

From: Amanda Scholes on behalf of Planning.Responses
Sent: 17 November 2020 11:02
To: Planning Scanning
Subject: FW: Land at Stakers Farm, Yapton - Y/71/20/RES & Y/72/20/RES
Attachments: 19-156-05 Drainage Technical Note.pdf

Importance: High

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From: Simon Davis <Simon.Davis@arun.gov.uk>
Sent: 17 November 2020 10:43
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Subject: FW: Land at Stakers Farm, Yapton - Y/71/20/RES & Y/72/20/RES
Importance: High

Please add the attached to both refs as an additional document. Thanks

From: Arek Kadlec [REDACTED]
Sent: 17 November 2020 10:40
To: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Cc: Paul Cann <Paul.Cann@arun.gov.uk>; Chris Harrison [REDACTED] Christian O'Brien [REDACTED]; Brian Chamberlain [REDACTED] Scott Webster [REDACTED]; Simon Davis <Simon.Davis@arun.gov.uk>; Kate Little <[REDACTED]>
Murray Armstrong <[REDACTED]>
Subject: RE: Land at Stakers Farm, Yapton - Y/71/20/RES & Y/72/20/RES
Importance: High

Hello Laura,

Thank you for your below e-mail and comments.
We have reviewed these and prepared the attached technical note which respond to each of the item.

Could you be so kind please to review the attached and agree to a Teams meeting this afternoon – I know that last week was not possible but I hope today we can all meet?
We would really appreciate your views in the light of the attached and hopefully during the meeting we could agree a way forward.

I have copied Client's representatives so please reply to all with the meeting time suitable for you and I hope that someone from Dandara can attend at short notice – I am available all day.

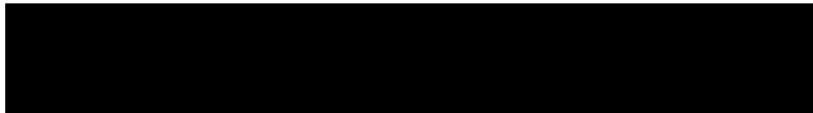
Kind Regards



Arek Kadlec | Principal Engineer

Msc CEng MCIVEM CWEM

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Project Name : Stakers Farm, Yapton

Job No : 19-156

Note Title : Technical Note

Author : AK

Checked : SW

Approved : BAC

Date : November 2020

1.0 INTRODUCTION

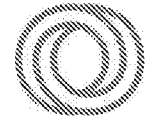
1.1.1 We have been instructed by Dandara to provide a short statement to alleviate the concerns of Arun DC relating to the drainage design by explaining the design principals and very difficult constraints of this site.

2.0 EXECUTIVE SUMMARY

Arun District Council (ADC) queries will be followed by Odyssey response

2.1.1 ADC "All structures half draining within 24 hours for the 1 in 10 year plus 40% climate change event" – Odyssey – Design is to 10 year storm (without climate change) as Paul Cann's advice which is therefore in accordance with West Sussex LLFA Policy for the Management of Surface Water (called 'the policy' in this statement) Section 5.2.2, namely "... (unless otherwise agreed with the LPA engineer)...".

2.1.2 ADC "All pipes achieving 1m/s full bore velocity" – Odyssey – Requirement of 1m/s full bore velocity is not 'the policy' requirement. Drainage design with gradients comply with 'BS EN 752 Drain and sewer systems outside buildings' and with 'The Building Regulations 2010 (2015 Edition) Section H3, point 3.15. Self-cleansing requirements are based on full bore flows generally to sewers with no flow restriction. The surface water outfall is to an infiltration basin were the outlet will be submerged restricting the flows and reducing the velocity. The industry standard Microdrainage software demonstrates no flooding. The main reason of 1 m/s is to minimise silt build up and



therefore maintenance. For this site a management company will be working to a strict maintenance regime to ensure the system does not become silted to the point where operation is affected.

2.1.3 ADC “All infiltrating devices must cater for the 1 in 10 year storm between the invert of the entry pipe to the soakaway, and the base of the structure” – Odyssey – Design will be reviewed to comply with this requirement, i.e. drainage network will be lifted so the inlet into the infiltration feature is above the 1 in 10 years storm storage volume.

2.1.4 ADC “All SuDS features must be located outside of the utilisable open space. The LAP must not be within the basin” (comment relevant to the 38 units scheme) – Odyssey – Design is amended to use only sub-surface infiltration storage with no surface basin. ADC comment not relevant any longer.

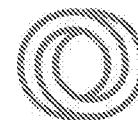
2.1.5 ADC “Adequate freeboard must be provided on open SuDS features” (comment relevant to the 38 units scheme) – Odyssey - Design is amended to use only sub-surface infiltration storage with no surface basin. ADC comment not relevant any longer.

3.0 SITE CONSTRAINTS

3.1.1 The overriding context for the drainage strategy is the fact that infiltration techniques will not work at depths greater than 600mm-750mm below existing ground level.

3.1.2 The above was confirmed by the Site Investigation (SI) company by virtue of trial pits and specific BRE365 testing. Below depth of 600mm-750mm the ground becomes less able to support infiltration.

3.1.3 Winter groundwater monitoring showed elevated water table in specific location which also restricted the depth to which infiltration can be effectively used.



4.0 DETAILED ADC QUERIES AND ODYSSEY RESPONSES

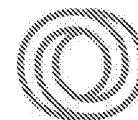
4.1.1 Arun DC Drainage engineer comment – “All structures half draining within 24 hours for the 1 in 10 year plus 40% climate change event”.

Odyssey response – During early liaison with the Arun DC drainage engineer it was established that climate change in a drainage designs for this particular site is to be applied to the 1 in 100 years event but was not required for the 1 in 10 years event (e-mails from Mr Paul Cann of 17th March 2020 and 24 September 2020). Requirement for half-draining is also repeated in the West Sussex LLFA Policy for the Management of Surface Water’ document. Relevant part of section 5.2.2 is cited below:

“...The infiltration structure should drain 50% of its total volume in 24 hours or less for the 1 in 10 year event and for the 1 in 100 year event (unless otherwise agreed with the LPA engineer) in order to provide spare capacity for subsequent storms.”

The main purpose of this requirement is “...to provide spare capacity for subsequent storms”. For sites with low infiltration such requirement of half drain within 24 hours can result in a very large storage area which would be challenging to incorporate without significant land take thus reducing the actual developable land area. It is not uncommon therefore for such situations to ‘provide spare capacity for subsequent storms’ either by applying half-drain criterion or to provide sufficient storage to cater for subsequent storms. Drainage system for this site is designed to provide sufficient storage so it does not flood during the 1 in 100 years + 40% climate change ensuring at the same time that two subsequent 1 in 10 years event can be stored within the system without flooding.

Furthermore, ‘the policy’ section 5.3.9 states that “The time required for the storage to accept further storm flows should be considered, especially if downstream flood levels can affect the outfall. Attenuation storage volume provided by any drainage area should half empty within 24 hours so that it can receive runoff from subsequent storms. If the drain down time (full to empty) is more than 24 hours, then long duration events should be assessed to ensure that drainage is not compromised by inundation. Drainage system for this site can cater for 1 in 100 years storm event (with 40% climate change) with a duration of 7 days without flooding thus meeting ‘the policy’.



4.1.2 Arun DC Drainage engineer comment – “All pipes achieving 1m/s full bore velocity”.

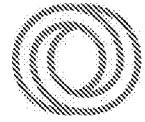
Odyssey response – the above requirement relates to pipes achieving self-cleansing velocity in the system if possible, however is not a requirement of ‘the policy’. British Standard and CIRA C753 documents do recognise that such ideal situation of 1m/s velocity is not always possible and allow for much flatter gradients where self-cleansing velocities will not be achieved. CIRA C753 in section 8.5.2 acknowledges that for very flat sites “...it is often not possible to construct piped drainage systems with sufficient falls to achieve minimum self-cleansing velocities”. It also further suggests that using shallow SuDS components like swales, pervious pavements and high capacity linear drainage channels helps in such situation. Current design incorporates pervious pavements and liner drainage as far as feasible, therefore it corresponds to CIRA document. The British Standard BS EN 752 in section ‘Design for self-cleansing’ advises that “...self-cleansing can generally be achieved by ensuring either that a velocity of at least 0.7m/s occurs daily, or that a gradient of at least 1:DN is specified”. Infiltration on this site can only be utilised in the upper 600mm-750mm depth of the ground therefore adopting gradients sufficient to achieve 0.7m/s were not possible for entire network (please note that majority of the pipes achieves flow in excess of 0.7m/s during the extreme event), however no part of the system is laid flatter than 1:DN (DN being the pipe diameter) thus the design complies with the current British Standard. BS also states that “Where self-cleansing conditions cannot be achieved provision should be made for adequate maintenance activities”. This site will be under the Management Company control relating to the maintenance and such maintenance activities can be tailored to detect any early signs of malfunction, siltation or similar and preventative actions undertaken to ensure proper operation of the system.

4.1.3 Arun DC Drainage engineer comment – “All SuDS features must be located outside of the utilisable open space. The LAP must not be within the basin” (comment relevant to the 38 units scheme)

Odyssey response – Design is amended to use only sub-surface geocellular units infiltration storage with no surface basin. ADC comment not relevant any longer

4.1.4 Arun DC Drainage engineer comment – “Adequate freeboard must be provided on open SuDS features” (comment relevant to the 38 units scheme)

Odyssey response – Design is amended to use only sub-surface geocellular units infiltration storage with no surface basin. ADC comment not relevant any longer



4.1.5 The above responses prove that the design meets the national and industry standards or guidance and thus the drainage design is fit for purpose and should not be a reason for objection to the development of this site.

4.1.6 Supporting calculations and designs are attached to follow on.

4.1.7 All other minor comments from Arun DC engineer (i.e. cover level to manholes, minimum cover level to the geocellular units infiltration blanket, bedding specification) will be addressed via revised drawings or supporting reports and evidence

APPENDIX A

To follow

APPENDIX B

To follow

APPENDIX C

To follow