



Project Name : Land West of B2132 Bilsham Road, Yapton
Job No : 14-111
Note Title : Flood Risk Assessment – Addendum No.1
Author : NA
Checked : GG
Approved : GG
Date : January 2018

1.0 INTRODUCTION AND BACKGROUND

1.1 Odyssey has been commissioned by Gleeson Strategic Land to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of a planning application for a proposed residential development in Yapton.

1.2 The 11.6ha site is located in Yapton, within the Arun District of West Sussex. The site currently comprises three fields of undeveloped farmland, and forms the eastern part of the emerging allocation site SD7 in the Arun Local Plan 2017-2031. The proposed development comprises up to 250 dwellings and associated infrastructure and landscaping.

1.3 A planning application was submitted to Arun District Council (ADC) in December 2017 (Ref. Y/91/17/OUT) along with the Flood Risk Assessment, Surface Water and Foul Drainage Strategy (FRA) completed by Odyssey. ADC's Drainage Engineer has since commented on drainage strategy for the site. Refer to Appendix A for the comments.

1.4 This addendum which should be read in conjunction with the FRA and Drainage Strategy completed by Odyssey in December 2017 (report no. 14-111-17B) addresses the comments raised by ADC regarding the proposed surface water drainage strategy.

2.0 RESPONSE TO ADC COMMENTS

2.1 The FRA states that due to the poor infiltration rates encountered across the site, surface water runoff will be managed through the implementation of Sustainable Drainage Systems (SuDS) in the form of attenuation basins, prior to restricted discharge to the watercourse.

2.2 Correspondence from the ADC Drainage Engineer (**Appendix A**) states:

'Soakaways/infiltration must be fully investigated for surface water disposal. Whilst the applicant has carried out some investigation into soakage potential (Sept/Oct 2017), whereby infiltration was found to be possible, they have not incorporated this into the initial surface water drainage design...Should infiltration not offer a full solution, then a hybrid scheme (infiltration/restricted discharge to watercourses) is likely to be required.'

2.3 The soakage testing was undertaken in late October 2017, and was carried out in accordance with BRE 365 methodology. The range infiltration rates ranged from 1.86×10^{-6} m/s to 9.91×10^{-6} m/s, and will not be adequate as the only means of surface water disposal. One test pit would not reach half empty within 24 hours and therefore the infiltration rate could not be determined. The proposed attenuation basins have been designed conservatively without infiltration to ensure that flows for all rainfall events up to the 1 in 100 year event plus climate change (40%) will be attenuated. Any additional infiltration testing would not impact on the SuDS features proposed.

2.4 The underlying bedrock geology at the site consists of chalk, and there are overlying river terrace deposits of sand, silt and clay. Groundwater monitoring was undertaken in late October 2017. The first recorded groundwater levels ranged from 1.69m to 3.58m below the ground surface, and the second recorded levels ranged from 1.70m to 3.63m below the ground surface.

2.5 The ADC Drainage Engineer notes that winter groundwater monitoring will be required to determine the highest winter groundwater table. Groundwater monitoring was carried out across the site in late October 2017, in accordance with the ADC 'Supplementary Requirements for Surface Water Drainage Proposals', which states that residential developments in excess of five properties will require groundwater monitoring to be undertaken between October and March inclusive.

2.6 The highest groundwater level recorded at the site was 1.69m below the ground surface, which means that, in terms of infiltration, there is insufficient clearance between the base of the proposed basins and the highest recorded groundwater level.

2.7 If further groundwater monitoring is required, results from the current ongoing monitoring can be submitted or this can be conditioned as part of the planning application approval.

2.8 The ADC correspondence also refers to the watercourses and Main River which flow through the site. The discharge rate from the site is restricted to less than Q_{BAR} , for the 1 in 100 year event plus climate change (40%) event. The proposed attenuation basins also offer water quality and biodiversity benefits.

2.9 Land Drainage Consent will be sought from the Lead Local Flood Authority and an Environmental Permit will be required from the EA prior to development following receipt of consent.

3.0 SUMMARY AND CONCLUSIONS

3.1 Odyssey has been commissioned by Gleeson Strategic Land to complete a FRA Addendum for the proposed development in Yapton. This document demonstrates the principles of surface water management at the site, and addresses the comments raised by ADC in response to the FRA and Drainage Strategy.

3.2 It is not feasible to discharge the surface water runoff from the site to the ground, as the infiltration rates established during the site investigation are not adequate for the size and design of the development. In addition, there would not be sufficient clearance between the base of an infiltration basin and the highest recorded groundwater level.

3.3 Groundwater monitoring was undertaken in accordance with ADC's guidance. If further groundwater monitoring is required, the the current ongoing continuous monitoring data can be supplied or this can be conditioned as part of the planning application approval.

3.4 The development will ensure no detriment to any watercourses or Main River, due to the restriction of surface water discharge from the site, and the water quality and biodiversity benefits of the proposed attenuation basins.

3.5 This addendum has demonstrated that the comments raised by ADC have been addressed and therefore not constrain the approval of the proposed development.

APPENDIX A

Arun District Council's Comments on Surface Water Drainage

From: Paul Cann
Sent: 03 January 2018 14:24
To: Planning.Responses
Subject: RE: Planning Consultation on: Y/91/17/OUT

Engineers comments in respect to surface water drainage:

Please apply standard conditions ENGD2B, ENGD3A, ENGD4A, ENGD5A, ENGD5B and ENGD6A.

Soakaways/infiltration must be fully investigated for surface water disposal. Whilst the applicant has carried out some investigation into soakage potential (Sept/Oct 2017), whereby infiltration was found to be possible, they have not incorporated this into the initial surface water drainage design. The soakage potential will need to be further verified by winter groundwater monitoring and percolation testing at agreed depths. Should infiltration not offer a full solution, then a hybrid scheme (infiltration/restricted discharge to watercourses) is likely to be required.

Infiltration rates for soakage structures are to be based on percolation tests undertaken in the winter period and at the location and depth of the proposed structures. The percolation tests must be carried out in accordance with BRE 365, CIRIA R156 or a similar approved method and cater for the 1 in 10 year storm between the invert of the entry pipe to the soakaway, and the base of the structure. It must also have provision to ensure that there is capacity in the system to contain below ground level the 1 in 100 year event plus 40% on stored volumes, as an allowance for climate change. Adequate freeboard must be provided between the base of the soakaway structure and the highest recorded annual groundwater level identified in that location.

Any SuDS or soakaway design must include adequate groundwater monitoring data to determine the highest winter groundwater table in support of the design. The applicant is advised to discuss the extent of groundwater monitoring with the Council's Engineers. Supplementary guidance notes are also enclosed for information.

The development will need to ensure no detriment to any existing watercourses and to also maintain access for future maintenance. This is covered by the condition ENGD6A. No structures/fences, etc to be located with 3 metres of the top of the banks.

Any culverting of ordinary watercourses to facilitate road crossings will require land drainage consent from ourselves.

A watercourse designated 'main river' passes through the site and therefore the Environment Agency should also be consulted.

Regards

Paul Cann
Senior Engineer (Drainage & Coastal)

Paul Cann | Senior Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre,



From: planning.responses@arun.gov.uk [<mailto:planning.responses@arun.gov.uk>]

Sent: 22 December 2017 13:33

To: Paul Cann

Subject: Planning Consultation on: Y/91/17/OUT

To: **Engineers (Drainage)**

NOTIFICATION FROM ARUN DISTRICT COUNCIL

Town & Country Planning Act 1990 (as amended)

Town & country Planning (Development Management Procedure) (England) Order 2015 -

Article 5

Outline Consent

APPLICATION Y/91/17/OUT

NO:

Registered: 14th December
2017

Site Address: Land at Bilsham Road Yapton

Grid Reference: 497590 102839

Description of Works: Outline application for the development of up to 250 residential dwellings (Class C3), vehicular access, public open space, ancillary works and associated infrastructure. Departure from the Development Plan

The Council have received the above application. I shall be pleased to receive any observations you may wish to make.

[Click here to view the application details](#)

Should you have any comments to make, these should be sent by replying to this email by 01-FEB-18.

You can also monitor the progress of this application through the Council web site:
www.arun.gov.uk/planning

Please be aware that any comments you may make will be available on our website so please do not insert personal details or signatures on your reply.

In the absence of a reply within the period stated, I shall assume that you have no observations to make.

The application will be determined having regard to the development plan policies (if any are relevant) and other material considerations. The development plan can be accessed via the website as can the leaflet which deals with material planning

considerations.

Should the application go to appeal the Planning Inspectorate will publish any comments made to the Council on their website:

www.planningportal.gov.uk/planning/appeals/ but they will protect personal details.

The officer dealing with this application is Mr D Easton who can be contacted on telephone number 01903 737619.

Regards

Planning Officer

consultee_email

Supplementary Requirements for Surface Water Drainage Proposals

Any proposed surface water scheme must consider sustainable drainage principles.

SuDS Selection

The following destinations must be considered for surface runoff in order of preference:

1. Discharge into the ground (infiltration);
2. Controlled discharge to a surface water body;
3. Controlled discharge to a surface water sewer.

Surface water must not be discharged into the foul sewer system. Infiltration structures include soakaways, basins, swales and permeable paving. Discharge to surface water bodies and surface water sewers must be restricted to an agreed rate.

SuDS selection hierarchy based on:

CIRIA C753 - The SuDS Manual

BS8582:2013 – Code of Practice for Surface Water Management for Development Sites

Approved Document H of the Building Regulations

Infiltration Drainage Design

Infiltration rates for soakage structures are to be based on percolation tests undertaken in the winter period at the location and depth of the proposed structures. The percolation tests must be carried out in accordance with BRE 365, CIRIA R156 or a similar approved method, and cater for the 1 in 10 year storm event between the invert of the lowest entry pipe into the infiltration structure and the base. For the purpose of design, the percolation rate must be applied to the sides of the infiltration structure only and the rate for the base must be zero. This does not apply to infiltration basins or permeable pavements, whereby the percolation rate is applied to the base only. There must be provision to ensure that there is capacity in the system to contain the 1 in 100 year storm event plus 40% on stored volumes, as an allowance for climate change. The infiltration structure should also drain 50% of its total volume in 24 hours or less for both the 1 in 10 and 1 in 100 year (plus 40%) storm events, in order to provide spare capacity for subsequent storms.

Any infiltration drainage design must include adequate winter groundwater monitoring data to determine the highest winter groundwater table. Residential developments in excess of five properties will require ground water monitoring to be carried out between October and March inclusive. The extent of monitoring required for smaller developments will be subject to agreement with the Council's Engineers.

Adequate freeboard must be provided between the base of the soakaway structure and the highest recorded groundwater level identified in that location.

Restricted Discharge

Discharge to a watercourse or surface water sewer must be restricted to the estimated mean greenfield runoff rate (Q_{bar}) by means of a controlled outflow (or restricted to existing runoff rates for brownfield sites). This can be derived from IH124 or a similar approved method. Any storage design must be submitted with groundwater monitoring data where applicable to ensure there will be no detrimental effect on the structure or storage. Storage areas are preferred to be in an 'open' form such as ponds, rather than underground tanks.

Flow Exceedance Routes

The drainage design should show flow routes through the proposed development, demonstrating where surface water will be conveyed for three types of flow:

1. Low flow routes

Regular flow from source control features such as permeable pavements should travel in low flow channels through the development in a controlled way contributing to landscape quality.

2. Overflows

In the event of local blockages or surcharge a simple overflow arrangement should allow water to bypass the obstruction and return to the management train sequence until conditions return to normal.

3. Exceedance routes

When SuDS are overwhelmed by exceptional rainfall, then exceedance routes are required to protect people and property. These provide unobstructed overland flow routes from the development and should be considered for all drainage schemes. Exceedance routes should also be protected from future changes in land use.

Culverting a Watercourse

Culverting (piping) a watercourse is not advised unless there is no alternative. The resulting reduction in storage volume, flow capacity and habitat potential would be unacceptable. Culverted watercourses are also more difficult to maintain due to the limited accessibility.

Land Drainage Consent must be sought from the Lead Local Flood Authority (West Sussex County Council), or its agent (Arun District Council – land.drainage@arun.gov.uk), prior to starting any works (temporary or permanent) that affect the flow of water in the watercourse. Such works may include culverting, channel diversion and the installation of trash screens.

The development layout must take account of any existing watercourses (open or culverted) to ensure that future access for maintenance is not restricted.

See also:

Land Drainage Act 1991 (amended 1994)

Maintenance and Management

Ditches and watercourses (including culverts) should retain a three metre easement with access that allows for its future maintenance.

Details of the maintenance and management of the SuDS system are to be set out in writing in a site specific maintenance manual. This manual shall include details of the financial management and arrangements for the replacement of components at the end of the manufacturers recommended design life. This document is then to be submitted as part of the planning process.

References

The Building Regulations 2000
Drainage and waste disposal
Approved document H
ISBN: 1-859462-08-1

Building Research Establishment,
Soakaway Design – Digest 365 (BRE 365)
ISBN: 1 86081 604 5, 1991

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Flood Estimation for Small Catchments - IH Report 124
Marshall, D.C.W. & Bayliss, A.C.
ISBN: 0948540621, 1994

CIRIA
C697 The SUDs Manual
Woods-Ballard, B.; Kellagher, R. et al
ISBN: 978-0-86017-697-8, 2007

CIRIA
R156 Infiltration Drainage – Manual of Good Practice
Bettess, R.
ISBN: 0 86017 457 3

British Standards Institution
BS8582:2013 – Code of Practice for Surface Water Management for Development Sites
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