From:	Richard Cord
Sent:	02/06/2017 13:29:58
To:	Higgins, Michael
Subject:	Fwd: Sandy Park Hotel amended FRA
Attachments:	095 R001P02 Flood Risk Statement.pdf; ATT00001.htm

Hi Michael

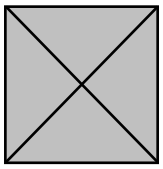
See email below and attached amended FRA/drainage report from our consultants, Sands, as issued to Richard Rainbow today for your information and consultation.

Please let me know if you need anything further.

Kind regards

Richard Cord RIBA

Managing Director



Kensington Taylor Limited

T 01392 360338

E richard.cord@kensingtontaylor.com

W www.kensingtontaylor.com

Begin forwarded message:

> **From:** "Dave Backway" <dave@sands-consultants.co.uk>
> **To:** "Richard Rainbow" <Richard.Rainbow@devon.gov.uk>
> **Cc:** "Richard Cord" <Richard.Cord@kensingtontaylor.com>, "Alex Nimmo" <Alex@sands-consultants.co.uk>
> **Subject: Sandy Park Hotel amended FRA**

Good afternoon Richard,

Please find attached a copy of the amended FRA for the proposed Sandy Park Hotel. We were hoping to discuss your comments and the resultant changes prior to issue, however due to holidays we had to amend the report and issue it. Therefore, please would you review the attached and if necessary, please contact me if you have any queries or any further requirements.

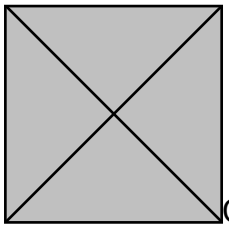
Regards

Dave

Dave Backway
IEng AMCIWEM

Director

M: 07929 348452
dave@sands-consultants.co.uk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Flood Risk Statement
for the Proposed Development at

SANDY PARK HOTEL, OLD RYDON LANE, EXETER

Client: Exeter Rugby Group Plc

Project Reference: 17.04.095

April 2017

AJ Sands Ltd T/A Sands
Registered in England No. 2608316
Registered Office: 5 Barnfield Crescent, Exeter, EX1 1RF

Directors: DJ Backway IEng AMCIWEM MJ Stroud BEng (Hons) CEng MIStructE ML Cridge BEng (Hons) CEng MIStructE

INVESTOR IN PEOPLE

Revision Record					
Rev	**Description**	**Date**	**Author**	**Checker**	**Approver**
01	First Issue	21 April 2017	AWN	DJB	DJB
02	Revised for planning further to LLFA comments	01 June 2017	MQ	AWN	DJB

File Ref: 095 R001P02 Flood Risk Statement.docx

Prepared for:

Exeter Rugby Group Plc,
Sandy Park,
Exeter,
Devon

Notes on Limitation:

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The findings and opinions expressed are relevant to the dates of the site work and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations Sands Consultants reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

Contents

Appendices

1 Introduction

1.1 General

1.1.01 This Flood Risk Assessment (FRA) relates to the development of the Brownfield site currently occupied by Sandy Park Lodge off Old Rydon Lane, Exeter, Devon, (referred to in this document as 'the site').

1.1.02 The site is approximately 0.85 Ha in area, and will be developed to provide new hotel and leisure facility with associated parking.

1.1.03 This development is classified as a 'Major Development' as defined by The Town and Country Planning (Flooding) (England) Direction 2007.

1.1.04 The development is a commercial hotel Development and therefore has a Flood Risk Vulnerability Classification of 'More Vulnerable'.

1.1.05 In order for the development to proceed, a Flood Risk Assessment is required to be submitted to the Local Planning Authority and the Lead Local Flood Authority in their role as Consultee to the planning process.

2 Existing Site Conditions

2.1 Site Location

2.1.01 The site is located on the south of the Sandy Park/Exeter Rugby Club development and west of the M5 motorway. The national grid reference for the centre of the site is SX 96407 90730.

2.1.02 A site location plan is provided at Appendix A.

2.2 Existing Site Description

2.2.01 The site is currently occupied by Sandy Park Lodge (referred to in this document as 'the lodge'), which is a detached residential dwelling with a large area of hardstanding fronting onto Old Rydon Lane, with a total impermeable area of approximately 840m².

2.2.02 To the east and south of the development is a large area of garden, which accounts for the remaining 0.770ha of site.

2.2.03 Adjacent to the M5 is a drainage ditch that forms part of the motorway drainage system.

2.3 Existing Topography

2.3.01 Levels on the site typically fall from north to the south from approximately 19mAOD at the Lodge, to 13.5mAOD in the southern corner of the site.

2.3.02 Along the eastern boundary, the development site rises above the motorway from approximately 1.5m to the south, up to 6.5m adjacent to Old Rydon Lane.

3 Sources of Flooding

3.1 General

3.1.01 The site is not shown to be at risk of fluvial flooding, as it falls outside of any functional flood plain and is outside the Environment Agency's (EA) indicative flood plain for extreme events. The site is at least 10m higher than the River Clyst, which is the nearest watercourse.

3.1.02 The site is not at risk of flooding from groundwater, tidal flooding or flooding from reservoirs. The site is located in Flood Zone 1.

3.1.03 The site is not shown to suffer from surface water flooding and does not fall within a problem drainage catchment area. Adjacent To the western boundary of the development is a field access track that is shown to be at low risk of surface water flooding, conveying exceedance flows from the north.

3.1.04 EA flood maps for the site are shown at Appendix B.

3.2 Existing Hydrology

3.2.01 The site is currently 10% impermeable and it is believed that all storm water drainage from the site is positively drained to the existing combined water sewer that runs through the site.

3.2.02 The exact routing, point of discharge and depth of the existing sewer will need to be confirmed by an on-site drainage survey during detailed design phase.

3.2.03 During larger storm events, the topography of the site is such that any run off from hardstanding areas would flow into the adjacent soft landscaping areas.

4 Surface Water Management

4.1 General

4.1.01 The proposed development will require a surface water drainage strategy that meets the approval of the Lead Local Flood Authority (in their capacity as a Consultee in the Planning Application process).

4.1.02 The new building, access and parking areas total approximately 0.447ha, which equates to approximately 53% of the total site area.

4.1.03 The CIRIA C753 SuDS Manual provides a hierarchal approach to the disposal of rainwater, with the preferred option to discharge to an adequate soakaway or other infiltration system. If this is not possible, the next favoured option is to discharge to a watercourse. Only, if neither of these options is possible, should the site discharge to a sewer. We have briefly assessed each of these options as follows:-

4.2 Infiltration

4.2.01 No ground investigation information has been provided at this time and therefore it is not clear whether or not infiltration on site would be possible.

4.2.02 As part of the detailed design, it will be necessary to undertake testing to BRE365 at the anticipated locations of the attenuation/infiltration system to determine whether full or partial infiltration will be feasible.

4.2.03 Consideration of the level difference and groundwater pathways adjacent to the motorway should be given during detailed design to ensure discharged flows do not lead to an instability in the existing embankment.

4.3 Discharge to Watercourse

4.3.01 There is no watercourse within a reasonable distance of the site into which a direct surface water drainage discharge can be made and therefore this option has not been considered any further.

4.4 Discharge to Existing Sewer

4.4.01 An existing 150mm diameter combined water sewer runs below the site, however it is assumed that South West Water (SWW) will be unwilling to consider a further connection or increase in existing flow to this asset.

4.4.02 A copy of the SWW sewer records is attached at Appendix C.

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4.5 Greenfield Runoff Calculation

4.5.01 The greenfield runoff values for the site have been calculated using Microdrainage Source Control as follows:

Return Period	Greenfield Runoff Rate for 0.85ha site	Rate per hectare of Development
(yr)	*(l/s)*	*(l/s/ha)*
1	1.6	1.9
QBAR	2.1	2.4
30	4.0	4.7
100	5.0	5.9

4.5.02 The current development proposals consist of 0.447ha of impermeable area, the following greenfield discharge rates based upon the ICP SUDS method would apply:

Return Period	Greenfield Runoff Rate for 0.447ha site
(yr)	*(l/s)*
1	0.9
QBAR	1.1
30	2.1
100	2.6

4.6 Drainage Proposals

4.6.01 As part of the development it will be necessary to divert the existing 150mm diameter combined sewer which passes through the site. The area to the south of the site where the SWW 630mm diameter HDPE rising main will need to be kept clear of any proposed SUDS systems, due the associated 3.5m easement requirements on either side of the centreline of the rising main.

4.6.02 Surface water drainage will be designed to be complaint with all latest guidance and will retain the 1 in 100 year design storm volume plus climate change allowances on site and released at equivalent greenfield runoff rates.

4.7 Infiltration

4.7.01 Following outline planning consent and when the site has been cleared, an Intrusive site investigation, which will include BRE 365 percolations tests, will be carried out. Should the ground conditions prove to be suitably permeable to allow for an infiltration based drainage design, the surface water drainage design will be developed based on the use of soakaways.

4.7.02 Initial proposals will include the car parking spaces and access aisle to be constructed using permeable paving, and if the ground conditions are sufficiently permeable, consideration will also be given to discharging some of the roof areas into the permeable construction layers of the car parking area.

4.7.03 The remaining roof areas will be discharged to other separate soakaways in order to ensure that all of the run off from the site is not concentrated into one area. Discussions with the permeable paving manufacturers have indicated that permeable car parks are suitable for ground conditions with a permeability of $1x10^{-6}$m/s if draining just their own footprint. Greater permeability allows for additional surface water drainage to be discharged into the car park construction.

4.7.04 The car parking area to the rear of the hotel has a total catchment area of 1350m². Based on a permeability of $1x10^{-6}$ m/s, the car park construction, using stone with a minimum 30% voids ratio, would need to be a minimum of 300mm deep below the surface construction with the water level reaching a peak depth of 276mm.

4.7.05 Should the ground be proven to be impermeable, or the ground water table is found to be too high, there should be sufficient permeability of the sub soils to allow for the car park and access aisles to be drained via infiltration.

4.8 Positive Discharge

4.8.01 If necessary, and storm water drainage from the building that cannot be discharged via infiltration will be discharged to an attenuation feature.

4.8.02 In order to determine the requirements of the outline proposals, a quick storage estimate has been undertaken for the 100yr + 40% climate change event discharging at no more than the equivalent QBAR greenfield runoff rate. For this calculation the entire catchment has been considered based on the permeability of the ground not be suitable for an infiltration based drainage design.

4.8.03 This results in a required attenuation volume of between 384 m³ to 510m³, assuming no infiltration allowance. Due to the large area of car parking allowance, this area can be readily stored in a tanked system below the construction build-up.

4.8.04 MicroDrainage calculations for greenfield runoff, an indicative permeable car park construction detail, and indicative storage requirements are included in Appendix D.

4.8.05 Foul water drainage is intended to be discharged to the SWW foul/combined water drainage network.

4.9 Responsibility and Maintenance

4.9.01 The site will be developed to provide hotel accommodation with associated facilities and these will all be maintained by a Management Company. The role of the Management Company will include responsibility to ensure that the on-site drainage is kept in a good state of repair and regularly maintained.

4.9.02 Where possible the main foul and storm water sewers from the site, connecting to the existing sewer network, will be offered to SWW for adoption under a S104 Agreement. Once adopted, the sewer networks will become the responsibility of SWW, who will be liable for their maintenance.

5 Climate Change

5.1 General

5.1.01 NPPF and the new Central Government Guidance on Climate Change Allowances, dated April 2016, provide recommended national precautionary sensitivity ranges for peak rain flow intensities.

5.1.02 As a commercial development located in Flood Zone 1, the range of allowances should be considered. The site is in an inner city densely developed area where the catchment has a rapid response and surface water runoff poses a significant risk in the long term.

5.1.03 The site should therefore be assessed against the central and upper end allowances for climate change to understand the range of impact from rainfall, with the system capacity and site layout then designed accordingly.

5.2 National Planning Policy Framework Sequential Test

5.2.01 National Planning Policy Framework – Planning Practice Guidance produces a sequential risk-based approach to developing in areas at risk from flooding or affecting flood risk areas.

5.2.02 The site lies within an area classified as Flood Zone 1 and therefore has a low risk of flooding

5.2.03 This Flood Risk Assessment confirms that the annual probability of flooding for the entirety of the site which is to be developed to provide new student accommodation is less than 0.001%, thus is at low risk of flooding. Accordingly, the site will not need to be sequentially assessed by the Local Planning Authority in respect of its allocation and appropriateness for the proposed development at this location.

5.2.04 The site will not be required to satisfy the Exception Test at this location.

5.2.05 The proposals to develop the site will not increase the risk of flooding off site and therefore the proposed development passes the risk-based Sequential Test.

5.2.06 The proposed development of the site is consistent with the required criteria of National Planning Policy Framework – Planning Practice Guidance.

5.3 Exceedance Events

5.3.01 The private surface water drainage network on the site will be based on 50mm/hr rainfall in accordance with Building Regulations. However, the drainage network model will be run for greater storm events up to and including the 100 year return period, including allowances for climate change in peak rainfall intensities.

5.3.02 Attenuation will be provided on site with adequate capacity to deal with all storm water drainage up to and including the 1 in 100 year event + climate change volume.

5.3.03 For storm events that exceed the 1 in 100 year event, or any overland flood flows resulting from the failure of the positive drainage network, the flood flows would fall towards the north of the development.

5.3.04 As with the existing pre-developed site, exceedance flood flows would be as overland sheet flow, and would discharge towards the motorway through green open space.

6 Conclusions

6.1 General

6.1.01 The site of this proposed development is outside the Environment Agency's indicative 1 in 1000 year flood plain and therefore flood flows do not encroach onto the developed site.

6.1.02 There are no foreseeable risks to the site from groundwater, flooding from sewers, or overland flood sheet flow. There is no proposed increase in flows off site which may affect flood plains in the local watercourse.

6.1.03 The proposed on-site drainage network will be designed in accordance with Building Regulations. The network will be modelled and upgraded where necessary to ensure that it has adequate capacity to cope with the 100 year design storm + climate change flows and volumes.

6.1.04 Subject to the results of the fully intrusive site investigation and percolation tests, the storm water drainage from this development will be discharged via infiltration wherever possible. Any runoff from areas which cannot be infiltrated will be attenuated and discharged to the existing ditch along the eastern boundary at agreed greenfield runoff rates.

6.1.05 All external levels will be designed to fall away from the buildings. Should there be a failure in the drainage network, some water storage will be accommodated on the site within external areas without affecting the development.

6.1.06 There are likely to be minor amendments to the layout currently shown as the scheme develops. However, this should have no impact on the flood risk / drainage philosophy for this development.

6.1.07 We believe that this site can be developed without any risk to the development and other properties downstream from the surface water drainage proposals.

Appendices

Appendix A Drawings

Drawing No. 1000 – Location Plan
1001 – Existing Site Layout
1002 – Proposed Site Layout
1003 – Flood Routing Plan

Project Title

PROPOSED DEVELOPMENT AT
SANDY PARK HOTEL
OLD RYDON LANE
DEVON

Scale/Size

1:5000/A4

Date

April 2017

Drawn

Matt Huda

Checked

Alex Nimmo

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Sands

Drawing Title

SITE LOCATION PLAN

Sands Project No.

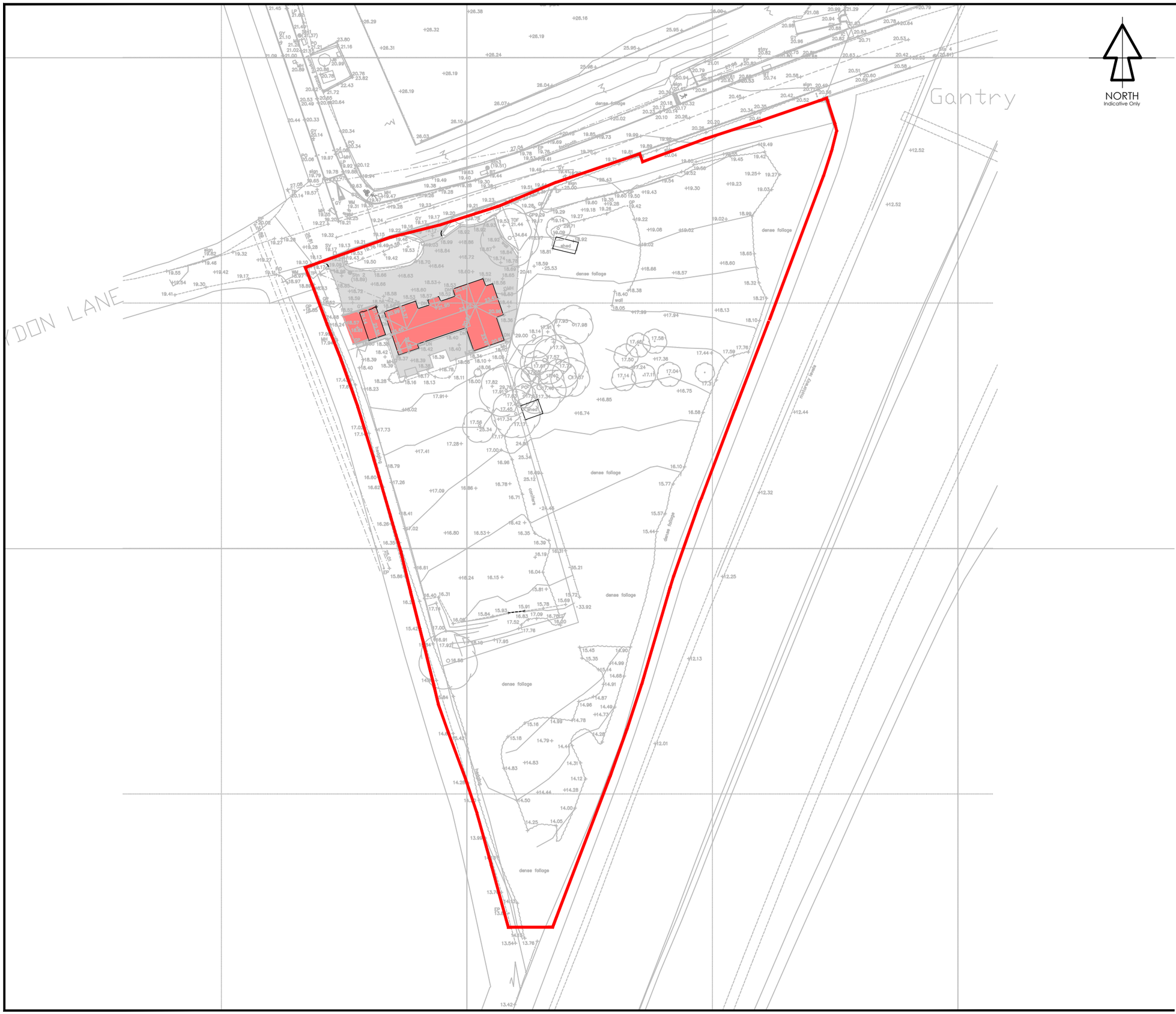
17.04.095

Drawing No.

1000

Revision

P01



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Rev	Date	Description	Chk
P01	24.04.17	Preliminary issue	DJB

Drawing revision denotes the following stages; P - Preliminary, T - Tender, C - Construction, R - Record/As Built.

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Client

EXETER RUGBY GROUP PLC
SANDY PARK STADIUM
EXETER
DEVON
EX2 7NN

Project Title

PROPOSED DEVELOPMENT AT
SANDY PARK HOTEL
EXETER
DEVON

Drawing Title

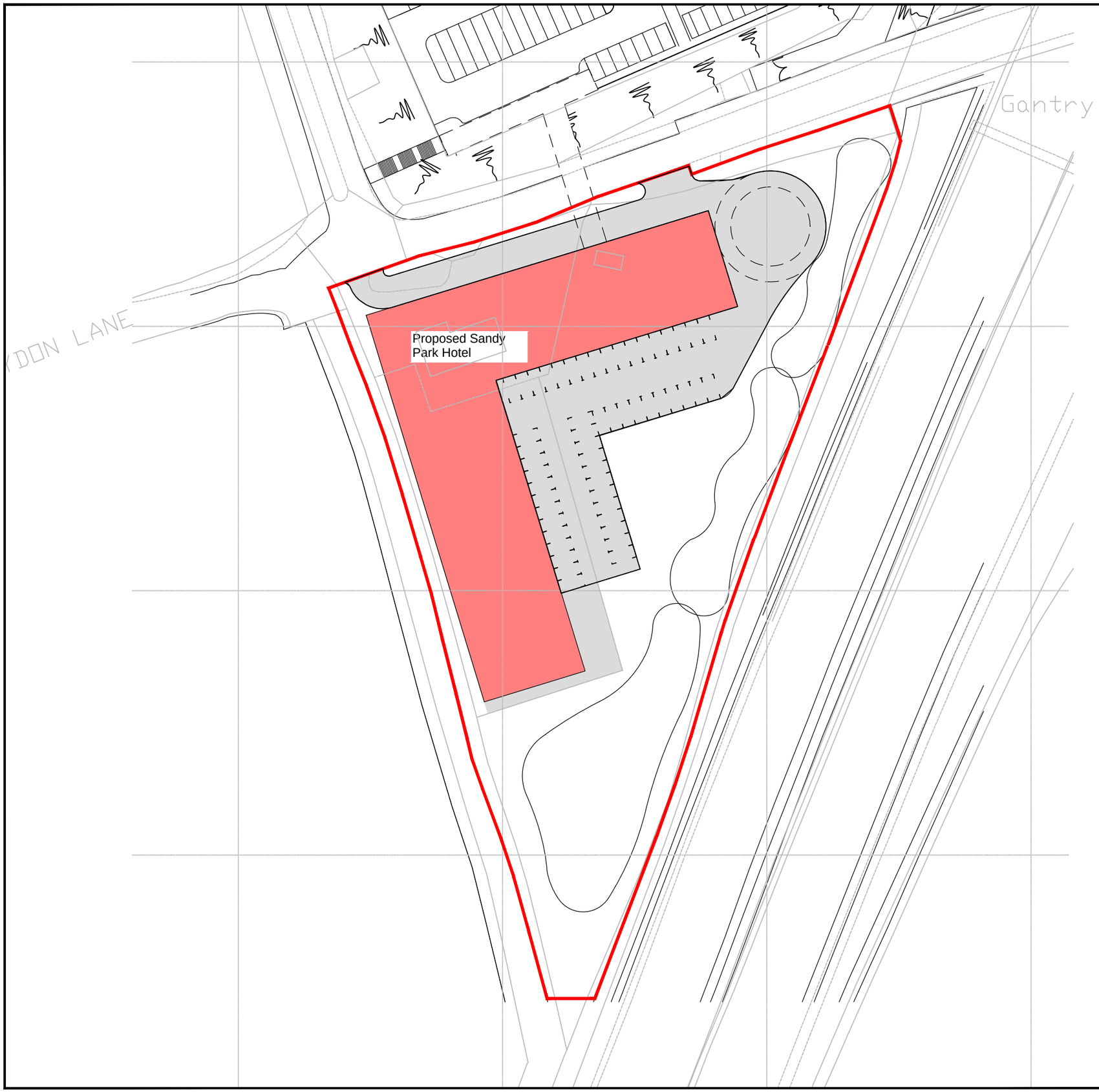
EXISTING SITE LAYOUT

Scale/Size	Date
N.T.S/A3	April 2017

Drawn	Checked
Matt Huda	Alex Nimmo

Sands Project No.	Client Project No.
17.04.095	-

Drawing No.	Revision
1001	P01



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Project Title

PROPOSED DEVELOPMENT AT
SANDY PARK HOTEL
EXETER
DEVON

Drawing Title

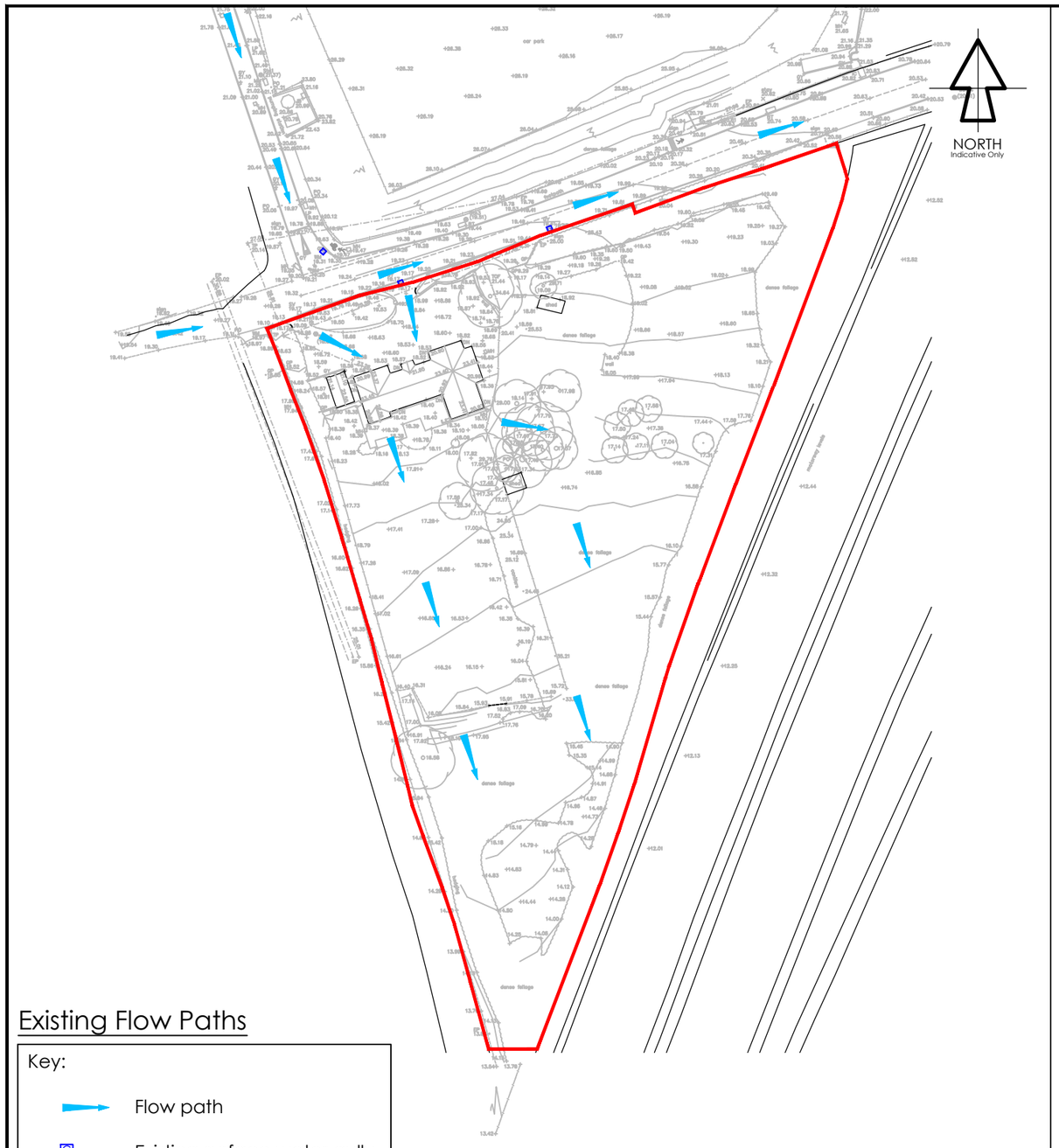
PROPOSED SITE LAYOUT

Scale/Size	Date
N.T.S/A3	April 2017

Drawn	Checked
Matt Huda	Alex Nimmo

Sands Project No.	Client Project No.
17.04.095	-

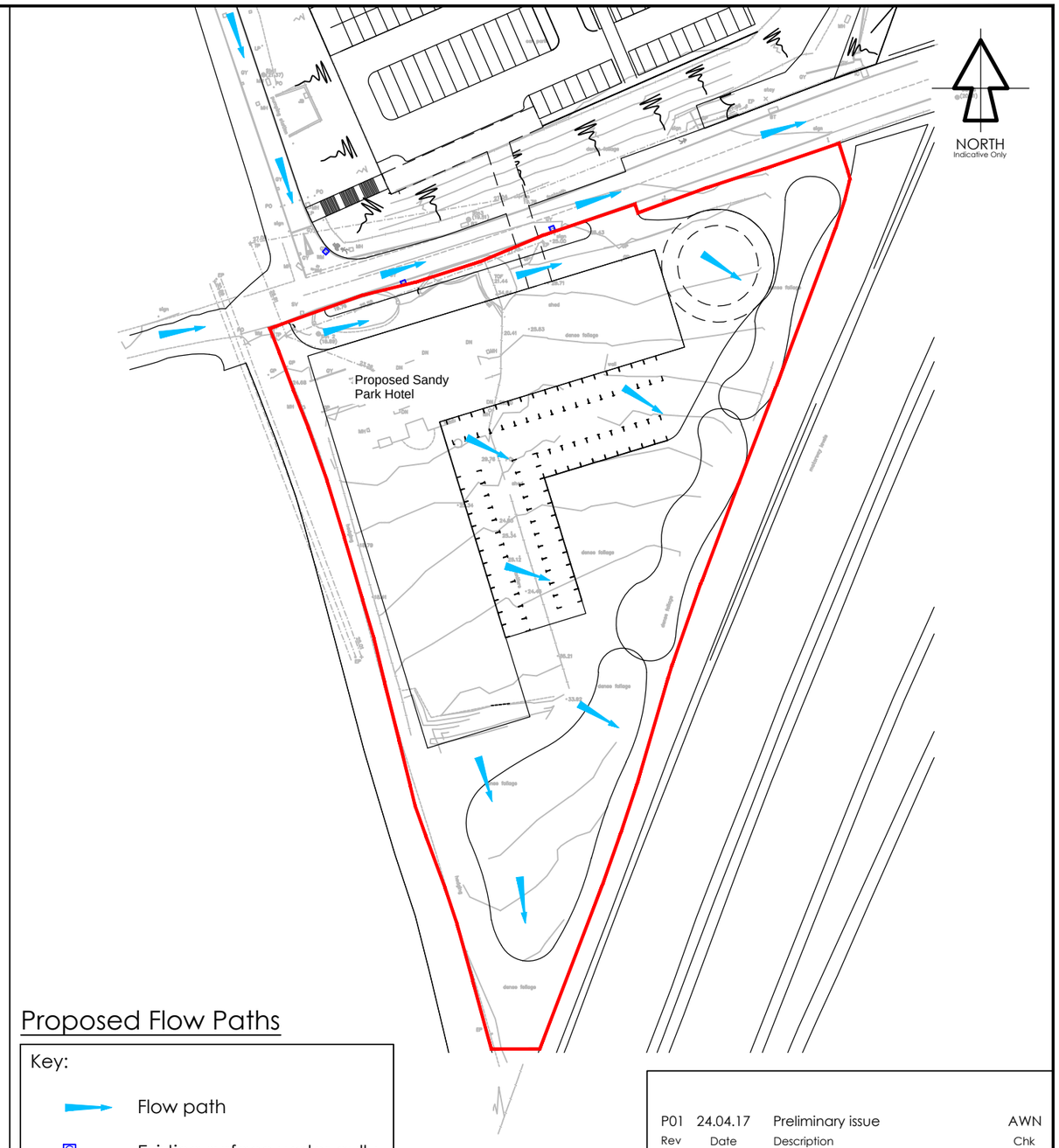
Drawing No.	Revision
1002	P01



Existing Flow Paths

Key:

- Flow path
- Existing surface water gully



Proposed Flow Paths

Key:

- Flow path
- Existing surface water gully

Rev	Date	Description	Chk
P01	24.04.17	Preliminary issue	AWN

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Client

EXETER RUGBY GROUP PLC
SANDY PARK STADIUM
EXETER
EX2 7NN

Project Title

PROPOSED DEVELOPMENT AT
SANDY PARK HOTEL
RYDON LANE
DEVON

Drawn By: Matt Huda

Checked By: Alex Nimmo

Scale/Size: 1:1000/A3

Date: April 2017

Drawing Status

PRELIMINARY

Drawing Title

FLOOD ROUTING PLAN

Sands Project No.: 17.04.095

Client Project No.:

Drawing No.: 1003

Revision: P01

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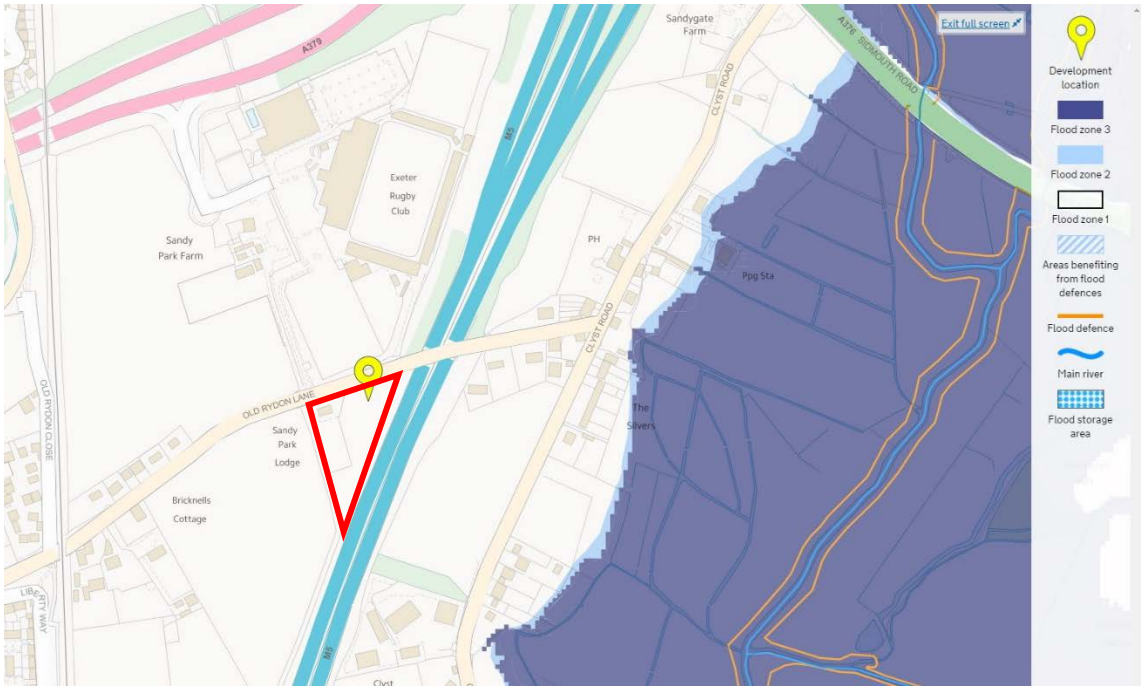
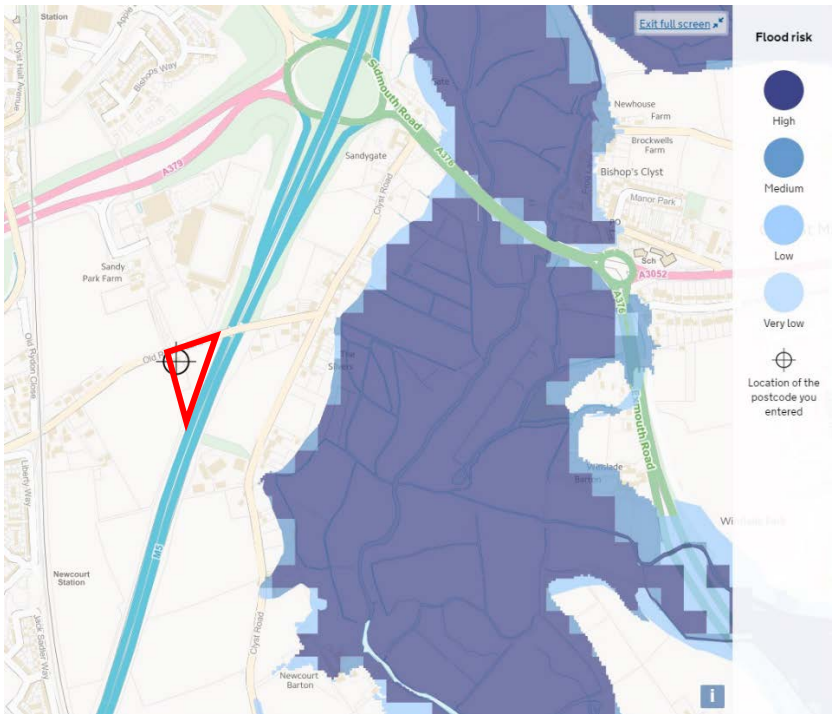
Appendix B Environment Agency Online Flood Mapping

Environment Agency - Extent of Flooding from Rivers and Sea
Obtained 20/04/17



Environment Agency - Extent of Flooding from Rivers and Sea
Obtained 20/04/17



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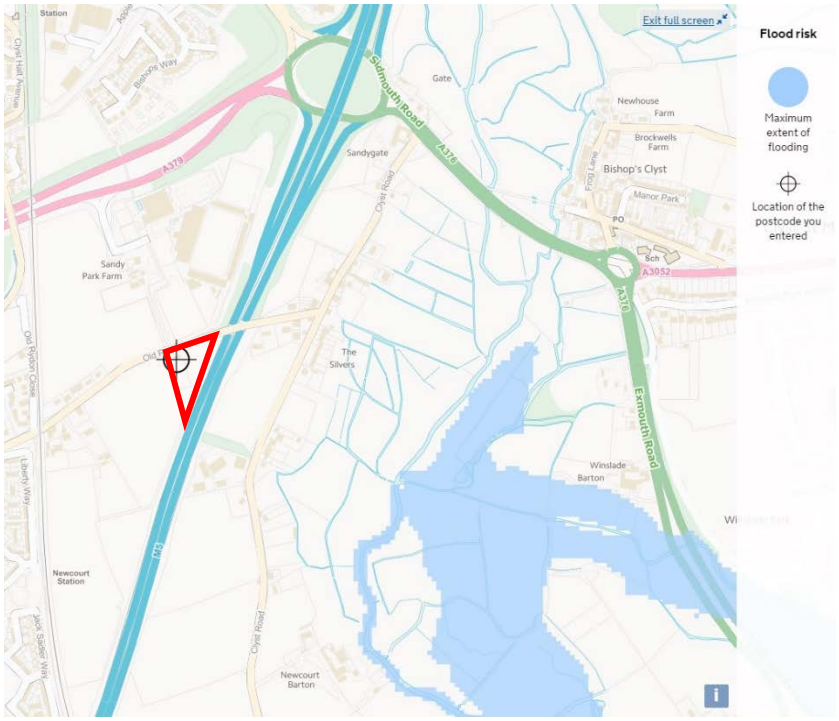
Obtained 20/04/17



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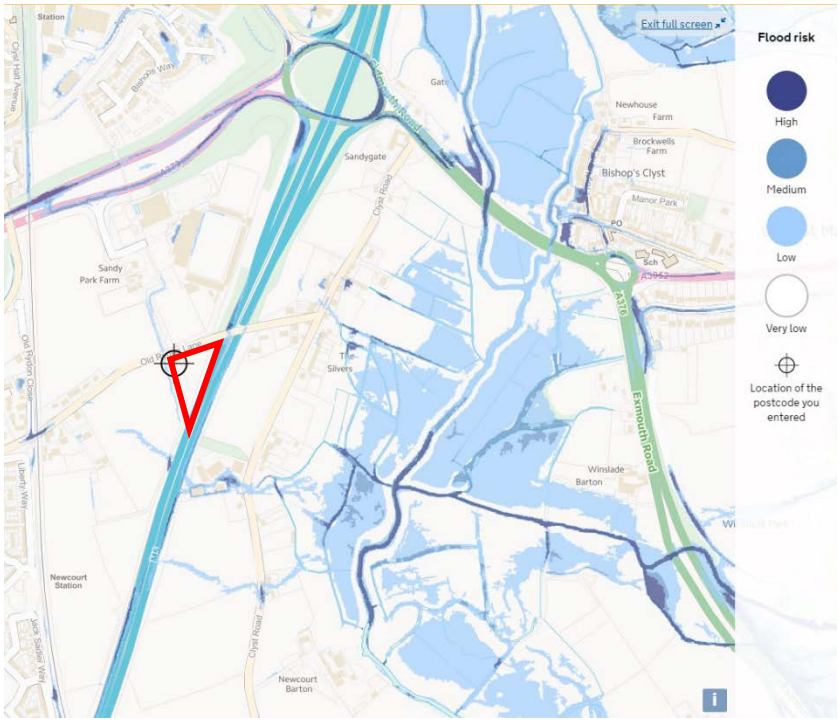
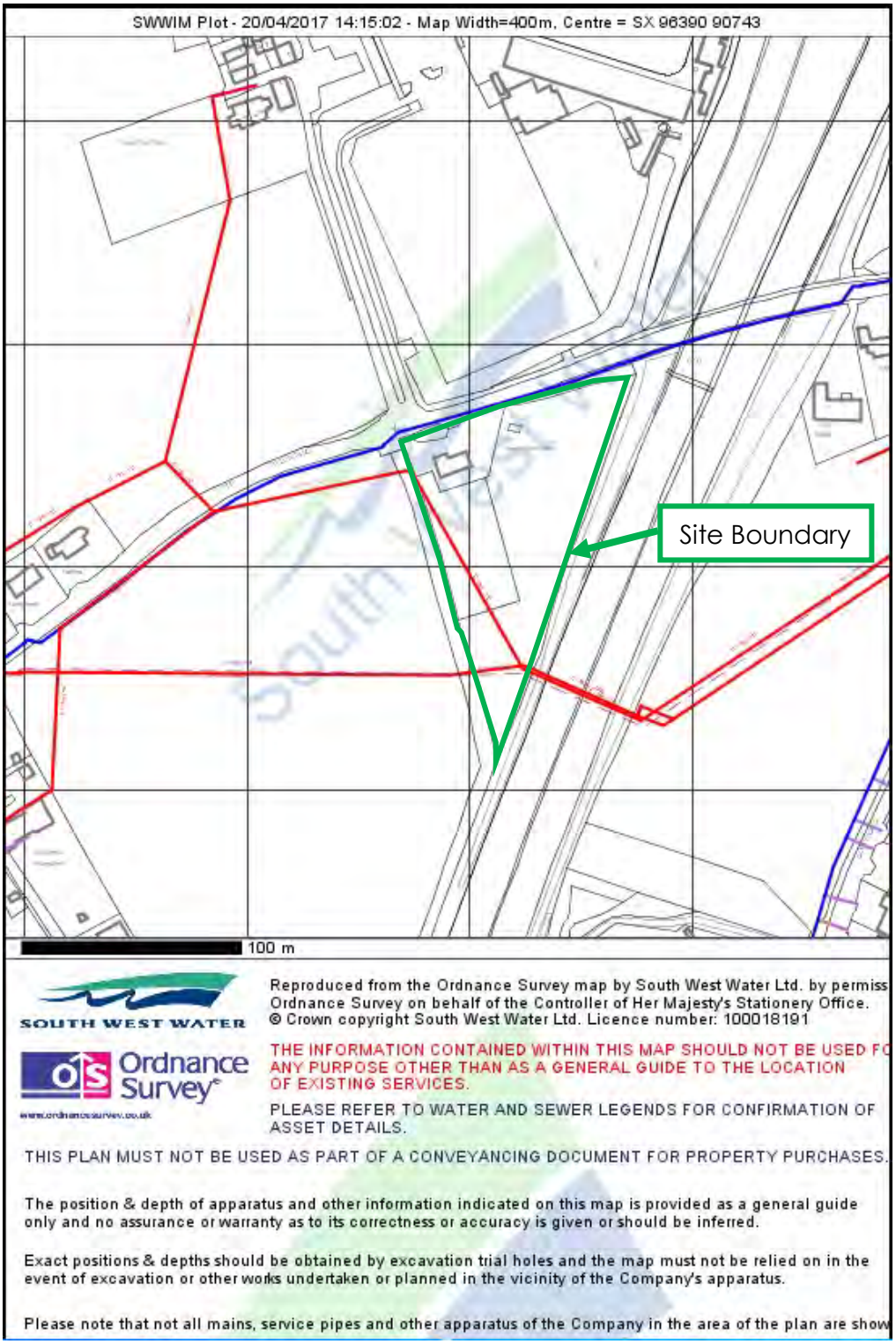
Obtained 20/04/17



Appendix C SWW Sewer Mapping


SWWIM Plot - 20/04/2017 14:15:02 - Map Width=400m, Centre = SX 96390 90743
Site Boundary
100 m
SOUTH WEST WATER
Ordnance Survey
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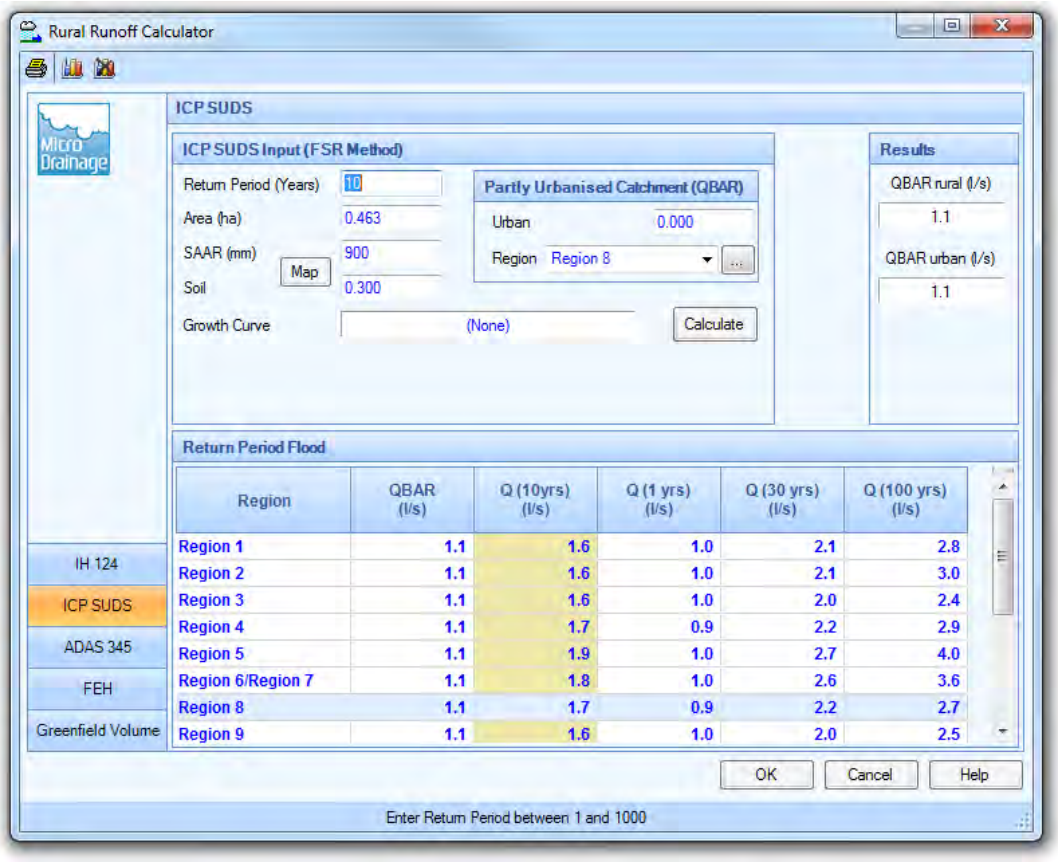
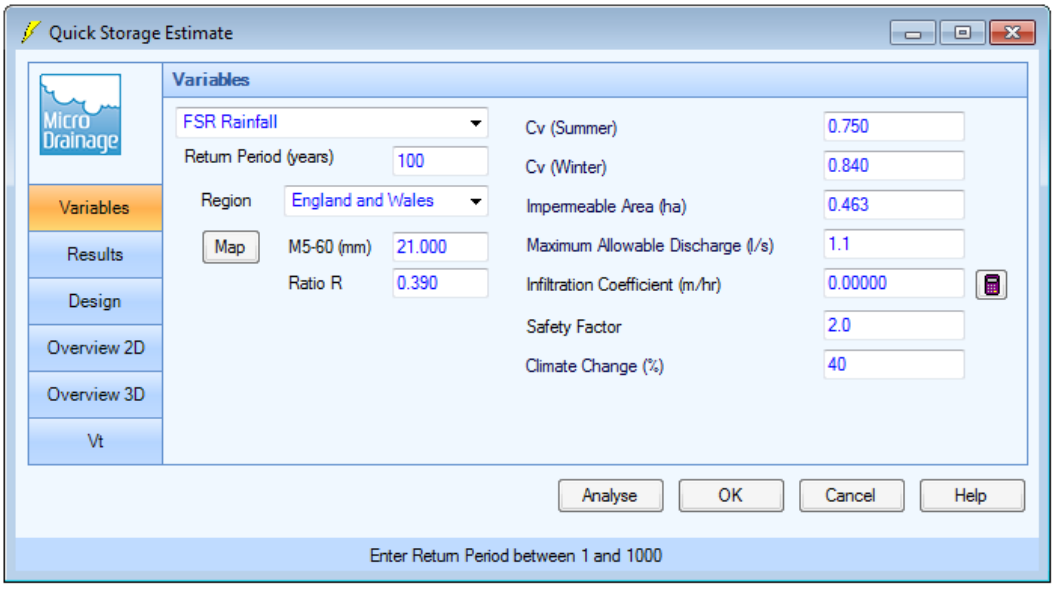
The position & depth of apparatus and other information indicated on this map is provided as a general guide only and no assurance or warranty as to its correctness or accuracy is given or should be inferred.
Exact positions & depths should be obtained by excavation trial holes and the map must not be relied on in the event of excavation or other works undertaken or planned in the vicinity of the Company's apparatus.
Please note that not all mains, service pipes and other apparatus of the Company in the area of the plan are show

Appendix D Microdrainage Greenfield Runoff Calculations

Greenfield Runoff Rate Calculation



Estimated Quick Storage Estimate Parameters



Estimated Quick Storage Volume