Flood Risk Assessment & Drainage Strategy

Title	Land South of A617
Client	ROMO Holdings Ltd
Location	Rainworth, NG21 0JY
Project number	18-0494
BIM reference	RAIN-BSP-ZZ-XX-RP-C-0001-P04_FRA_DS
Date	16th March 2021

Authorisation Sheet & Revisions Record

Project Number:	18-0494
Project Title:	Land South of A617
Client:	ROMO Holdings Ltd
Location:	Rainworth, NG21 0JY
Document Reference:	CLBR-BSP-ZZ-XX-RP-C-0001-P04_FRA_DS
Office Address:	BSP Consulting, 5 Pride Point Drive, Derby, DE24 8BX
Telephone No:	0115 704 3300

Rev:	Issue Date:	Description:	Prepared:	Checked:	Authorised:
P01	18/12/20	Initial Issue	BJS	MV	MA
P02	20/01/21	Updated to include FPCR latest development framework plan	BJS	MV	MA
P03	04/03/21	Report title amended	BJS	CN	MA
P04	16/03/21	Updated FCPR drawing and site location	BJS	CN	MA

BJS	Ben Seamer MEng, BEng (Hons)	b.seamer@bsp-consulting.co.uk Graduate Civil Engineer
CN	Craig Noonan BSc (Hons)	m.viggars@bsp-consulting.co.uk Principal Civil Engineer
MA	Monika Anszperger MEng CEng MIStructE	m.ansperger@bsp-consulting.co.uk Associate

Contents

Executive Summary

Introduction	BSP Consulting has been commissioned by ROMO Holdings Ltd to undertake a Flood Risk Assessment and Drainage Strategy for the development of Land South of A617, Rainworth. This Flood Risk Assessment has been prepared in accordance with the Technical Guidance to the National Planning Policy Framework. This report is written in support of an outline planning application for the site.
Development Description and Planning Context	The proposals are for the construction of up to 95 dwellings and associated infrastructure.
Existing Site Conditions	The site is currently a greenfield site with mostly vegetation. There is an existing wetland within the east of the site as well as Rainworth Water which runs south to east towards the east of the site. An existing dismantled railway runs through the site parallel with the south western boundary which is to be retained. The site slopes west at a maximum existing level of approximately 101.560mAOD to east at a minimum level of 87.16mAOD.
Definition of Flood Hazard	Rainworth Water and adjacent wetland runs through the east of the site from south to north. Fluvial flooding and ground water flooding are not considered as significant risks to the site. Surface water flooding is the primary concern on the development site.
Probability (Rivers/fluvial)	The EA Risk of Flooding from Rivers and Sea mapping indicates that the proposed site has a less than 0.1% (1:1000 year) probability of flood event occurring due to flooding from any local watercourses. An area to the east of the site is at 0.1%-1% chance of flooding due to the existing wetland.
Climate Change	The implications of climate change of up to 40% are to be considered in the assessment of surface water drainage, with the mitigation measures being determined accordingly. The site lies entirely in Flood Zone 1 so fluvial climate change effects have not been considered.
Development Proposals	In accordance with NPPF, the residential use in Flood Zone 1 falls under the **more vulnerable** category in terms of flood risk. The proposed development site is located mostly in Flood Zone 1.

Flood Risk Management Measures	The site is at some risk surface water flooding. Floor levels should therefore be set a minimum 600mm above the equivalent 1:100yr+40% CC flood plain levels of the existing wetland. Finished floor levels should also be set 150mm above external surrounding areas to mitigate problems caused by localised surface water ponding.
Off Site Impacts	The proposed development drainage will discharge via soakaways or discharge will be limited to greenfield rates of 4.75l/s/ha. Attenuation via open suds features would appear to be viable and is to be accommodated within a future detailed scheme layout. The Rainworth Heath SSSI is located approximately 0.1km downstream of the site. The inclusion of SuDS features and flow controls within the proposed drainage strategy will ensure that water is treated and discharged at a controlled rate such that there are no adverse effects to Rainworth Heath SSSI. The proposed development will therefore not increase or exacerbate any flooding problems adjacent to or downstream of the site.
Residual Risks	The investigations carried out as part of this flood risk assessment and flood risk management measures proposed have demonstrated that the development will be safe, without increasing flood risk elsewhere.
Recommendations	The following recommendations are made to ensure flood risk at this site is minimised: • The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100 year plus climate change storm event of + 40% on site without flooding any buildings. • Floor levels should be set a minimum 600mm above the 1% flood plain levels of 88.310mAOD. i.e a minimum floor level of 88.910mAOD. • The floor levels should however be set a minimum of 150mm above the surrounding external levels in line with general good practice to mitigate any potential adverse effects as a result localised surface water ponding. • Site topography favours a surface gravity sewage layout. The discharge options are as follows: - Discharge via soakaways subject to ground investigations. -Discharge to Rainworth Water. Open water storage to be provided. Discharge rates are to be restricted by flow control(s). Total discharge rate should be limited to greenfield rates of 4.75l/s/ha. • A new foul connection is proposed to the public combined sewer running south to north through the east of the site.

1.0 Introduction

1.1 Terms of Reference

1.1.1 BSP Consulting has been commissioned by ROMO Holdings Ltd to undertake a Flood Risk Assessment and Drainage Strategy for the development of Land South of A617, Rainworth. This Flood Risk Assessment has been prepared in accordance with the Technical Guidance to the National Planning Policy Framework.

1.1.2 This Flood Risk Assessment has been prepared in accordance with the Department for Communities and Local Government (DCLG) Planning Practice Guidance website section on 'Flood Risk and Coastal Change' and the Site-Specific Flood Risk Assessment Checklist.

1.1.3 This report is written in support of an outline planning application for the site.

1.1.4 This report has been produced on behalf of the client, ROMO Holdings Ltd, and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of BSP Consulting. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

1.2 National Planning Policy Framework

1.2.1 The National Planning Policy Framework (NPPF) was published on 27 March 2012, with the latest update published in February 2019. This replaces Planning Policy Statement 25: Development and Flood Risk.

1.2.2 Planning Practice Guidance to the NPPF regarding Flood Risk and Coastal Change has been published and this site-specific FRA is written in compliance with this guidance.

1.2.3 The NPPF, and supporting technical guidance, can be downloaded free of charge from the internet at the following link:

http://www.communities.gov.uk/publications/planningandbuilding/nppf

1.3 Legislation/Guidance Background

1.3.1 In line with the Building Regulations Part H and Ciria SuDS Manual C753 the site should follow the "Hierarchy of SuDS". This states that the primary means of drainage for any development site should be to the ground (via infiltration). Where this not feasible discharge should be made to a nearby watercourse, only if both of these options are not possible should discharge to sewerage systems be made.

1.3.2 The drainage systems themselves should be designed to enable adoption by an appropriate authority or recognised body to ensure ongoing maintenance is provided.

1.3.3 New Ofwat codes for adoptable sewers came into force in England from April 2020 replacing all versions of Sewer for Adoption. This new guidance *"Design and Construction Guidance for foul and surface water sewers"* (DCG) is for use by developers when planning, designing and constructing foul and surface water drainage systems intended for adoption by English water and sewage companies under a section 104 agreement. It differs from the outgoing Sewers for Adoption guidance as compliance will be mandatory.

1.3.4 The adoption code is significant as it provides the mechanism by which water companies can secure the adoption of a wide range of SuDS components that are compliant with the document. It is noteworthy that the water companies are yet to publish their addendum documents to set out what criteria will be used to determine what constitutes "compliant". It is, however, widely expected that this will make strong reference to C753, see section 1.3.1 above.

1.3.5 The new code states that the layout of the whole development including the drainage layout should be considered at the earliest stages of the design as it is fundamental to the performance and affordability of the drainage system as well as the wider urban design including the character of the development, amenity, biodiversity, connectivity and use of the site.

1.3.6 Other key points in relation to the design and construction of new surface water drainage systems include:

- The location of adoptable drainage components should take account of the need to provide appropriate access to each component for maintenance.
- Health and safety risks should be assessed and managed in accordance with Ciria C753 SUDS manual and a copy of the principle designers risk assessment submitted to the water company.
- Provided there is provision for the flows to reach a particular feature, surface SuDS features designed to take 1 in 100 year rainfall event plus climate change will normally be adoptable.

2.0 Background Information

2.1 Site Details

2.1.1 Figure 2.1 below indicates the location of the site; a more detailed site plan is located in **Appendix A**. A range of sources have been used to assess the local topography, local watercourses and current site use.

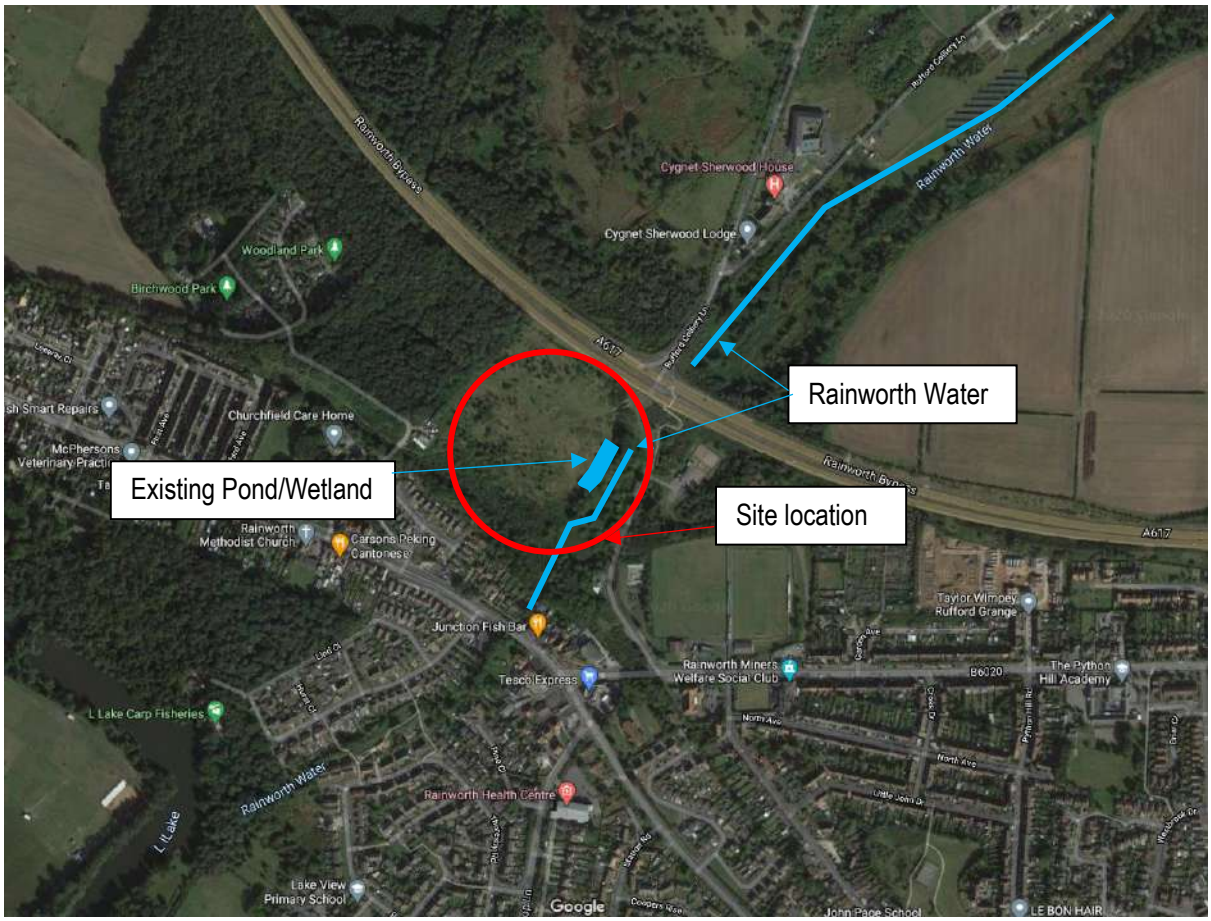


Figure 2.1 Land South of A617, Rainworth - Site Location Plan

2.1.2 The proposed development site boundary is indicated by the red outline, occupying approximately 6.6ha. It is located to the south of A617 centred at approximately OSNGR 459050 E, 358650 N.

2.1.3 The site is currently a greenfield site with mostly vegetation. There is an existing wetland within the east of the site as well as Rainworth Water which runs south to east towards the east of the site. An existing dismantled railway runs at an elevated level through the site parallel with the south western boundary and is to be retained The site is bounded by A617 Rainworth bypass towards the northeast; Hedge and vegetation towards north west; Rufford Colliery Way and vegetation towards the east and gardens to existing lots towards the south of the site.

2.1.4 A survey was carried out to assess the topography of the site and is included in **Appendix B.** The site slopes west at a maximum existing level of approximately 101.560mAOD to east at a minimum level of 87.16mAOD.

Table 2.1: Overall Catchment Context and Local Watercourse Classifications

Classification	Name	Description
Main Rivers	N/A	There are no main rivers in close located in close proximity to the site.
Ordinary Watercourses	Rainworth Water	Rainworth Water runs enters the site along the south west boundary and approximately runs south to north.
	Unknown	There is an existing pond/wetland located towards the east of the site.
Canals	N/A	There are no live Canals located in close proximity to the site.
Riparian Watercourses	N/A	There are no riparian watercourses located in close proximity to the site

2.1.5 The approximate locations of the above watercourses are indicated on Figure 2.1 above.

2.2 Approach to the Assessment

2.2.1 Publicly available online Environmental agency (EA) flood mapping has been used to assess flood levels for the site and local area. Correspondence with the Lead Local Flood Authority (LLFA) is also referred to in the report.

2.2.2 This study has been supplemented by additional information from Severn Trent Water (STW), information contained on the British Geological Society (BGS) website and site Investigation works by GeoDyne.

2.2.3 This assessment seeks to draw together the relevant level information from the EA and to collate this with the findings of our investigations and discussions to assess the flood risk at this site.

3.0 Flood Risk Assessment

3.1 Development Description and Planning Context

3.1.1 The proposals are for the construction of up to 95 dwellings and associated infrastructure

3.1.2 A proposed site concept layout is included as **Appendix A.**

3.1.3 In accordance with NPPF, the residential use falls under the **more vulnerable** category in terms of flood risk.

3.2 Definition of Flood Hazard

The potential sources of flooding in the vicinity of the site are as detailed below:

Fluvial Flood Risk

3.2.1 The site is not located in close proximity to any main rivers or live canals. Rainworth Water runs along the western boundary of the site.

Figure 3.1 Land South of A617, Rainworth – Fluvial Flood Mapping

3.2.2 Figure 3.1 shows the site majority of the site is located in Flood Zone 1 with less than 0.1% chance of flooding from fluvial sources. There is an area of the site considered as being at 0.1%-1% chance of flooding from existing wetland.

3.2.3 As the majority of the proposed development site is located entirely in Flood Zone 1 and the proposed residential development is not proposed within the area considered as being in Flood zone 2, it does not require sequential or exceptions testing.

3.2.4 The flood risk associated with the existing wetland and Rainworth Water is considered further in the surface water flood risk section. Hence, the site is not considered as being at significant risk of fluvial flooding.

Tidal Flood Risk

3.2.5 The site is not located in close proximity to any tidal rivers or seas. The lowest point of the site is approximately 87.16mAOD and is therefore not at risk of flooding from tidal sources.

Surface Water Flood Risk

Figure 3.2 Land South of A617, Rainworth – Surface Water Flood Mapping

3.2.6 Figure 3.2 above shows that majority of the site is at very low risk of surface water flooding. An area towards the eastern part of the site has a low to high (0.1%-3.33%) probability of flooding due to surface water. Surface water flooding, delivered by the wetland adjacent to Rainworth Water, is therefore considered as the primary concern flooding to the site.

3.2.7 The natural topography of the site also suggests that the east of the site may be at risk of pluvial flooding.

Flood Risk from Ground Water

3.2.8 The British Geological Survey's Geology of Britain mapping indicates that the site is situated upon bedrock geology of Chester Formation consisting of Sandstone, Pebbly Sedimentary rock. No Superficial Deposits.

3.2.9 The bedrock is classed as a Principal aquifer on DEFRA mapping.

3.2.10 Any risk associated with this source is likely to be influenced by the local watercourses. If groundwater flooding was to occur, this would likely be due to heavy rainfall and standing water and any resulting groundwater flooding would occur in conjunction with surface water flooding.

3.2.11 Subject to Phase I & II ground investigations, ground water flooding can be discounted as a considerable source of flood risk to the site.

Flood Risk from Sewers and Infrastructure

3.2.12 The Environmental Agency mapping confirms that the site does not lie in an area that is at risk of flooding from reservoirs.

3.2.13 The site is not within close proximity of any wet process industrial works.

3.2.14 An existing 750Ømm combined sewer runs approximately south to north through the east of the site. STW developer enquiry response indicates foul flows from the proposed site can be accommodated in this 750Ømm sewer and hence is not considered as a significant risk of flooding to the site. See **Appendix D** for sewer location and STW developer enquiry response. It is sat within the lower area of the site and should any flooding occur this would not impact the development areas.

3.2.15 STWL have been consulted regarding the development proposals and have not raised any concerns regarding any potential for flooding or drainage capacity issues. A copy of the STWL Development Enquiry and other correspondence are included in **Appendix D**.

3.2.16 The sewers and infrastructure flood risk source can therefore be discounted as a significant source of flood risk to the site.

3.3 Probability of Flood Risk

3.3.1 Publicly available flood mapping indicates that the majority of the site is at less than 0.1% probability of flooding due to fluvial and surface water sources. An area to the east of the site is at 0.1%-3.33% chance of flooding due to surface water flooding. This map shows the indicative extent of the natural floodplain, if there were no flood defences or certain other manmade structures, such as surface water sewers, and channel improvements.

3.4 Climate Change

3.4.1 Climate change is recognised as a factor for consideration in terms of its effects on flood risk. However, the site is within flood zone 1 so climate change factors do not need to be considered in terms of fluvial flooding.

3.4.2 The implications of climate change should be taken into account in relation to surface water drainage. Peak rainfall intensity for longer lifetime residential developments is estimated to increase between 20% and 40% as a result of climate change. In this instance the site is in close proximity to Rainworth Water and has a 0.1% - 3.33% probability of flooding due to surface water. Therefore, it is recommended that the Upper End allowance of 40% is applied to design rainfall intensity to allow for the potential implications of climate change. This is in line with the LLFA planning request.

3.5 Detailed Development Proposals

3.5.1 The proposed development and vulnerability classification are discussed in **section 3.1** above and the proposed site is included within **Appendix A.**

3.5.2 In accordance with the NPPF, the proposed residential use falls under the more vulnerable category in terms of flood risk. The proposed development site is located mostly in Flood Zone 1.

4.0 Flood Risk Management

4.1 Fluvial and Surface Water Flood Risk Mitigation - Finished Floor Levels

4.1.1 As outlined in **section 3.2**, the site is at risk of surface water flooding towards the east of the site. These flood levels have been sketched onto the existing site topography as shown in **Appendix E**. Assessing the topography alongside the EA flood mapping, it is evident that the flood modelling shown in **section 3.2** is not necessarily a true representation of flood levels. The dismantled railway is at an elevated bank level running parallel with the southwestern boundary and is to be retained as part of the development proposals.. The flood mapping currently shows the railway towards the south of the site to be within the 1 in 30-year flood plain. However, since the railway is at an elevated level of 99.13mAOD compared to Rainworth Water top of bank level of 89.36mAOD approximately 15m to the southeast of the railway bank, the flood mapping is considered incorrect in this area.

4.1.2 The elevated railway is not reflective of the natural landscaping of the site. Assessing the ground levels further, the first location along the east of the site considered as representative of the natural landscape is approximately the mid point of the eastern boundary of the site. The 1% flood level at this location is approximately 88.310mAOD as noted on the drawing presented in **Appendix E**

4.1.3 Due to the uncertainty of flood levels and the consideration for climate change, floor levels should therefore be set a minimum 600mm above the equivalent 1% flood plain levels of 88.310. i.e., a **minimum FFL of 88.910mAOD.**

4.1.4 Where practicable, floor levels should also be set a minimum 150mm above surrounding external levels to minimise the risk of surface water flooding due to localised ponding. Where possible, levels should also be set as to create gradients which fall away from housing plots.

4.2 Surface Water Drainage

Sustainable Drainage Systems

4.2.1 Part H of the Building Regulations 2010 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable.
b) a watercourse, or, where that is not reasonably practicable.
c) a sewer.

4.2.2 It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

Discharge via Infiltration Based Systems

4.2.3 Ground investigations have not yet been undertaken for the site. In line with the hierarchy of SuDS the option to discharge via soakaways should be explored first subject to ground conditions.

4.2.4 Regional mapping suggests soakaways may be viable, refer to section 3.2.8, however the presence of the wetland to the east of the site would appear to contradict this slightly.

4.2.5 Should infiltration drainage prove viable it must provide the main means of draining the development, features such as infiltrating swales, plot soakaways and a highway infiltration basin should be considered. It is noted that these features will require no further space beyond those proposed in the non-infiltrating scenario, as such the worst case, non-infiltrating scenario, has been considered through-out the remainder oof the report.

Discharge via Open Watercourses

4.2.6 Should the option to discharge via soakaways be found to not be practicable, Rainworth water to the east of the site provides a suitable watercourse to discharge to. This is in line with LLFA planning request included in **Appendix C**.

4.2.7 The proposed drainage design should aim to limit the new surface water discharge rate to Qbar, as set out in the NCC LLFA planning response. See **Appendix C.**

4.2.8 In the case where surface water is to discharge to Rainworth Water, surface water attenuation is to be provided open water storage. The attenuation is to be coupled with flow control(s) to limit the total surface water discharge into the watercourse to QBar greenfield rates as requested by the LLFA. The proposed drainage layout outline showing approximate attenuation to outfall locations to the brook is included in **Appendix E**. LLFA correspondence confirming the allowable discharge rate is included in **Appendix C**.

4.2.9 Preliminary surface water attenuation calculations have been made based on the following figures:

- Total site area of 6.6ha. Qbar for total site= 31.49l/s. This (see **Appendix F** for calculations)
- A total of approximately 4.4ha is determined as developable land.
- 60% of the developable land is assumed impermeable.
- Approximate total impermeable catchment area for the site of 2.64ha.

4.2.10 The total discharge rate cannot exceed 31.49/s, equating to approximately 4.75l/s/ha. However formal discharge is to be based upon the developed area only, discounting any open space. Based upon a 60% impermeable rate of the developable land at a rate of 4.75l/s/ha, the total design site discharge is expected to be 12.6/s.

4.2.11 It is noted that the QBar figure derived in calculations is as a result of a manual edit of the soil parameters in the greenfield run-off calculator. The un-adjusted calculator results suggest a very low QBar figure, in line with regional mapping. However for the purposes of testing the masterplan it has been taken that the site is not suitable for infiltration.

4.2.12 Quick storage estimates have been carried out to assess the attenuation requirements and discharge rates. The storage requirements are summarised as follows:

Total Catchment Area	2.64ha
Discharge Rate	12.6 l/s
Storage Required	1711-2300m³

Table 4.1 Attenuation Requirements

4.2.13 A copy of the quick storage estimate results is included in **Appendix G.**

4.2.14 Attenuation is to be provided through a combination of a pond and swales across the site. Indicative locations for these storage features are shown in **Appendix E.**

4.2.15 Following the introduction of the DCG in Oct 2019 the SUDS pond design can now be presented to STWL for consideration of adoption such that they own and maintain it along side their transitional piped system.

Discharge via Sewers

4.2.16 STWL developer enquiry response indicated public sewers are present through the site. A copy of the developer enquiry is included in **Appendix D**.

4.2.17 However, due to the site topography and close proximity to Rainworth Water (allowing for discharge into an existing watercourse), it is not currently proposed to discharge surface water into public sewers.

4.3 Design Consideration of Exceedance

4.3.1 The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100 year plus climate change storm event of + 40% on site without flooding any buildings. The depth of the flood water should be considered in detailed design to ensure that they do not pose a hazard on site.

4.3.2 In the event of a failure of the existing drainage system, flood flow routes through the proposed development should be included at the detailed design stage. This will require consideration of the proposed finished floor and external levels, such that potential flood waters can flow away from the site with the local topography without entering the proposed or existing buildings.

4.4 Residual Risks & Off-Site Impacts

4.4.1 The proposed development drainage discharge will be limited to Qbar greenfield rates of 4.75l/s/ha, as discussed in section 4.2.7. Therefore, the proposed development will not increase or exacerbate any flooding problems adjacent to or downstream of the site.

4.4.2 The Rainworth Heath SSSI is located approximately 0.1km downstream of the site. The inclusion of SuDS features and flow controls within the proposed drainage strategy discussed previously will ensure that water is treated and discharged at a controlled rate such that there are no adverse effects to Rainworth Heath SSSI.

4.4.3 The investigations carried out as part of this flood risk assessment and flood risk management measures proposed have demonstrated that the development will be safe, without increasing flood risk elsewhere.

4.5 Foul Water Discharge

4.5.1 Local sewers are operated and maintained by STWL. The initial developer enquiry indicates that there is a 750mmØ combined water gravity sewer running through the site south to north and has the capacity to accommodate the foul flows generated by the proposed site. STW sewer records are shown in **Appendix D**.

4.5.2 It is therefore proposed that the sites foul water discharges into the existing 750mmØ public combined sewer subject to STW S106 approval. Correspondence with STW approval for discharge is included in **Appendix D**.

4.5.3 STW have advised that the existing combined water sewers running through the site require a 10m easement across the site.

Recommendations

The following recommendations are made to ensure flood risk at this site is minimised:

- The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100 year plus climate change storm event of + 40% on site without flooding any buildings.
- Floor levels should be set a minimum 600mm above the 1% flood plain levels of 88.310mAOD. i.e a minimum floor level of 88.910mAOD.
- The floor levels should however be set a minimum of 150mm above the surrounding external levels in line with general good practice to mitigate any potential adverse effects as a result localised surface water ponding.
- Site topography favours a surface gravity sewage layout. The discharge options are as follows:

  - Discharge via soakaways subject to ground investigations.

  -Discharge to Rainworth Water. Open water storage to be provided. Discharge rates are to be restricted by flow control(s). Total discharge rate should be limited to greenfield rates of 4.75l/s/ha.

- A new foul connection is proposed to the public combined sewer running south to north through the east of the site.

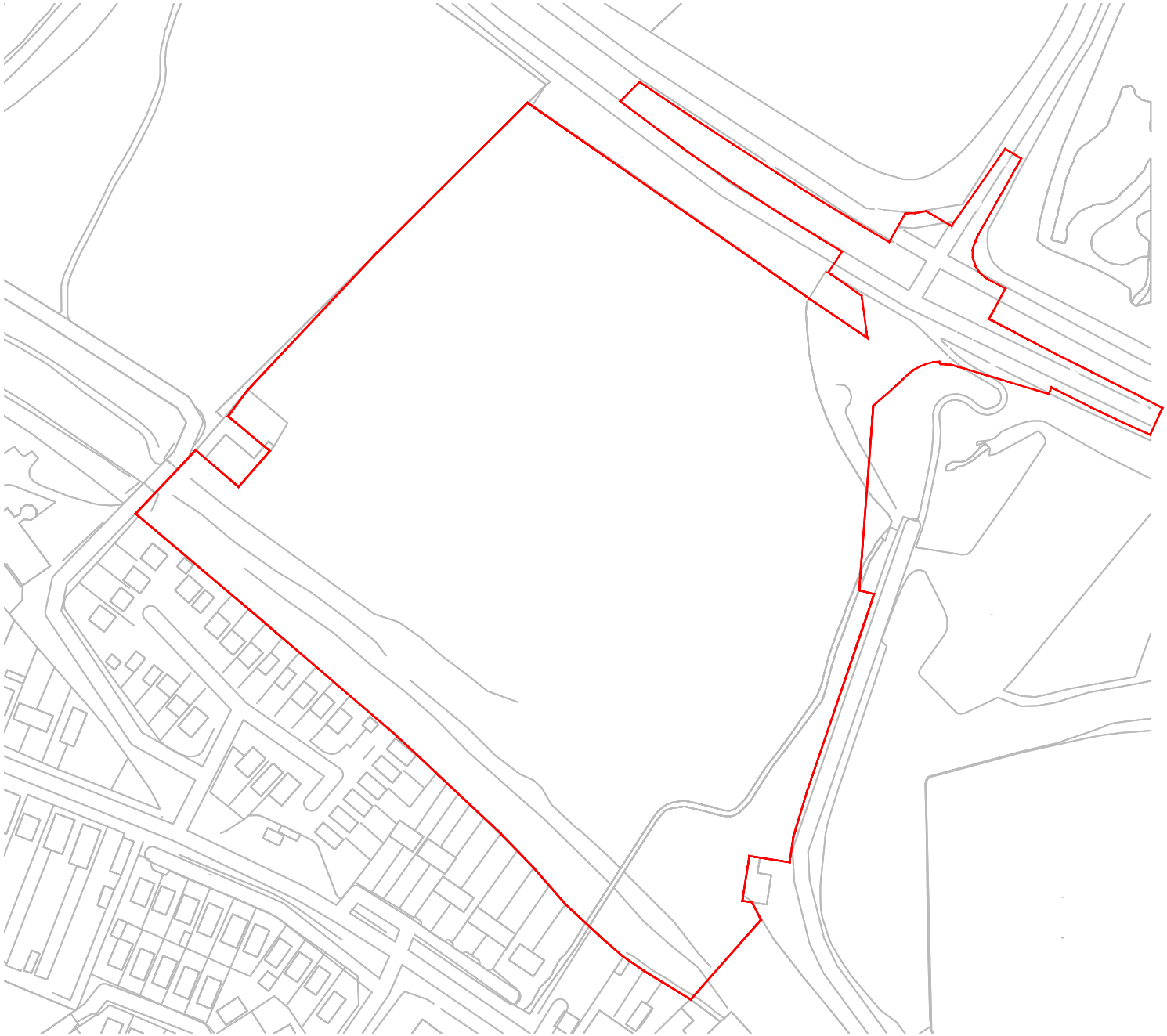
Disclaimer

We would note that all comments made in this report are based on the sources stated in Section 1.1. This report and its recommendations are intended for the use of ROMO Holdings Ltd for the above site only.

Appendix A

FPCR Site location 9474-L-07

FPCR Development Framework 9474-L-02A



NOTES

N

0 50 100 150

rev	date	description	drn	chkd
-	09.03.2021	First issue.		JJ

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture

FPCR Environment and Design Ltd
Lockington Hall
Lockington
Derby DE74 2RH

t: 01509 672772
f: 01509 674565
e: mail@fpcr.co.uk
w: www.fpcr.co.uk

client
Aspbury Planning

project
Land South of A617
Rainworth, Nottinghamshire

drawing title
Site Location
-

scale
1:2,500 @ A4

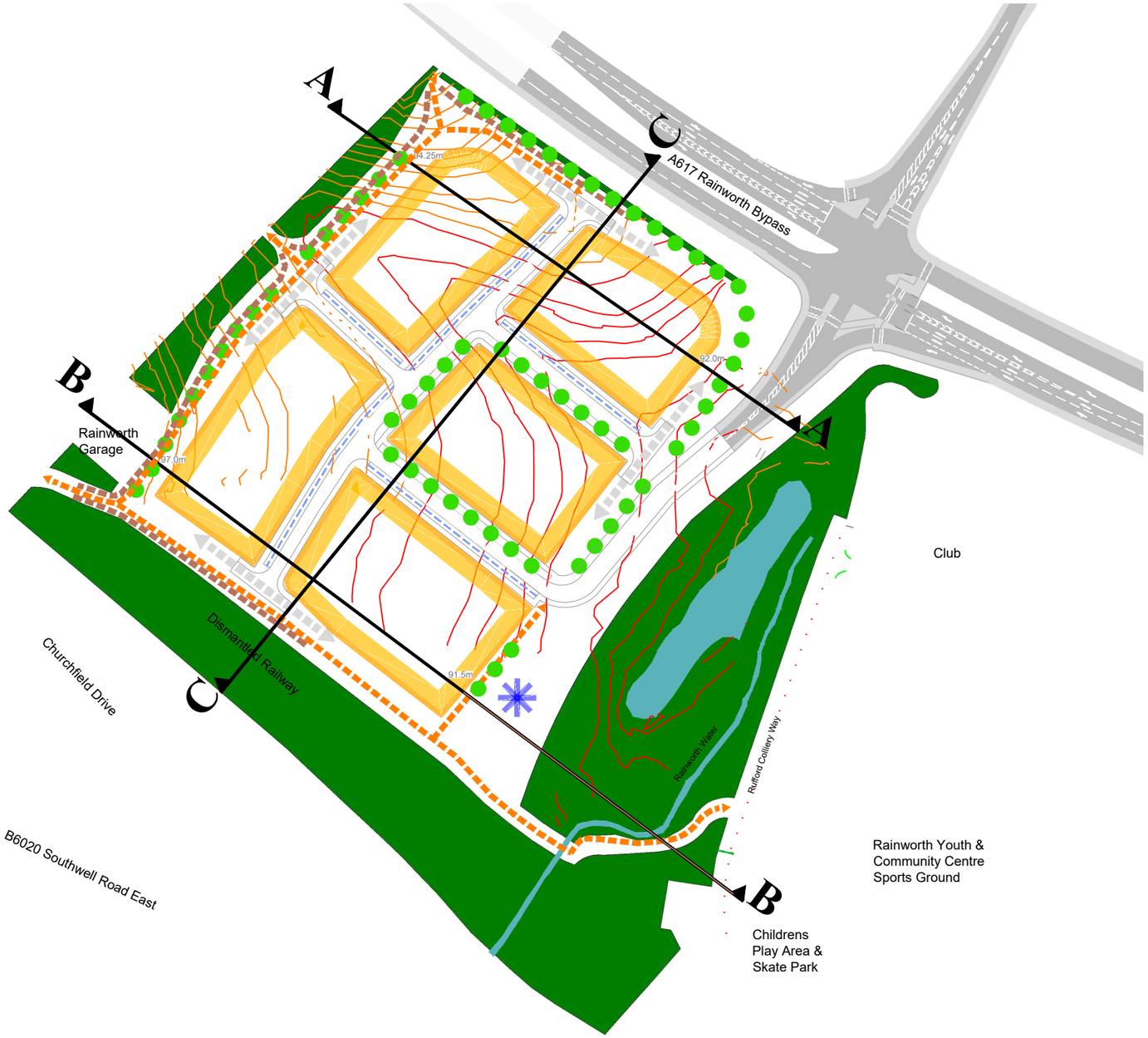
drawn / checked
/ JJ

revision date
9 March 2021

drawing number
9474-L-07

rev
-

CAD file: C:\Users\JJ\Desktop\9474 Rainworth 2021\9474-L-02-03 Development Framework Plan.dwg



NOTES

N

0 50 100 150 200m

- Proposed Residential Development 3Ha (Not more than 95 dwellings at c32dph)
- Proposed Building Frontages Private Rear Gardens
- Proposed main access off Rainworth Bypass
- Indicative Main & Secondary Streets
- Indicative Lanes & Private Driveways
- Potential Footpath Routes
- Potential gabion retaining wall - indicative subject to detail design
- 93.0m — Proposed level -indicative subject to detail design
- Existing Pond & Watercourse
- SUDS attenuation basin - indicative location
- SUDS Dry Swale - indicative location
- Existing Retained Vegetation - Woodland, hedgerow, scrub, marsh & grassland
- Proposed Trees - indicative location
- Green Infrastructure (c3.4Ha)

Includes: natural & semi natural green space, green corridors, amenity green space and SuDs attenuation basin.

- A — Illustrative Cross Sections - refer to FPCR Dwg Ref 9474-L03
- Existing Contours

Aspbury Planning
Land South of A617
Rainworth, Nottinghamshire

DEVELOPMENT FRAMEWORK

1:2,000 @ A3
10 March 2021 / JJ
9474-L-02 rev **C**

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture

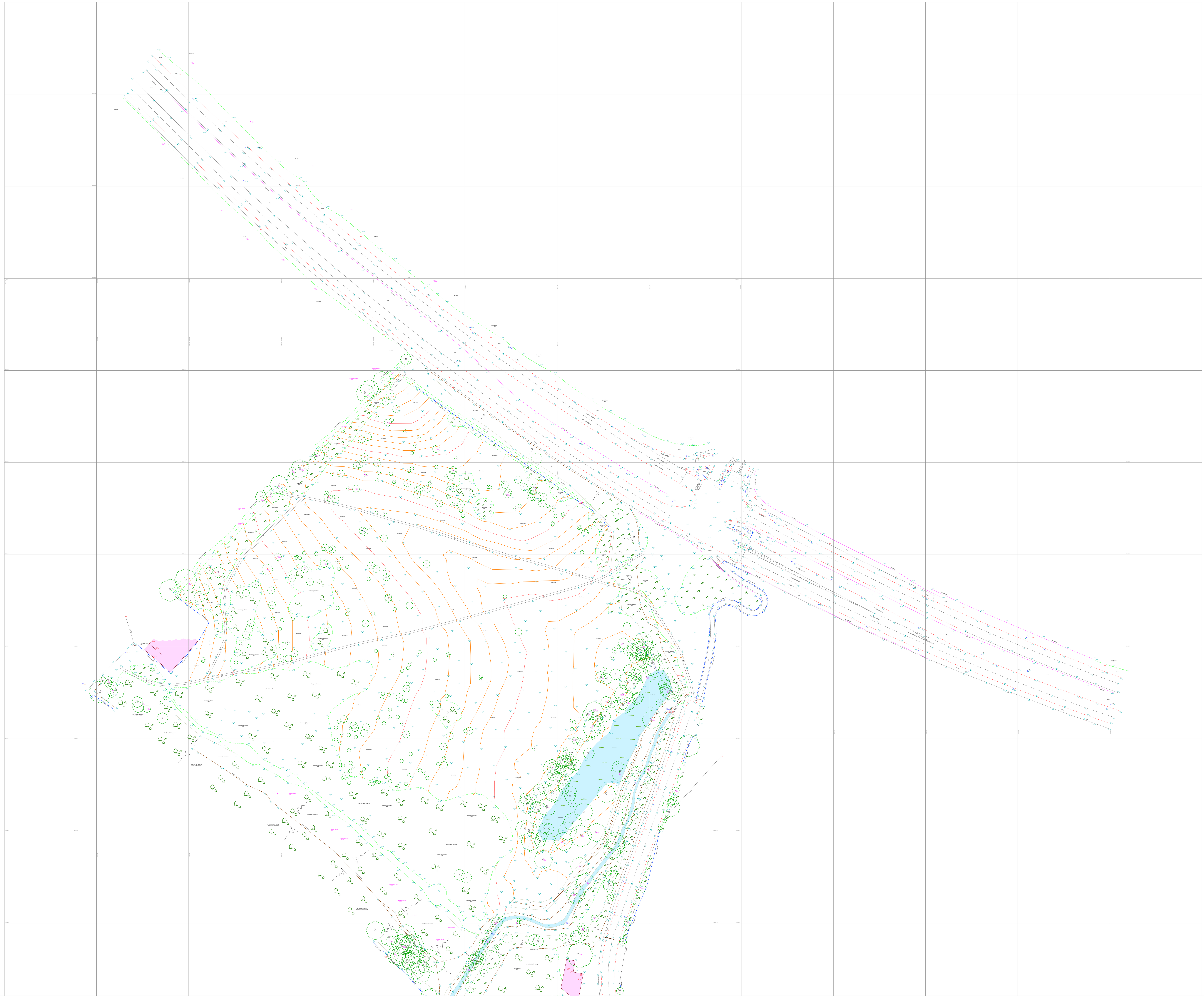
FPCR Environment and Design Ltd
Lockington Hall
Lockington
Derby DE74 2RH

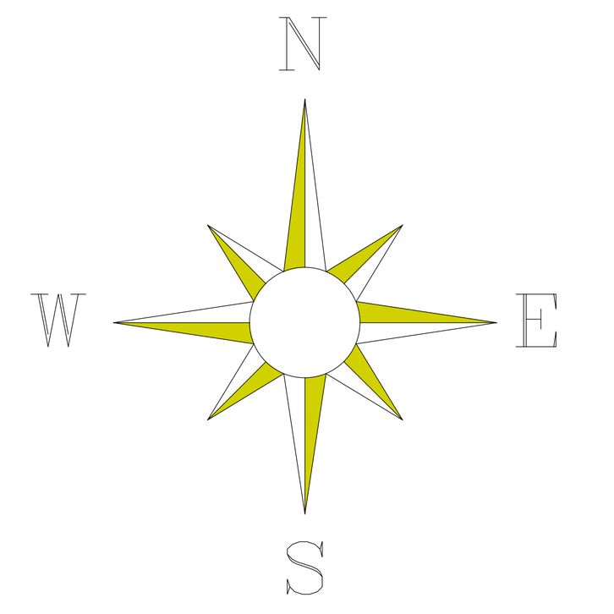
t: 01509 672772
f: 01509 674565
e: mail@fpcr.co.uk
w: www.fpcr.co.uk

CAD file C:\Users\JJ\Desktop\9474 Rainworth 2021\9474-L-02-03 Development Framework Plan.dwg

Appendix B

Mapmatic Topographical Survey 3614_Rev 1A





Key:

FL:	Floor level	Building line	
CL:	Ceiling level	Beam	
SusCL:	Suspended ceiling level	Window	
U/S:	Underside level	Dimension	10.00m
SHL:	Sill height level		
HHL:	Head height level		
SPR:	Spring Point	Ground light	
	Sanitary ware	Door / sliding door	
Heater	Heater / radiator	Inspection cover	

Av	Air valve	G:	Girth circumference	Sv	Stop valve
Bg	Back gully	Gy	Gully	TCB	Telephone call box
BH	Borehole	Ht.	Height	TTL:	Tree top level
BM	Benchmark	IC	Inspection cover	THL	Threshold level
Boll	Bollard	IFL	Internal floor level	TCB	Telephone call box
Bs	Bus stop	IL	Invert level	TL	Traffic light
BT	British Telecom	Lb	Letter box	THL	Threshold level
Bg	Back Gully	Lp	Lamp Post	Tp	Telegraph post
CL	Cover Level	MG	Multigirth	Ts	Traffic signal
CBX	Control box	MH	Manhole	TT	Tactile paving
CPS	Concrete paving slab	Mkr	Marker post	Twl:	Top of wall level
CTV	Cable TV cover	NVP	No visible pipes	UTL	Unable to lift
Elc	Electric cover	PInv	Pipe invert	WL	Water level
Ep	Electricity post	Pb	Post box	Wm	Water meter
Er	Earth rod	Re	Rodding eye	Wo	Wash out
Fh	Fire hydrant	Sp	Sign post		
Fs	Flagstaff	St	Stop tap		

Road
Drop Kerb
Verge Tarmac
Verge Concrete
Verge Grass
Verge
Tops
Bottoms

Ordnance Survey information is provided for a guide only.
OS BUILDING OUTLINE
OS DETAIL

Station	Easting (m)	Northing (m)	Level (m)
M1	458865.920	358646.970	101.161
M2	458892.009	358634.572	99.699
M3	458842.006	358629.941	101.636
M4	459175.285	358621.618	90.024
M5	459153.786	358573.332	90.229
M6	459146.095	358551.676	90.638
M7	459136.056	358522.443	92.099
M8	459130.354	358504.929	93.255

REV	DATE	DESCRIPTION OF WORK	SURVEYOR	CHECKED BY
1	14.05.20	Road Added	MR	AW

MAPMATIC
MEASURED SURVEYS

SETTING OUT M UTILITY SURVEYS M CAMERA SURVEYS M FLOOD RISK ASSESSMENT
AERIAL PHOTOGRAPHY M EARTHWORK CALCULATIONS M MEASURED BUILDING SURVEYS M TOPOGRAPHICAL SURVEYS

Mapmatic, Suite 1, Woburn House, South Street, Vernon Gate, Derby, DE1 1UL
Tel: 01332 650 580 www.mapmatic.com Email: info@mapmatic.com

CLIENT
Romo
Holdings

PROJECT
Land to South of A617
Rainworth
NG21 0BJ

TITLE
Topographical
Survey

Scale	1: 750@A0	Date	05.05.2020
Drawn	MR	Checked	AW
Level datum	GNSS	Grid orientation	GNSS
Job number	3614	Revision	0
Drawing no.	0001	Sheet	8 of 8

Notes:

All critical measurements should be checked on site prior to design. No liability will be taken for this plan if passed onto 3rd parties. Trees and other survey data may be omitted due to dense vegetation. Some services may have been omitted due to parked vehicles and vegetation. Please note the drainage information has been ascertained by visual inspection from the surface and therefore values are estimated.

This survey has been orientated to the Ordnance Survey (OS) national grid via a Global Navigation Satellite System (GNSS) and the OS Active Network (OS NET). A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true OS bearing for angle orientation. No scale factor has been applied to the survey therefore the coordinates shown are arbitrary and not true OS coordinates.
Please refer to the survey station table to enable establishment of the on-site grid.

RICS ICES

Appendix C

LLFA Response

Ben Seamer

From: Ross Marshall <ross.marshall@nottscc.gov.uk>
Sent: 09 April 2020 12:26
To: Ben Seamer
Subject: RE 18-0494 Rainworth

Hi Ben

I've copied below our standard expectations from a surface water design and trust these help.

"Given the proposed scale of the development to satisfy the National Planning Policy Framework (NPPF) further details would need to be submitted to support this application. Paragraph 163 fn.50 of the NPPF requires that applications in Flood Zone 2, 3 and in Flood Zone 1 over 1 hectare should be accompanied by a site-specific flood risk assessment, reviewing the potential flood risks to the development from all sources. An FRA is vital if the local planning authority is to make an informed planning decision.

As LLFA we also require details of the proposed surface water drainage strategy for the development. Paragraph 165 of the NPPF states that major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The LLFA advise that any proposed drainage strategy should be in accordance with CIRIA C753 and current best practice guidance. Any FRA or drainage strategy should include following information:

- *With regards to an acceptable surface water management scheme for the site we would offer the following comments and recommendations;*
    - *Provide evidence of a proven outfall from site in accordance with the drainage hierarchy the follows options should be considered, in order of preference; infiltration, discharge to watercourse, discharge to surface water sewer or discharge to combined sewer.*
    - *Justification should be provided for the use or not of infiltration, including the results of soakaway testing, in accordance with BRE 365.*
    - *The maximum discharge should be set to the QBar Greenfield run-off rate for the positively drained area of development.*
    - *The site drainage system should cater for all rainfall events up to and including the 1 in 100-year event including a 40% allowance for climate change.*
    - *For all exceedance to be contained within the site boundary without flooding any properties in a 1 in 100year+CC storm.*
    - *SuDS systems should be incorporated into the surface water management scheme for the site, preference should be given to above ground SuDS which provide multi-functional benefits.*
    - *Details of who will manage and maintain all drainage features for the lifetime of the development will be required prior to construction.*

This is only a brief outline of the minimum information we would be expecting to see and not an exhaustive list.

Informative

1. *SuDS involve a range of techniques and SuDS methods can be implements on all sites. SuDS are a requirement for all major development as set out within paragraph 165 of the NPPF.*

2. *The LLFA does not consider oversized pipes or box culverts as sustainable drainage. Should infiltration not be feasible at the site, alternative sustainable drainage should be used, with a preference for above ground solutions.*

3. *Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. Sustainable Drainage Systems (SuDS) are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on-site as opposed to traditional drainage approaches which involve piping water off-site as quickly as possible. "*

Ross Marshall
Principal Flood Risk Management Officer
0115 9774473

Appendix D

Severn Trent Water Correspondence

WONDERFUL ON TAP

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

Tel: 02477 716843
www.stwater.co.uk
net.dev.east@severntrent.co.uk

Contact: Belal Ali

Our ref: 8406733

BSP Consulting Ltd
5 Pride Point Drive
Pride Park
Derby
DE2

F.A.O: Ben Seamer

5th May 2020

Dear Sir/Madam,

Proposed Development: (70 mixed dwellings) — Land South of A617, Rainworth – 459040 358665

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

Public Sewers in Site – Required Protection

Records show 750mm combined sewer running through site boundary, this pipe will require 10m protection strip, 5m on each side from the pipe centreline. The 300/375mm combined sewer would require same protective strip as above.

Due to the critical nature of this sewer and close proximity to the watercourse any diversion works would be carried out strictly under STW engineering scheme funded by the developer. We would expect the above protective strip to be accommodated at this early stage to avoid a costly diversion. Note diversion schemes can take 18-20 months deliver.

Due to a change in legislation on 1 October 2011 there may be former private sewers on the site which have transferred to the responsibility of Severn Trent Water Ltd, which are not shown on the statutory sewer records, but are located in your client's land. These sewers would require protective strips of 3 metres either side of the sewer's centreline that we will not allow to be built over. If such sewers are identified to be present on the site, please contact us for further guidance.

Foul Water Drainage

Records show the 750mm combined sewer running within your site boundary is the most suitable connection point for your development. Gravity flows from 70 dwelling can be accommodated in this network. A connection is therefore acceptable subject to a formal S106 submission (see later).

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If these are found to be unsuitable, satisfactory evidence will need to be submitted. The evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter).

In presence of available watercourse no surface shall discharge to the public network.

Subject to the above, Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA / EA.

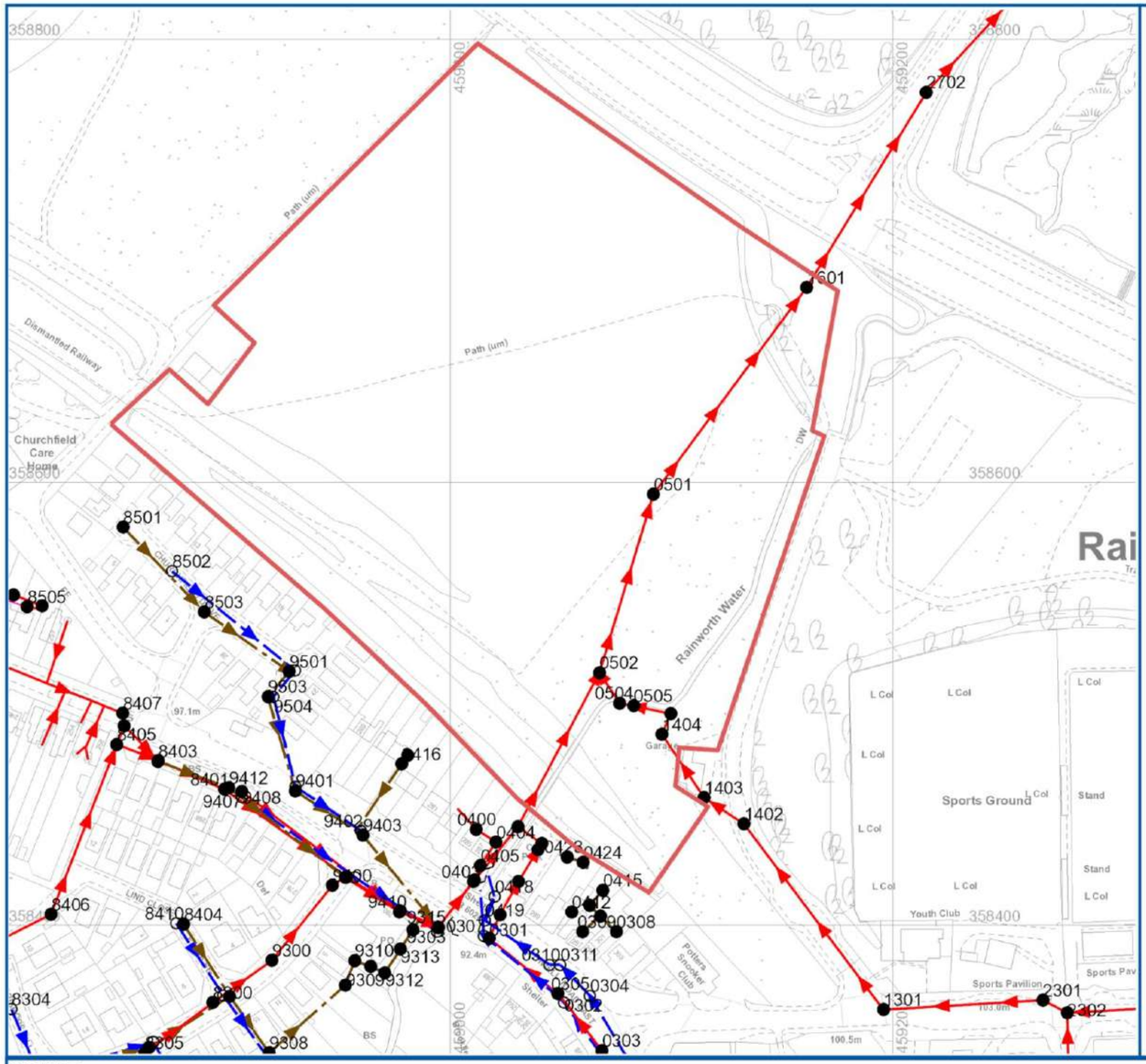
Connections

For any new connections (including the re-use of existing connections) to the public sewerage system, the developer will need to submit a Section 106 application form. Our Developer Services department are responsible for handling all new connections enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 7076600 or download from www.stwater.co.uk.

Please quote the above reference in any future correspondence (including e-mails) with STW Limited. Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

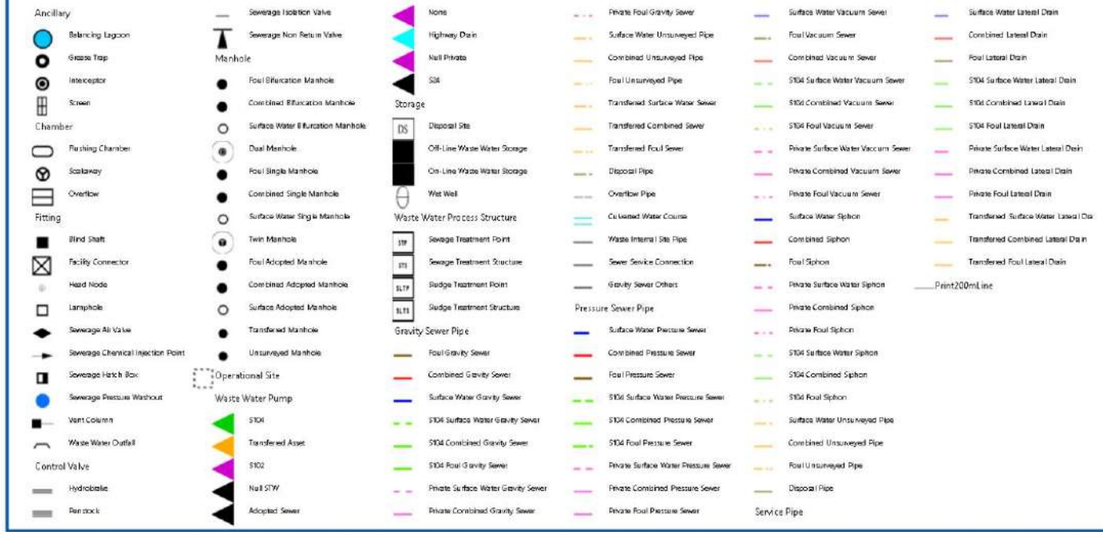
Yours sincerely

Belal Ali
Asset Protection Waste Water East
Wholesale Network Control and Asset Management



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK58589309	<UNK>	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58589313	<UNK>	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58589311	<UNK>	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58588311	93.86	92.65	91.38	S	<UNK>	C	225	<UNK>	50.46	31/12/1899 00:00:00
SK58588408	97.5999	<UNK>	94.72	C	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK58588410	95.73	94.32	92.65	S	<UNK>	C	225	<UNK>	23.45	31/12/1899 00:00:00
SK58588402	97.1699	94.72	93.54	C	<UNK>	C	375	<UNK>	27.58	31/12/1899 00:00:00
SK58589308	<UNK>	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58588501	98.9	97.26	95.51	F	<UNK>	C	150	<UNK>	30.31	31/12/1899 00:00:00
SK58589312	<UNK>	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58588307	94.65	93.17	92.75	S	<UNK>	C	225	<UNK>	31.76	31/12/1899 00:00:00
SK59580402	92.194	<UNK>	91.838	C	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK58588406	97.86	96.22	95.65	C	<UNK>	C	450	<UNK>	143.25	31/12/1899 00:00:00
SK58588503	97.1399	95.51	93.69	F	<UNK>	C	150	<UNK>	25.76	31/12/1899 00:00:00
SK58588404	95.54	93.86	92.25	F	<UNK>	C	150	<UNK>	24.16	31/12/1899 00:00:00
SK58589310	0	<UNK>	<UNK>	F	<UNK>	C	150	<UNK>	0	31/12/1899 00:00:00
SK58589502	95.51	94.4	94.3	S	<UNK>	C	150	<UNK>	154.2	31/12/1899 00:00:00
SK58589404	93.4199	90.84	90.69	C	<UNK>	C	500	<UNK>	195.87	31/12/1899 00:00:00
SK58588308	94.72	92.92	92.25	F	<UNK>	C	150	<UNK>	65.07	31/12/1899 00:00:00
SK58588304	97.68	95.83	93.92	S	<UNK>	C	150	<UNK>	17.1	31/12/1899 00:00:00
SK58588405	97.5999	95.65	94.72	C	<UNK>	C	375	<UNK>	21.55	31/12/1899 00:00:00
SK58588405	97.5999	95.73	<UNK>	C	<UNK>	C	375	<UNK>	0	31/12/1899 00:00:00
SK58589407	95.8799	94.28	90.75	C	<UNK>	C	150	<UNK>	25.56	31/12/1899 00:00:00
SK58589405	93.4199	92.24	91.47	S	<UNK>	C	225	<UNK>	58.21	31/12/1899 00:00:00
SK58588401	96.11	93.54	90.84	C	<UNK>	C	375	<UNK>	25.13	31/12/1899 00:00:00
SK58589408	95.8799	94.6	92.24	S	<UNK>	C	225	<UNK>	26.48	31/12/1899 00:00:00
SK59580503	96.2369	<UNK>	92.82	C	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK58589504	95.73	94.3	94.24	S	<UNK>	C	150	<UNK>	701.67	31/12/1899 00:00:00
SK58589409	95.23	94.24	92.4	S	<UNK>	C	150	<UNK>	20.47	31/12/1899 00:00:00

LEGEND



MATERIALS

-	- NONE
AC	- ASBESTOS CEME
BR	- BRICK
CC	- CONCRETE BOX CULVERT
CI	- CAST IRON
CO	- CONCRETE
CSB	CONCRETE SEGMENTS (BOLTED)
CSU	- CONCRETE SEGMENTS (UNBOLTED)
DI	- DUCTILE IRON
GRP	- GLASS REINFORCED PLASTIC
MAC	- MASONRY IN REGULAR COURSES
MAR	- MASONRY RANDOMLY COURSED
PE	- POLYETHLENE
PF	- PITCH
PP	- POLYPROPYLENE
PSC	- PLASTIC STEEL COMPOSITE
PVC	- POLYVINYL CHLORIDE
RPM	- REINFORCED PLASTIC MATRIX
SI	- SPUN (GREY) IRON
ST	- STEEL
U	- UNKNOWN
VC	- VITRIFIED CLAY
XXX	- OTHER

CATEGORIES

W	- WEIR
C	- CASCADE
DB	- DAMBOARD
SE	- SIDE ENTRY
FV	- FLAP VALVE
BD	- BACK DROP
S	- SIPHON
D	- HIGHWAY DRAIN
S104	- SECTION 104

SHAPE

C	- CIRCULAR
E	- EGG SHAPED
O	- OTHER
R	- RECTANGLE
S	- SQUARE
T	- TRAPEZOIDAL
U	- UNKNOWN

PURPOSE

C	- COMBINED
E	- FINAL EFFLUENT
F	- FOUL
L	- SLUDGE
S	- SURFACE WATER

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD (Tabular)

O/S Map Scale: 1:2,500

Date of Issue: 04-05-20

This map is centred upon:

X: 459054.96 **Y:** 358577.67

Disclaimer Statement:

1. Do not scale off this Map.
2. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.
3. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.
4.
5. Ordnance Survey licence number: **100031673**
6. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

SUPPLEMENTARY GUIDANCE NOTES RELATING TO DISPOSAL OF SURFACE WATER

Introduction

The purpose of this guidance note is to provide advice to applicants when completing the surface water drainage design for a new development, both for Greenfield and Brownfield sites. This does not affect foul drainage disposal which should be discussed with Severn Trent as early as possible to ensure additional flows can be accommodated without undue delay to the development.

Lead Local Flood Authority (LLFA) Consultation

Since April 2015, the LLFA have assumed the role of being a statutory consultee in the planning process for developments of 10 dwellings or more; or equivalent non-residential and/or mixed development. The LLFAs role is vital to ensure that surface water disposal on new development is adequately assessed so that the local planning authority can satisfy themselves that drainage proposals are satisfactory and to make sure, through the use of planning conditions or planning obligations, that there are clear arrangements in place for future maintenance of sustainable drainage systems (SuDS) over the lifetime of the development. This will also ensure surface water disposal aligns with local planning policies, flood risk strategies and national policies, such as the National Planning Policy Framework (NPPF).

It is strongly recommend that the LLFA are involved in early pre-application discussions when the development of a site is initially being considered. Pre-application discussions will help to ensure that SuDS are appropriately considered ahead of or as part of preliminary development layouts, and that they are fully integrated into the final development layout. Whilst Severn Trent are willing to advise on sewerage availability this does to negate the planning requirement relating to adequacy of SuDS on new development.

SuDS Hierarchy

Severn Trent is fully supportive of the fundamental SuDS principle that priority should be given to managing surface water as close to source as possible. In accordance with national standards and guidance a sequential series of checks should be undertaken to ensure the relevant SuDS features are being proposed whereby (in order of priority) rainwater re-use, infiltration to ground and controlled discharge to a water body are properly considered ahead of any controlled connection to a culverted watercourse/other drainage system or public surface water sewer.

A controlled connection to a public combined/foul sewer would only be considered under rare exceptional circumstances where all other options have been completely exhausted. Acceptance of surface water into a combined sewer is not only unsustainable because of the need to convey/treat rainwater but is also takes away existing capacity which could constraint the connection of foul flows on future development. It is also possible that connection of additional surface water flows will require capacity upgrades to the existing sewerage system which may delay development.

Connection to a Public Sewer

Whilst Severn Trent will be able to provide advice on potential public surface water sewer connection options, it is essential that a developer contacts the LLFA as early as possible to discuss surface water disposal as they will be able to provide guidance on surface water flood risk policy which may influence SuDS requirements. It is strongly recommended that LLFA discussions take place before contacting Severn Trent. Where the outcome of LLFA discussions concludes that a controlled discharge to the public sewerage system is the only viable option then Severn Trent would be pleased to discuss sewer connection options, satisfied that the LLFA have been consulted in line with their surface water management role and in their capacity as statutory consultee.

Evidence must be provided to demonstrate why the sequential SuDS checks have concluded that a connection to the public sewer is required. This must include a Site Investigation Report including percolation test data/graphs/calculations/results together with relevant correspondence with the LLFA.

Design Standards

Surface water disposal design should consider the interactions between the adoptable sewer design criteria based on a 30 year design storm (outlined in 'Sewers For Adoption') and the "Non-statutory technical standards for SuDS" requirement to restrict discharge from a site up to and including the 1 in 100 year critical storm event plus an allowance for climate change as required by the LLFA.

For Greenfield development, the peak runoff rate should never exceed the peak pre-development run-off rates/volumes for the same rainfall event irrespective of the design storm duration consistent with the national non-statutory technical standards. For developments which were previously developed (Brownfield), the peak runoff rate must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment again for the same rainfall event. This requirement to remove pre-development surface water discharges to the sewerage system will help remove capacity constraints and aid future development.

To establish the pre-development run-off rates a detailed existing drainage survey will be required indicating pipe locations including sizes and levels, impermeable area connectivity to each pipe and topographical information to support existing drainage assumptions. Photographs of the existing buildings and surface features should be provided and where necessary a CCTV sewer survey should be provided to support the drainage survey to demonstrate connectivity.

In line with 'Sewers for Adoption', the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event. For higher storm return periods the drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station, electricity substation, water booster station) within the development.

Small Developments

Whilst developments of fewer than 10 dwellings (or their equivalent) are excluded from the post April 2015 planning requirements the underlying principles regarding sustainable surface water management are still valid. The collective impacts of surface water discharges from smaller developments can have an adverse impact on flood risk, especially in smaller rural catchments where smaller sewerage systems are more susceptible to increases in surface water inflow. On small developments infiltration to ground and peak flow attenuation must be considered to mitigate flood risk in the community but where a sewer connection is envisaged then the developer is recommended to discuss surface water disposal options with Severn Trent as early as possible.

Contact

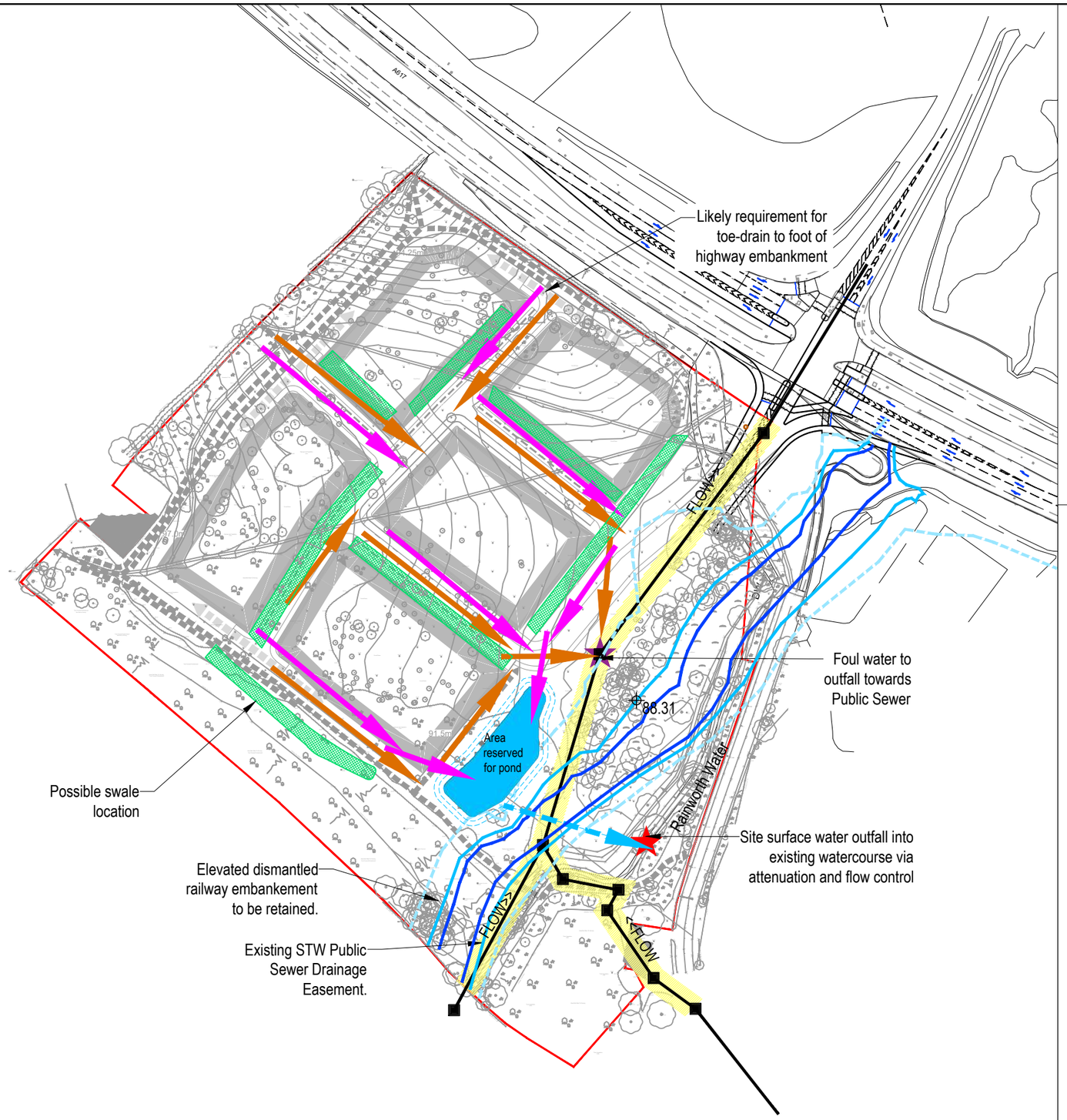
For further assistance please contact our Asset Protection teams via:

net.dev.west@severntrent.co.uk
(Birmingham & Black Country, Staffordshire, Shropshire, Worcestershire, Gloucestershire, Herefordshire, Powys)

net.dev.east@severntrent.co.uk
(Derbyshire, Leicestershire, Nottinghamshire, Warwickshire, Coventry)

Appendix E

Proposed Drainage Parameters RAIN-BSP-ZZ-ZZ-DR-C-0001_P01



NOTES

1. DO NOT SCALE.

2. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.

3. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.

4. All dimensions are in millimetres unless otherwise stated.

5. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any works on site.

6. This drawing contains the following model files:
FCPR Development Framework Drawing 9474-I-01 Rev A
Mapmatic Survey Drawing 3614

Key

Approx. Site Boundary Line

Approximate extents of flood plain High risk (3.3%)

Approximate extents of flood plain Medium risk (1%)

Approximate extents of flood plain Low risk (<1% >0.1%)

Proposed SUDS attenuation pond

Approx. surface water gravity sewer inlet to pond route — FLOW >>

Approx. surface water gravity sewer outfall route — FLOW >>

Approx. foul water gravity sewer inlet route — FLOW >>

Existing adopted public foul/combined water sewer — FLOW >>

Proposed sewer easement
(required width - 5m)

Proposed Swale

KEY PLAN

Construction Risks	Maintenance/cleaning Risks	Demolition/adaptation Risks

In addition to the hazard/risks normally associated with the type of works detailed on this drawing take note of the above.
It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

REV	COMMENT	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	Initial Issue	BJS	17/12/20	SM	17/12/20	MV	17/12/20

SCALE @ A3	ISSUING OFFICE	PROJECT NUMBER
1:2000	DERBY	18-0494

CLIENT APPROVAL

- A - APPROVED
- B - APPROVED WITH COMMENTS
- C - DO NOT USE

STATUS	PURPOSE OF ISSUE
S1	PRELIMINARY

• CIVIL • STRUCTURAL • TRANSPORTATION • GEOTECHNICAL • ENVIRONMENTAL

bsp CONSULTING

5 Pride Point Drive, Pride Park,
Derby, DE24 8BX
Tel: (01332) 374880 - Fax: (01332) 374889
e-mail: info@bsp-consulting.co.uk
Also offices in Nottingham, Leicester and Sheffield

PROJECT

Land South of A617
Rainworth

TITLE

Drainage Parameters

CLIENT

ROMO Holdings LTD

PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NUMBER	REV
RAIN-BSP-ZZ-ZZ-DR-C-0001	P01

Appendix F

Qbar Greenfield Runoff Estimate

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Ben Seamer
Site name:	Land South of A617
Site location:	Rainworth

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

Site Details

Latitude:	53.12151° N
Longitude:	1.11912° W
Reference:	2623038802
Date:	Dec 14 2020 16:24

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 6.6

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	1	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	693	693
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

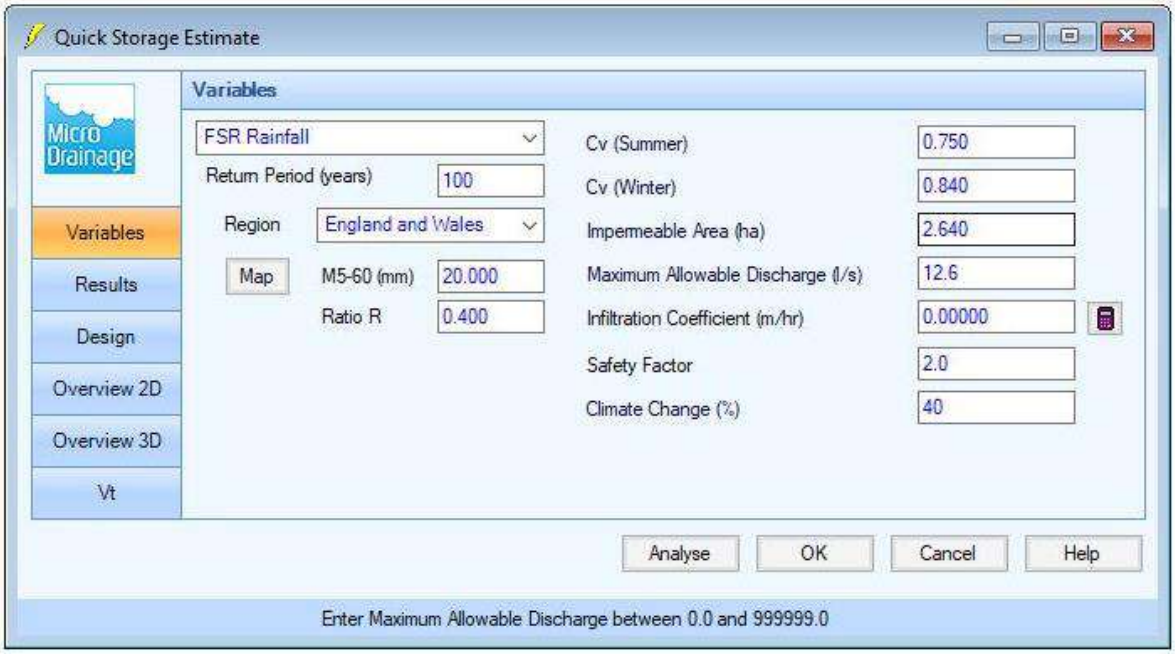
Greenfield runoff rates

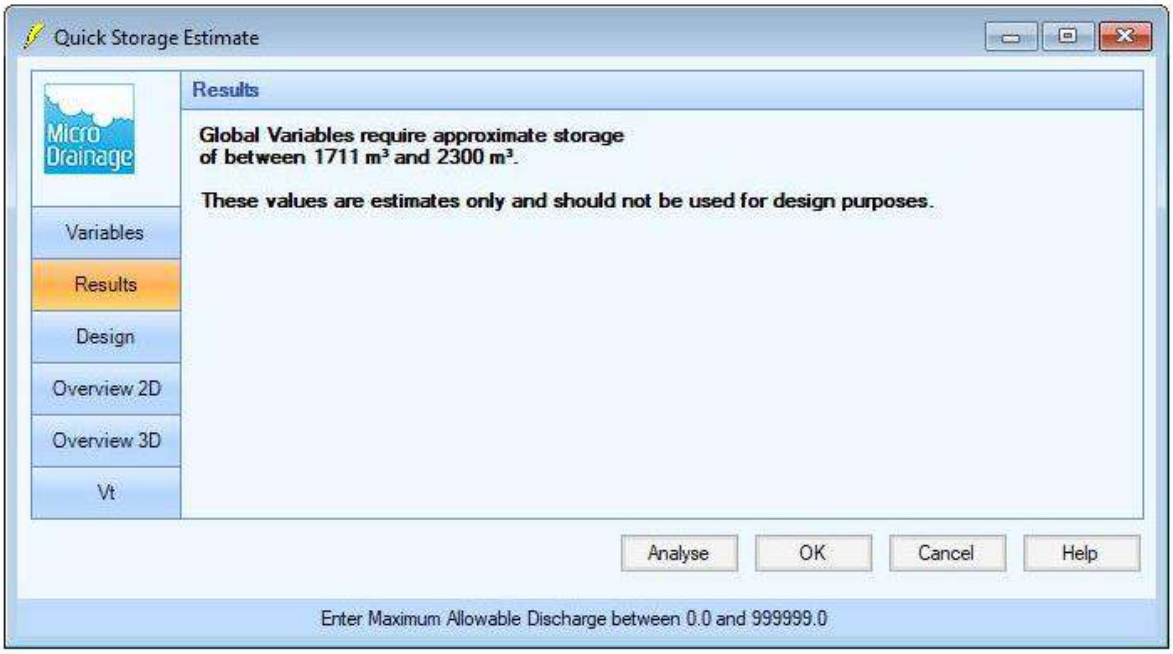
	Default	Edited
Q_{BAR} (l/s):	1.1	31.49
1 in 1 year (l/s):	0.91	26.14
1 in 30 years (l/s):	2.19	62.98
1 in 100 year (l/s):	2.82	80.93
1 in 200 years (l/s):	3.33	95.73

Appendix G

Mircrodrainage Quick Storage Estimate

18-0494 Land South of A617- Rainworth Quick Storage Estimates





bsp CONSULTING

Nottingham
12 Oxford Street
Nottingham
NG1 5BG
0115 704 3300

Derby
5 Pride Point Drive
Pride Park
Derby
DE24 8BX
01332 374 880

Leicester
Floor 4
24 De Montfort St
Leicester
LE1 7GB
0116 204 7766

Sheffield
Smithy Wood House
Smithy Wood Cres
Sheffield
S8 0NU
0114 272 1589

www.bsp-consulting.co.uk

REGISTERED MANAGEMENT SYSTEMS BS EN ISO 9001:2015 ASCB

smas worksafe consultant SSIP

Apprenticeships Good for our Business

CSCS

Constructionline

CYBER ESSENTIALS PLUS

equality accredited customer service bronze level