T1486-903 - Site Location Plan
- 18T1486-904 - Flood Exceedance Flow Routes

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
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- 18T1486-904 - Flood Exceedance Flow Routes

1. Cover levels are approximate only and may vary on site. Covers to suit finished levels.
2. Contractor is responsible for positioning MHs so they do not compromise line or level of kerbing or other delineation at the juncture of two surface materials.
3. PPIC manhole diameters may vary and are dependant on manufactures specification and diameter of incoming / outgoing pipes.
4. Concrete manhole diameters are dependant on nominal internal diameter of largest pipe in manhole. See Table A on Typical Manhole Details drawing.

PROPOSED FOUL WATER DRAINAGE						
REF.	COVER LEVEL*	INVERT LEVEL	TYPE	DIA	COVER TYPE	COMMENTS
F1	100.050	99.350	PPIC	450	B125	
F2	100.050	99.245	PPIC	450	B125	
F3	100.050	99.075	PPIC	450	B125	
F4	100.000	98.670	Conc	1200	D400	
F5	99.900	98.200	Conc	1200	D400	
F6	98.900	97.860	Conc	1200	D400	
F7	98.100	97.445	PPIC	450	B125	
F8	97.900	97.350	PPIC	450	B125	
F9	100.050	99.350	PPIC	450	B125	
F10	100.050	99.350	PPIC	450	B125	
F11	100.050	99.350	PPIC	450	B125	
F12	100.050	99.350	PPIC	450	B125	
F13	100.050	99.350	PPIC	450	B125	
F14	100.050	99.300	PPIC	450	B125	
F15	100.050	98.995	PPIC	450	B125	
F16	100.050	98.930	PPIC	450	B125	
F17	100.050	99.350	PPIC	450	B125	
F18	100.050	99.350	PPIC	450	B125	
F19	100.050	99.350	PPIC	450	B125	
F20	100.050	99.350	PPIC	450	B125	
F21	100.050	99.350	PPIC	450	B125	
F22	100.050	99.350	PPIC	450	B125	
F23	100.050	99.350	PPIC	450	B125	
F24	100.050	99.350	PPIC	450	B125	
F25	100.050	99.350	PPIC	450	B125	
F26	100.050	99.350	PPIC	450	B125	
F27	100.050	99.350	PPIC	450	B125	
F28	100.050	99.350	PPIC	450	B125	
F29	100.050	99.350	PPIC	450	B125	
F30	100.050	99.350	PPIC	450	B125	
F31	100.050	99.265	PPIC	450	B125	
F32	100.050	98.950	PPIC	450	B125	
F33	100.050	99.350	PPIC	450	B125	
F34	100.050	99.350	PPIC	450	B125	
F35	100.050	99.350	PPIC	450	B125	
F36	100.050	99.350	PPIC	450	B125	
F37	99.050	98.350	PPIC	450	B125	
F38	99.050	98.350	PPIC	450	B125	
F39	99.050	98.180	PPIC	450	B125	

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3. PPIC manhole diameters may vary and are dependant on manufactures specification and diameter of incoming / outgoing pipes.
4. Concrete manhole diameters are dependant on nominal internal diameter of largest pipe in manhole. See Table A on Typical Manhole Details drawing.

PROPOSED SURFACE WATER DRAINAGE						
REF.	COVER LEVEL*	INVERT LEVEL	TYPE	DIA	COVER TYPE	COMMENTS
S1	98.900	97.778	Conc	1200	D400	
S2	99.900	97.501	Conc	1200	D400	
S3	100.000	96.805	Conc	1200	D400	
S4	100.000	96.342	Conc	1200	D400	
S5	100.250	96.123	Conc	1200	B125	Backdrop = 97.353
S6	100.000	95.796	Conc	2100	D400	Hydrobrake @ 5 l/s
S7	98.120	95.156	Conc	1200	D400	
S8	96.864	94.516	Conc	1200	D400	
S9	94.855	94.196	PPIC	450	D400	
S10	100.000	98.650	Conc	1200	B125	
S11	99.050	98.450	PPIC	450	B125	
S12	99.050	98.450	PPIC	450	B125	
S13	99.050	98.290	PPIC	450	B125	
S14	99.050	98.210	PPIC	450	B125	
S15	99.050	98.035	PPIC	450	B125	
S16	99.500	98.800	PPIC	450	B125	
S17	98.250	97.250	PPIC	450	B125	Silt Trap
S18	98.250	97.150	PPIC	450	B125	
S19	100.050	99.450	PPIC	450	B125	
S20	100.050	98.950	PPIC	450	B125	
S21	100.050	98.825	PPIC	450	B125	
S22	100.050	99.450	PPIC	450	B125	
S23	100.050	99.450	PPIC	450	B125	
S24	100.050	99.450	PPIC	450	B125	
S25	100.050	98.930	PPIC	450	B125	
S26	100.050	99.450	PPIC	450	B125	
S27	100.050	99.285	PPIC	450	B125	
S28	100.050	99.200	PPIC	450	B125	
S29	100.050	99.055	PPIC	450	B125	

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4. Concrete manhole diameters are dependant on nominal internal diameter of largest pipe in manhole. See Table A on Typical Manhole Details drawing.

PROPOSED EFFLUENT WATER DRAINAGE						
REF.	COVER LEVEL*	INVERT LEVEL	TYPE	DIA	COVER TYPE	COMMENTS
E1	97.900	97.150	PPIC	600	B125	Hinged Lockable Lid

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Client
Jomast

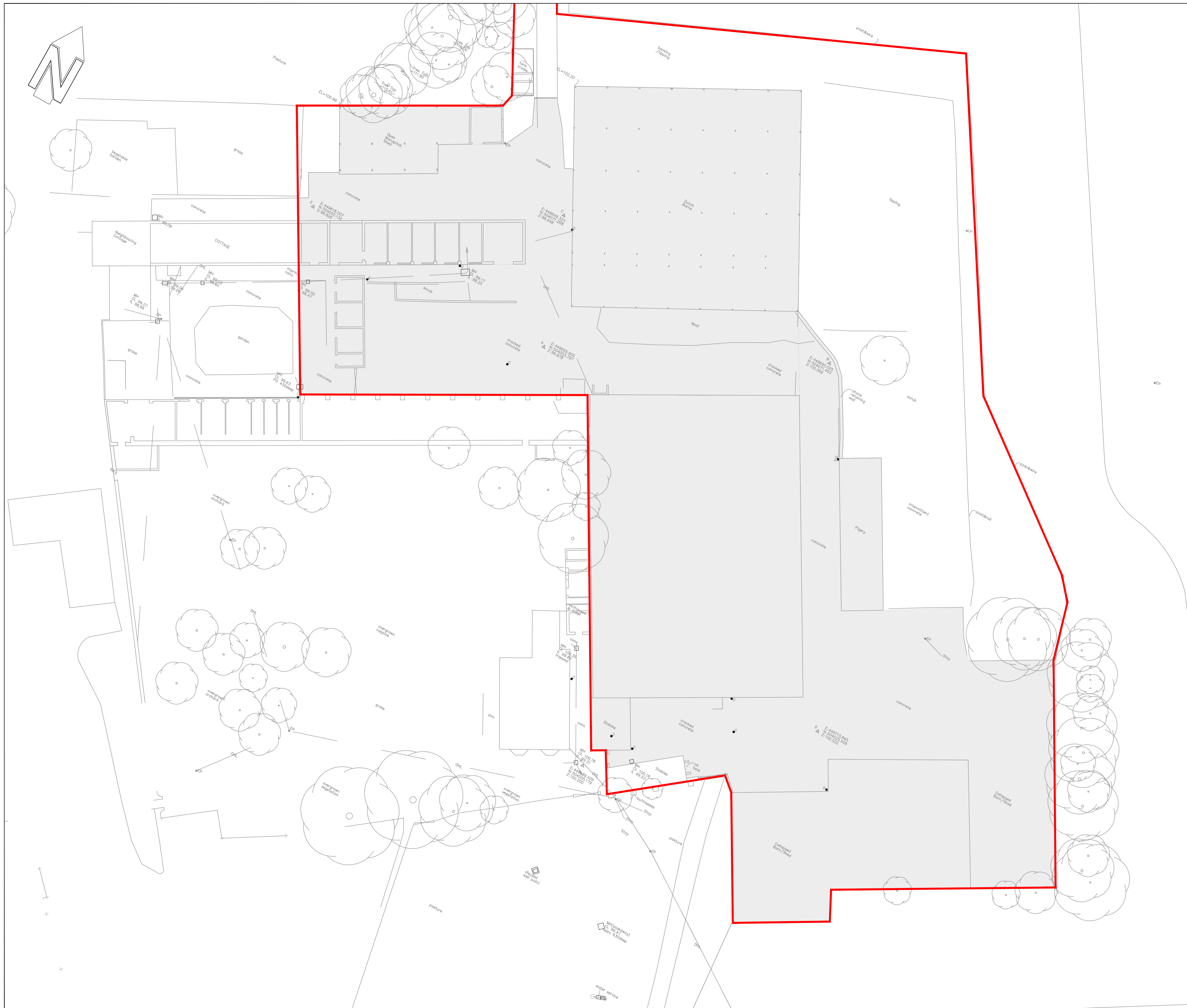
Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
Manhole Schedule

Drawn	J. Herbert	Date	August 2019
Checked	S. Ramshaw	Date	August 2019
Scale	1:200	Original Size	A1



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CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,
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DO NOT SCALE

Key

- Existing Impermeable Area = 6073m² (0.607ha)
Hence (0.607 x 2.78 x 50mm/hr) = 83.4 l/s.
- Site Boundary Line

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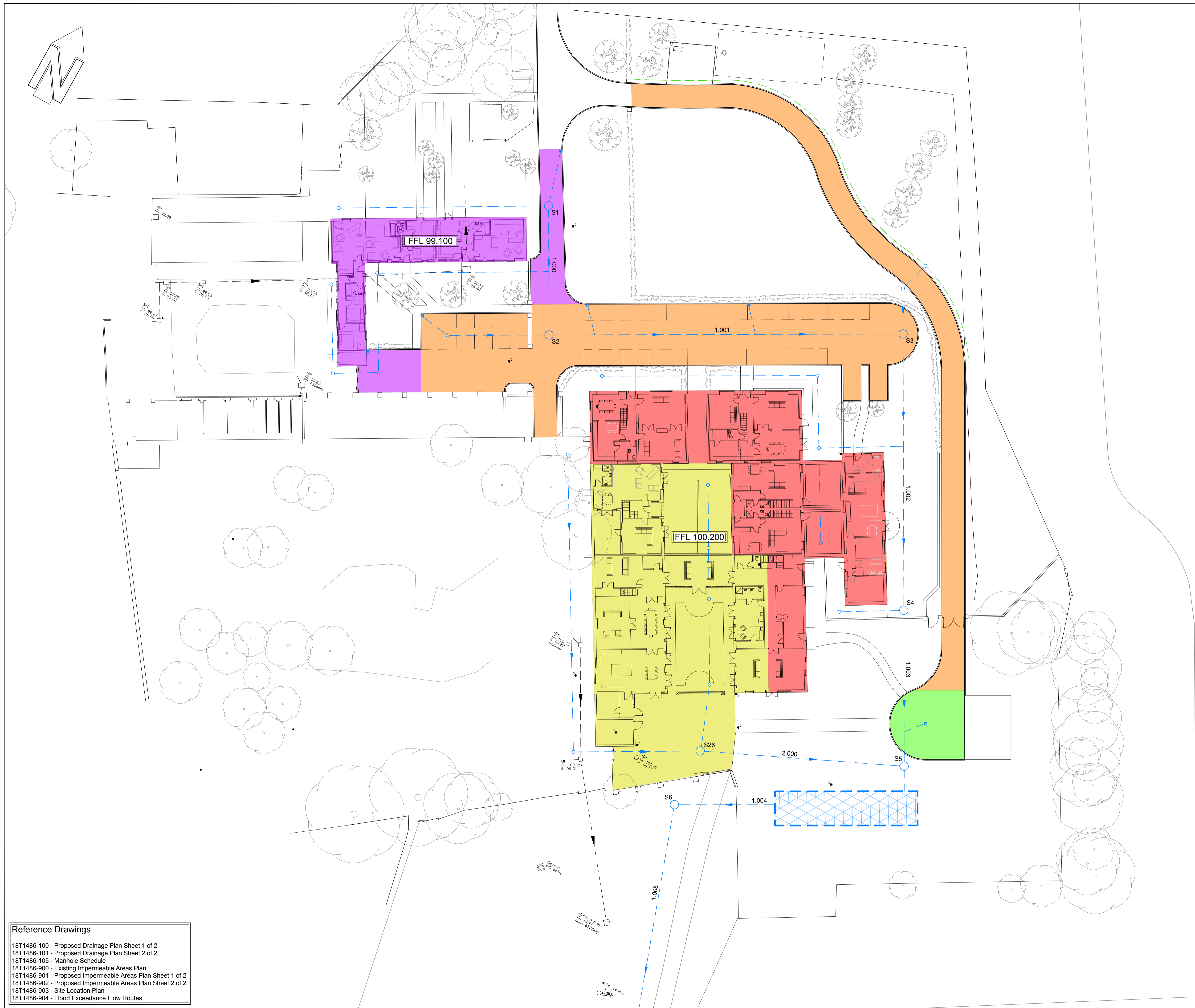
Client
Jomast

Project
**Faceby Lodge Farm
conversion of existing buildings**

Drawing Title
Existing Impermeable Areas Plan

Drawn	Z.Waller	Date	14.11.2018
Checked	S.Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

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CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court.



DO NOT SCALE

Legend:

	Pipe 1.000 Area = 365m ² = (0.0365ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.001 Area = 1048m ² = (0.1048ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.002 Area = 740m ² = (0.0740ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.003 Area = 92m ² = (0.0092ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.004 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.005 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.006 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.007 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 2.000 Area = 954m ² = (0.0954ha) Fall = 0.0m / Length = 00.000m

Total Impermeable Area = 3199m²

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AMENDMENT	BY	REV	CHK	DATE

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Impermeable Areas Plan
Sheet 1 of 2**

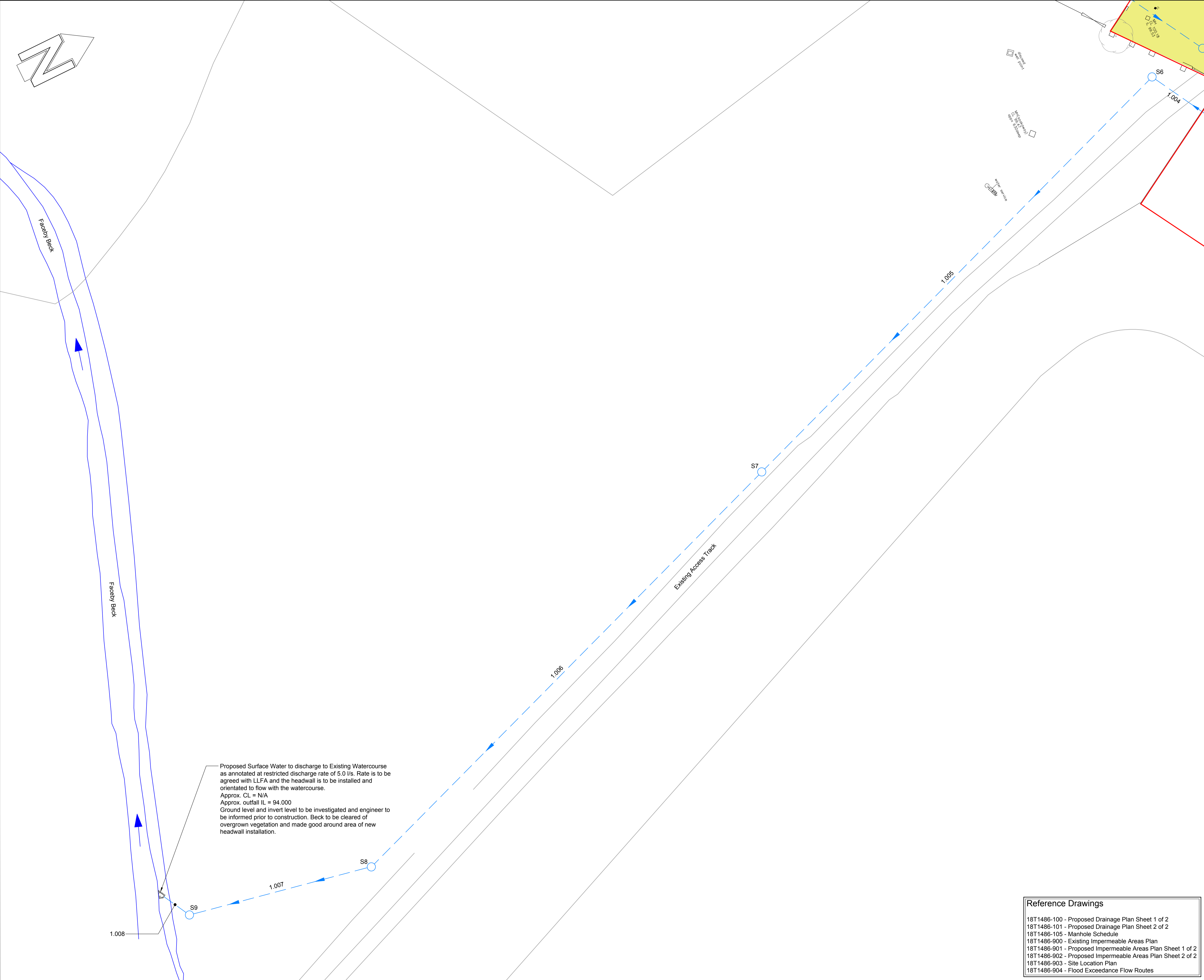
Drawn	Z. Waller	Date	14.11.2018
Checked	S. Ramshaw	Date	14.11.2018
Scale	1:250	Original Size	A1

Billinghurst George & Partners
CIVIL & STRUCTURAL ENGINEERS
BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court,

Drg. No. **18T1486-901** Rev. **P2**

Reference Drawings

18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
18T1486-105 - Manhole Schedule
18T1486-900 - Existing Impermeable Areas Plan
18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
18T1486-903 - Site Location Plan
18T1486-904 - Flood Exceedance Flow Routes



Proposed Surface Water to discharge to Existing Watercourse as annotated at restricted discharge rate of 5.0 l/s. Rate is to be agreed with LLFA and the headwall is to be installed and orientated to flow with the watercourse.
 Approx. CL = N/A
 Approx. outfall IL = 94.000
 Ground level and invert level to be investigated and engineer to be informed prior to construction. Beck to be cleared of overgrown vegetation and made good around area of new headwall installation.

DO NOT SCALE

Legend:

	Pipe 1.000 Area = 365m ² = (0.0365ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.001 Area = 1048m ² = (0.1048ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.002 Area = 740m ² = (0.0740ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.003 Area = 92m ² = (0.0092ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.004 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.005 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.006 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 1.007 Area = 0m ² = (0.0ha) Fall = 0.0m / Length = 00.000m
	Pipe 2.000 Area = 954m ² = (0.0954ha) Fall = 0.0m / Length = 00.000m

Total Impermeable Area = 3199m²

Issued for Planning	JJH	P1	SR	02/08/2019
AMENDMENT	BY	REV	CHK	DATE

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Client
Jomast

Project
**Faceby Lodge Farm
Conversion of Existing Buildings**

Drawing Title
**Impermeable Areas Plan
Sheet 2 of 2**

Drawn	J. Herbert	Date	August 2019
Checked	S. Ramshaw	Date	August 2019
Scale	1:250	Original Size	A1

Reference Drawings

18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
18T1486-105 - Manhole Schedule
18T1486-900 - Existing Impermeable Areas Plan
18T1486-901 - Proposed Impermeable Areas Plan Sheet 1 of 2
18T1486-902 - Proposed Impermeable Areas Plan Sheet 2 of 2
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18T1486-904 - Flood Exceedance Flow Routes

Billinghurst George & Partners
 CIVIL & STRUCTURAL ENGINEERS
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 Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-902** Rev. **P1**



Issued for Planning	JJH	P1	SR	02/08/2019
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AMENDMENT	BY	REV	CHK	DATE
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DO NOT SCALE

Client Jomast

Title Faceby Lodge Farm
Conversion of Existing Buildings
Site Location Plan

Drawn: J. Herbert


Date: August 2019

Original Size A3

Checked: S. Ramshaw

Date: August 2019

Scale: 1:5000

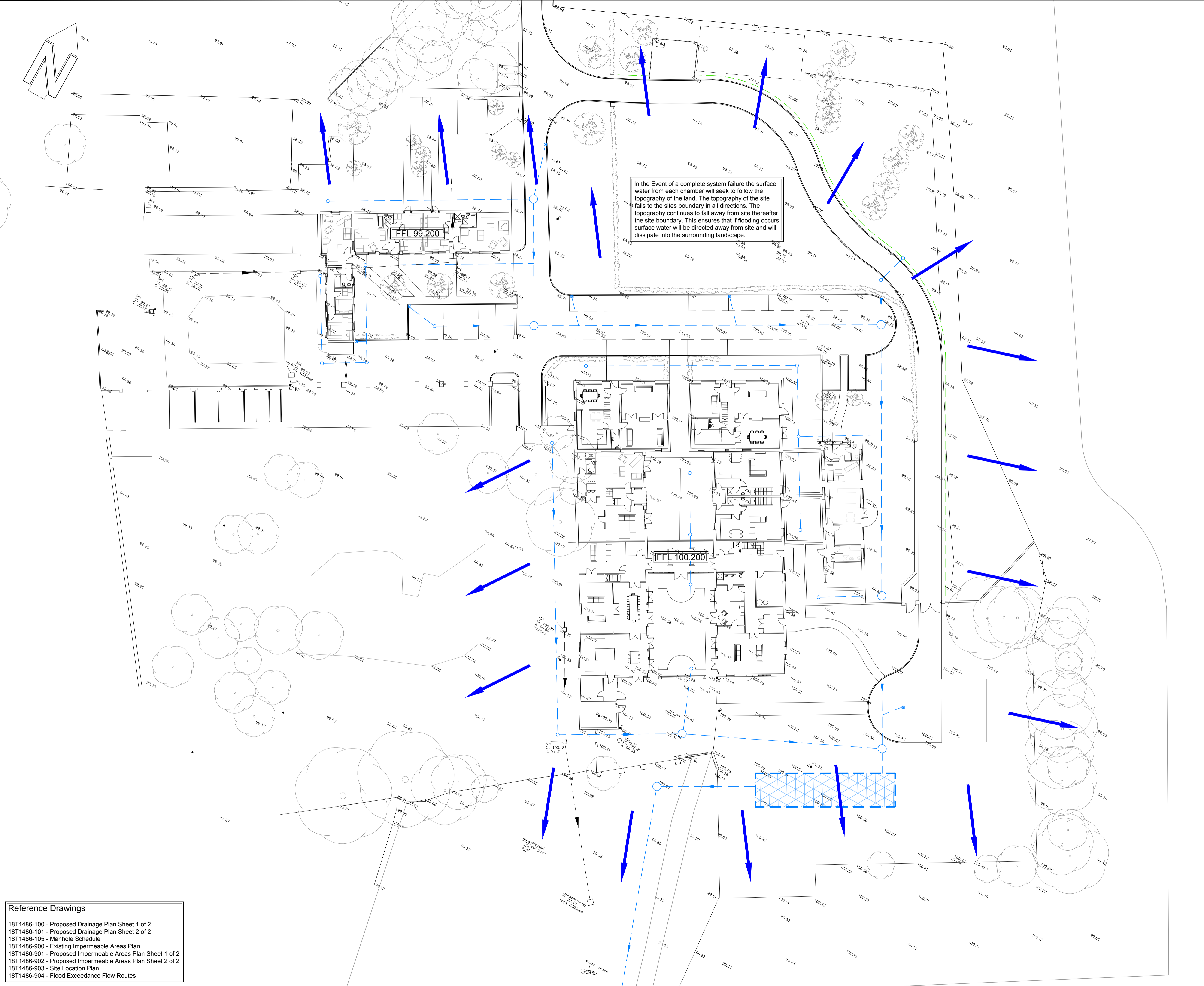


Billingham George & Partners
Civil & Structural Engineers & Building Surveyors
1st Floor, Wellington House, Wellington Court
Stockton-on-Tees, TS18 3TA

Drg. No. **18T1486-903** Rev. **P1**

Legend

Flood Exceedance Flow Path
(Complete System Failure)



In the Event of a complete system failure the surface water from each chamber will seek to follow the topography of the land. The topography of the site falls to the sites boundary in all directions. The topography continues to fall away from site thereafter the site boundary. This ensures that if flooding occurs surface water will be directed away from site and will dissipate into the surrounding landscape.

Reference Drawings

- 18T1486-100 - Proposed Drainage Plan Sheet 1 of 2
- 18T1486-101 - Proposed Drainage Plan Sheet 2 of 2
- 18T1486-105 - Manhole Schedule
- 18T1486-900 - Existing Impermeable Areas Plan
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Issued for Planning	JJH	P1	SR	02/08/2019
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Client
Jomast

Project
Faceby Lodge Farm
Conversion of Existing Buildings

Drawing Title
Flood Exceedance Flow Routes

Drawn J. Herbert Date August 2019

Checked S. Ramshaw Date August 2019

Scale 1:250 Original Size A1

Billingham George & Partners
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BUILDING SURVEYORS
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