

Client	Persimmon Homes		
Project Title	Dappers Lane, Angmering	Project No	20079
File Reference	20079/docs/civils/planning/discon/TN01		
Prepared By	S.Marshall	Date	22 October 2021
Subject	Discharge of ADC A/76/20/PL Conditions 18, 19 and 21	Revision	-

Introduction

This Technical Note has been prepared in response to an ADC (Arun District Council) Drainage Engineer request for further information/clarification¹.

Background

Planning Permission for the construction of 84 dwellings, along with associated infrastructure, was granted by ADC, subject to conditions, on 9 February 2021.

Condition 2 requires the development to be carried out in accordance with a list of approved documents, of which included:

- Flood Risk Assessment (Ref. D1260/FRA 1.4), prepared by RGP Design Limited, September 2020.
- Drawing No. D1260-PL300 Rev. C – Proposed Drainage Strategy.
- Drawing No. D1260-PL301 Rev. C – Proposed Drainage Strategy Alternative Solution.
- D1260 SW FINAL 2020-07-07 Network: Surface Water.

Notwithstanding this, the following conditions were also imposed:

- Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.*
- Development shall not commence until full details of the maintenance and management of the surface water drainage system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The manual is to include details of financial management and arrangements for the replacement of major components at the end of the manufacturer's recommended design life. Upon completed construction of the surface water drainage system, the owner or management company shall strictly adhere to and implement the recommendations contained within the manual.*
- The development shall not proceed until details have been submitted to and approved in writing by the Local Planning Authority for any proposals: to discharge flows to watercourses; or for the culverting, diversion, infilling or obstruction of any watercourse on or adjacent to the site. Any discharge to a watercourse must be at a rate no greater than the pre-development run-off values. No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site.*

¹ A/188/21/DOC Consultation Response email dated 19 October 2021 (Appendix A1)

Approved Documents

Flood Risk Assessment

For the purposes of this Technical Note focus is directed to sections:

- 1.4 – Groundwater.
- 4.1 – Surface Water Drainage Strategy.

Groundwater

According to published datasets the Site has a 'negligible' risk of groundwater flooding.

The Site is mapped as being underlain by Head deposits over the London Clay Formation which have aquifer designations of 'Secondary Undifferentiated' and 'Unproductive Strata' respectively.

The aquifer status of the underlying geology is 'unproductive strata' which has negligible significance for water supply or baseflow to rivers due to its low permeability.

No groundwater strikes were recorded in any of the trial pits or boreholes during the intrusive fieldwork (February 2019). Groundwater monitoring was subsequently undertaken at fortnightly intervals between March to May 2019. The first visit did not record any groundwater and whilst water was identified within all monitoring wells on subsequent visits this was attributed to surface water inundation following significant precipitation during 3-18 March 2019.

Further groundwater monitoring was undertaken between the end of November 2019 and beginning of January 2020 with very shallow water recorded. The letter report was factual and did not include any interpretation.

Surface Water Drainage Strategy

Based upon the results of site-specific infiltration tests the use of infiltration techniques was discounted. It was proposed that a connection to the watercourse flowing along the southern site boundary would be made at the southwest corner of the Site². It was noted that improvement works to the downstream culverted watercourse would be required.

However, an alternative strategy³ was also described for a new sewer to be laid through the grounds of St. Margaret's Church of England Primary School to avoid the need for the downstream culverted watercourse improvements.

Attenuation storage was to be provided in permeable paving spread throughout the development with the wider attenuation provided in a lined pond located in the southwest corner of the Site.

It was proposed that surface water flows leaving the development would be no greater than 13.6 litres per second, the calculated Greenfield Qbar rate, although it is noted that during the critical 1 in 100 year + 40% climate change event the actual discharge rate was slightly lower at 10.1 litres per second.

The Greenfield runoff calculation was based upon a total site area of 3.7-hectares.

² Proposed Drainage Strategy Drawing D1260-PL300 (Appendix A2)

³ Proposed Drainage Strategy Alternative Solution Drawing D1260-PL301 (Appendix A2)

Detailed Design

Banners Gate were instructed to commence detailed designs in September 2020.

Following a detailed review of the Surface Water Drainage Strategy, certain modifications were deemed necessary from both a viability and compliance perspective.

Compliance

Greenfield runoff rates were recalculated using the developable area of the Site (2.5-hectares). FEH rainfall was used with impermeable runoff coefficients of 1.0 applied.

Viability

The strategy pond as depicted was unimplementable. The following table summarises the pertinent levels.

Parameter	Level (mAOD)
Base level	19.8
Top water level	21.17
Top of bank level	21.3
Minimum existing ground level around perimeter	~19.7
Maximum existing ground level around perimeter	~21.8

Table 1: Surface Water Drainage Strategy Pond Levels

To deliver the strategy pond it would have been necessary to construct a raised embankment along the full length of the southern elevation; no allowances for this were made within the original strategy. Resultant design water levels would have been at worst approximately 1.5m above the natural ground level at the southwest corner of the Site which was deemed to pose an unacceptable and unnecessary risk to the existing single-storey dwellings to the south.

Additionally, the increased land take to deliver the strategy pond would have required a layout replan. Consequently, during the detailed design process the base of the attenuation pond was lowered to 18.4mAOD with a design top water level of 19.8mAOD.

In accordance with the strategy, an impermeable liner was specified. With consideration of historical borehole data and the groundwater strikes recorded during the intrusive investigations it was deemed the groundwater monitoring related to perched water, resulting from the relative impermeability of the underlying London Clay compared to the Head deposits. As the base of the attenuation pond is to be within the London Clay Formation the effects of buoyancy due to the presence of groundwater were not accounted for and the liner was positioned 0.2m below the base of the pond.

The extent of permeable paving was reduced during the detailed design process when service margins and topography were considered and after considering the achievable attenuation volume it was decided that the implications of introducing the 14+ small flow controls, with diameters of less than 30mm, outweighed the limited storage volume provided. Consequently, the use of permeable paving as a storage solution was discounted, although the permeable paving was retained in certain locations for water quality purposes.

To compensate for the resultant attenuation storage shortfall, some oversized pipes and cellular storage crates were introduced.

Discharge of Conditions Applications

A/85/21/DOC

The first Discharge of Conditions application, relevant to this Note, was submitted on 30 April 2021.

We understand the ADC Drainage Engineers were formally consulted on 5 May 2021 with their consultation response⁴ provided on 1 June 2021 recommending that the applicant either withdraws the application or the application is refused given the amount of information that was deemed missing.

A virtual meeting with the ADC Drainage Engineer was subsequently held on 15 June 2021 to discuss the application, however no further submissions were made prior to the application being refused on 25 June.

The ADC Drainage Engineers were consulted directed during July and August 2021 with a view to resolving outstanding issues prior to the second Discharge of Conditions application⁵ being submitted.

Condition 18

ADC Drainage Engineers raised⁶ a further 19 queries. The comment with the largest implications related to the provision of floatation calculations for the attenuation tank and basin, noting the structures must be lined and able to resist buoyancy forces.

An interpretive report⁷ written by a Geotechnical Specialist, a Chartered Geologist and Fellow of the Geological Society, was subsequently submitted confirming groundwater uplift does not need to be accounted for if the base of the structure is taken to the top of the London Clay Formation. However, this was dismissed by the ADC Drainage Engineers⁸ noting that the majority of Angmering sites in the area have groundwater at around 1m depth or shallower.

To progress matters Persimmon Homes authorised Banners Gate to revise the attenuation pond design to satisfy the ADC Drainage Engineers requirements. This has resulted in relatively significant design buoyancy forces on the impermeable liner which now needs to be installed at maximum depth of 4.5m below the base of the pond. Although this is a design, based upon assumptions rather than observed data, the design complies with the ADC Drainage Engineers requirements. A Contractors Risk Assessment & Method Statement has been produced.

Condition 19

A Maintenance Manual was requested.

Condition 21

Evidence of a Land Drainage Consent application submission was requested.

⁴ Email (Appendix A3)

⁵ A/188/21/DOC

⁶ Email dated 20 July 2021 (Appendix A4)

⁷ Arena Geo Letter Report Ref: 211025/002 (Appendix A5)

⁸ Email dated 24 August 2021 (Appendix A6)

A/188/1/DOC

The second Discharge of Conditions application, relevant to this Note, was submitted on 3 September 2021.

We understand the ADC Drainage Engineers were formally consulted on 7 September 2021 with their initial consultation response⁹ provided on 21 September 2021 recommending the conditions are not discharged.

A resubmission of details on 5 October resulted in further comments¹⁰ on 19 October 2021. The comments and responses are contained within Appendix A8. Updated drawings and documents included in Appendix B.

⁹ Email (Appendix A7)

¹⁰ Email (Appendix A1)

Appendix A1

Scott Marshall

Subject: FW: Planning Consultation on: A/188/21/DOC - Dappers Lane, Angmering

Importance: High

From: Laura Gibbons <[REDACTED]>
Sent: 19 October 2021 14:23
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Cc: Michael Eastham <Michael.Eastham@arun.gov.uk>
Subject: RE: Planning Consultation on: A/188/21/DOC

Dear Michael,

Thank you for consulting us, please see our comments below in *purple* to the applicants latest responses which are shown in *red*.

Condition 18

No flotation calculations have been provided, a further statement from a geotechnical company has been provided, this does not alter our previous requests for features to be lined and for flotation calculations to be provided. The majority of Angmering sites in this area have groundwater at around 1m depth or shallower, design must demonstrate that groundwater will be kept out of attenuation features now and for the lifetime of development. **BGC 30/08/21 - Attenuation Basin flotation calculations illustrated on drawing; 20079/211. Cellular Storage flotation calculations illustrated on word document; 20079 – Cellular Storage Flotation Calculations – 2021.08.04.**

Calculations should apply a factor of 0.9 to resisting forces, and a factor of 1.1 to destabilising forces. Furthermore the concrete cover slab to crates will also displace groundwater, this has not been accounted for in calculations and design. – Flotation calculations updated to reflect 0.9 factor to resisting forces and a factor of 1.1 to destabilising forces. Upon revising our calculations we can confirm that no concrete slab is required, please refer to flotation calculation word doc PDF's and drawing numbers 20079/315 C, 20079/316 C & 20079/211 D. Okay, point closed.

Concrete slab of 600mm depth leaves insufficient depth of topsoil to ensure adequate grass establishment. A minimum depth of 250mm of topsoil is required. – We can confirm no concrete slab is required and a minimum depth of 250mm topsoil can be achieved with the revised design. Please refer to drawings 20079/315 C & 20079/316 C. Okay, point closed.

Cost of 600mm deep concrete cover slab and the cost likely involved in replacing this tank at end of design life will be very significant and an unfair burden upon residents. Shallower drainage design should be considered.

Concrete cover slab must be shown on construction detail drawing. – Upon revising our calculations we can confirm that no concrete slab is required, please refer to flotation calculation word doc PDF's and drawing numbers 20079/315 C, 20079/316 C. Okay, point closed.

It is unclear how it will be possible to excavate 4.5m below the base of the attenuation basin and line it with an impermeable liner. Groundwater will make construction exceptionally difficult, if not impossible. The proximity of the basin to the adjacent watercourse will also prevent adequate batter, and will necessitate significant temporary works to stabilise excavations. Cost of replacement of liner at end of design life is an unfair burden upon residents. Also unclear how it will be possible to construct the basin with such varying liner depth accurately. – Persimmon have not expressed any concerns over the ability to construct our latest design, therefore

we foresee no issues. Please see comments of 12/10/21, awaiting full response. Excavating over 6m only 3m away from the watercourse, and the acceptability of proposals throughout the lifetime of development, are seriously questioned.

1. Please provide greenfield runoff calculations. Not provided, please provide. I note you have an impermeable area of 1.587ha, according to UKSuDS this gives a QBar rate of 3.19l/s. Please provide justification for your discharge rate, including calculations. **BGC 30/08/21 – Greenfield runoff calculations provided within re-submission, please refer to 1109-20079_ReFH2-Dev Area.pdf.** In addition to this, we would like to add that the RGP Design Flood Risk Assessment (D1260/FRA 1.4 dated 08/09/2020) states that post=development flows are not to exceed 13.6l/s (the calculated Qbar rate). Document referred to does not appear to have been provided. Please provide, and please not RGP design at Full planning was not approved. – The RGP Flood Risk Assessment and associated Drainage Drawings are listed in the approved documents/plans under condition 2. Notwithstanding this in accordance with the guidance on UKSuDS the greenfield runoff rate has been calculated using the developable area of the Site. Our requirements are for discharge rate to be based upon the area positively drained. At no stage during the full planning application did we state that the drainage strategy should be approved.
2. Please provide 30 year calculation results. ~~Provided.~~
3. Please include details of flow control devices within causeway printouts. ~~Provided, okay.~~
4. Please provide cover levels on plans. Cover levels of attenuation tanks should be provided on layout plan too. CL of CC12 is incorrectly detailed on plan. Please also see comment 6 below. **BGC 30/08/21 – Cover levels of attenuation tanks added to plan & CC12 cover level corrected, see drawings; 20079/100S104 & 20079/116-118. See below comments.** – Cover levels checked and corrected where necessary.
5. Please detail all pipe diameters and falls on plan. Not provided, please provide for Private Drainage network. **BGC 30/08/21 – All pipe diameters added and falls illustrated, see drawings; 20079/116-118.** Okay. Please connect pipes which drain more than one property to the main network via manholes rather than junctions, e.g. plots 71-72, 77-78. – Sewers that serve more than 1 property have been updated to connect directly to a MH as requested. PS106 does not tally with where the pipes are connected to the network.
6. Please detail pipe networks from housing on plan. Cover levels and invert levels, pipe diameters and falls all need to be shown on plan as per checklist requirements. I would also request that more of the network is modelled to evidence that appropriate pipe sizes and falls are being provided and that flooding does not occur. **BGC 30/08/21 – All pipe diameters added and falls illustrated, see drawings; 20079/116-118.** PS126, PS150, have no cover level stated. – Cover levels checked and corrected where necessary. Okay, point closed. PS170, PS200, PS202, PS294, PS300 have inconsistent cover levels between modelled network and layout drawing. – Cover levels checked and corrected where necessary. There is still an inconsistency at PS202
7. Please detail gully levels. ~~Okay.~~
8. Please clearly show permeable paving extents, finish and formation levels of these areas, and how they connect to the wider drainage network. – Permeable paving extents and formation levels with specific Permavoid collector outlet levels shown on master drainage layout plan, drawing numbers 20079/116 – 118. Also, permeable paving extents, formation and finish levels shown on external levels plans, drawing number 20079/101-103. Broadly okay, greater network detail is required, with invert levels of collectors very clearly shown along with the accompanying network. **BGC 30/08/21 – All Permavoid collectors have invert levels and connections to sewer network illustrated along with the accompanying network, see drawings; 20079/101-103 for sub-base formation levels and 20079/116-118 for Permavoid collector invert levels and connection to drainage network along with the accompanying network levels.** Okay. As per comments to floatation calculations, you may wish to look at a shallower drainage solution here, i.e. utilising the storage within permeable paving. – Reviewed where possible to provide shallower drainage.

~~9. Please provide details of how your proposals will ensure adequate water quality prior to discharge. And how they provide treatment at source and via a treatment train as is required. Not elaborated on. How is satisfactory treatment being provided, e.g. for highways that are not permeable.~~

~~BGC 30/08/21 – We have reviewed the SuDS Manual in regard to Surface water treatment and as per Table 26.2 and Table 26.3 below we can advise the following: The proposed development consists of 'Residential roofs' and 'Individual driveways, car parks & low traffic roads', the anticipated 'total suspended solids', 'Metals' and 'Hydro-carbons' are no greater than the treatment we are providing. For example, the total expected 'TSS' 'Low traffic roads' provides a pollutant index of 0.5. As per Table 26.3 the basin provides a pollutant mitigation index of 0.5 which will counter act the anticipated 'TSS'. Okay.~~

~~10. Please provide a catchment area plan. Please clearly show where urban creep allowances have been applied. Provided.~~

~~11. Please provide an exceedance flow route drawing. Provided.~~

~~12. Please make the attenuation tank online rather than offline. Both tanks are offline, please make these online. BGC 30/08/21 – The tanks must remain offline as this is to the adopting authorities' requirements (ICOSA). – No further action. Point closed.~~

~~13. Please provide a catchpit upstream of the tank. A minimum of 300mm sump is required in manholes upstream of tanks. BGC 30/08/21 – As per above response to comment 12. Catchpits must be provided upstream of attenuation tanks. – Catchpit has been provided upstream of attenuation tanks, (VC01 & VC02), see detail drawings 20079/315 & 20079/316. Point closed.~~

~~14. Please provide construction details of the attenuation basin, this should include a minimum of two perpendicular cross-sections. Provided.~~

~~15. Please provide full construction detail drawings. Please provide construction detail drawings of catchpits, ACO drains, permeable paved roads, etc.~~

~~BGC 30/08/21 – Full set of Construction Details provided within latest submission including ACO drains and permeable paved roads. Please refer to drawings; 20079/311, 20079/315, 20079/316, 20079/320, 20079/321, 20079/322, 20079/326, 20079/327, 20079/330 & 20079/331.~~

~~Please see earlier comment regarding showing concrete cover slab on tank detail. – Details updated to reflect required amount of sub-soil to be laid on top of storage tank, no concrete cover slab is required as per earlier comment. Okay, point closed.~~

~~Please detail what bed and surround requirements are for pipes outside of adoptable highways. – Bed and surround detail added to private drainage details. Apologies, this only appears to show class S bedding, are you confident that cover depths everywhere within private extents are sufficient to not require concrete bed and surround?~~

~~Overflow levels at CC12 and CC28 appear to be below 100 year plus 40% cc water level. – Checked, and can confirm the overflow levels are above the 100 year + 40% CC water level within the relevant Node/MH. Okay, point closed.~~

~~16. 300mm of freeboard must be provided all around the basin. If an emergency spillway is provided, this should be set a minimum of 300mm above maximum predicted water levels. Okay.~~

~~17. Can design be adjusted to ensure no flooding? Otherwise, please provide a plan which clearly shows flood extents, surrounding kerb levels and FFLs. No flooding shown in network that has been modelled, as requested in point 6 above a greater network extent should be modelled. BGC 30/08/21 – Master Drainage Network calculations provided for 2 Year, 30 Year & 100 Year + 40% Climate Change. Minor flooding (Less than 3.0m3) occurs across the network within the 15 min duration 100 Year + 40% CC event, flood routing plan illustrates flood routing paths, see drawing; 20079/161. It should be noted that in most cases where minor flooding occurs, it is within close proximity to permeable paving which will intercept flood paths. Where this does not occur, our levels design and drawing demonstrate the flood routing to either the attenuation basin and / or the proposed ditch.~~

~~Calculations show flooding at PS-286, where cover level is the same as adjacent property FFL, please removed flooding or revise FFL in this area. – Downstream pipe upsized and flooding removed.~~

~~Flooding is shown at PS-260 where adjacent garage FFL is 300mm lower than cover level. Please remove flooding. – Downstream pipe upsized and flooding removed.~~

Flooding is shown at PS-240 where adjacent FFL is 100mm lower than cover level. Please remove flooding. – Downstream pipe upsized and flooding removed.

Flooding is shown at PS-214 where adjacent FFL is 100mm lower than cover level. Please remove flooding. – Downstream pipe upsized and flooding removed.

Flooding is shown at PS102 where adjacent garage FFLS is 100mm lower than cover level. Please remove flooding. – Downstream pipe upsized and flooding removed.

Okay, point closed.

18. Please refer to our checklist for full details of our requirements for a discharge of conditions application.

BGC 30/08/21 – Checklist reviewed and no further comments / actions.

19. I note that a 300mm high bund is proposed along the northern and western boundary to "divert overland flows away from the development". It will need to be evidenced that this will not increase flood risk off site. **BGC 30/08/21 – The 300mm high bund simply diverts any existing overland flows away from the development and imitates the current pre-development situation. Unclear how this replicates the predevelopment situation, topographic survey does not identify a bund in this location currently. Proposals will mean the diversion of overland flows off site and will increase off site flood risk. Please remove bund. – Bund updated to cut off further north of the site to avoid directing overland flows to the adjacent school field and towards the development attenuation basin. Apologies but the bund does not appear to replicate the predevelopment situation, unless evidence can be supplied to the contrary the bund should be removed.**

Comments Regarding Condition 19

No maintenance manual has been supplied with this application. – Refer to Drainage Maintenance Manual Report 20079/DMM

Please include details of the replacement of features at the end of their lifetime. I.e. please indicate lifetimes of elements and the requirements for replacement at the end of their life. This should also include the regular inspection of impermeable liners.

We query the construction cost stated for the attenuation basin.

We also note that an annual maintenance budget of 1% of the costs indicated is very low.

The maintenance manual should include the requirements for riparian maintenance of the watercourse, this should include detail of the monitoring, regular maintenance and occasional maintenance as well as a statement of why riparian maintenance is required. Reference should be made to a drawing showing the extents of watercourses for which the management company will have responsibility for maintaining.

Comments Regarding Condition 21

Land drainage consent has not been granted to date. Furthermore, it is unclear how current proposals for the basin can be delivered without significant impact upon the ordinary watercourse. – We originally made the application on 05/08/2021, as far as we are aware, this was agreed to be sufficient to discharge this condition.

Once reviewed, please feel free to call to discuss any areas you wish. Please supply evidence of land drainage consent.

Kind regards,

Laura Gibbons

Drainage Engineer

Engineering Services

Please note that I work Tuesdays 08:00-16:00 for Arun only.



ARUN DISTRICT COUNCIL, Civic Centre, Mantravers Rd, Littlehampton, West Sussex, BN17 9LF

From: Planning.Responses <Planning.Responses@arun.gov.uk>

Sent: 12 October 2021 15:34

To: Land Drainage <Land.Drainage@arun.gov.uk>

Subject: Planning Consultation on: A/188/21/DOC

To: Engineers (Drainage)

NOTIFICATION FROM ARUN DISTRICT COUNCIL

TOWN AND COUNTRY PLANNING ACT 1990

Application No: A/188/21/DOC

Registered: 3rd September 2021

Site Address: Land at Dappers Lane Angmering Littlehampton

Description of Works: Approval of details reserved by condition imposed under ref A/76/20/PL relating to Condition Nos 17 - existing & proposed ground levels, 18 - surface water drainage, 19 - maintenance & management of surface water drainage, 21 - discharge flows to watercourses and 22 - foul drainage system

The Council have received the above application to discharge conditions. I shall be pleased to receive any observations you may wish to make in respect of those conditions relating to your field of expertise.

[Click here to view the Discharge of Condition application](#)

[Click here to view conditions on original application - click on decision tab](#)

Should you wish to make any comments click on the link www.arun.gov.uk/planning and click into ?Enter Comment? or if this is not possible email your response to planning.responses@arun.gov.uk by **2nd November 2021**.

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.

Yours sincerely

Michael Eastham

Planning Case Officer- Arun District Council

Telephone: 01903 737772

Email: michael.eastham@arun.gov.uk

PLCONDDC (C68) 2020

<http://www.arun.gov.uk>

DX 57406 Littlehampton

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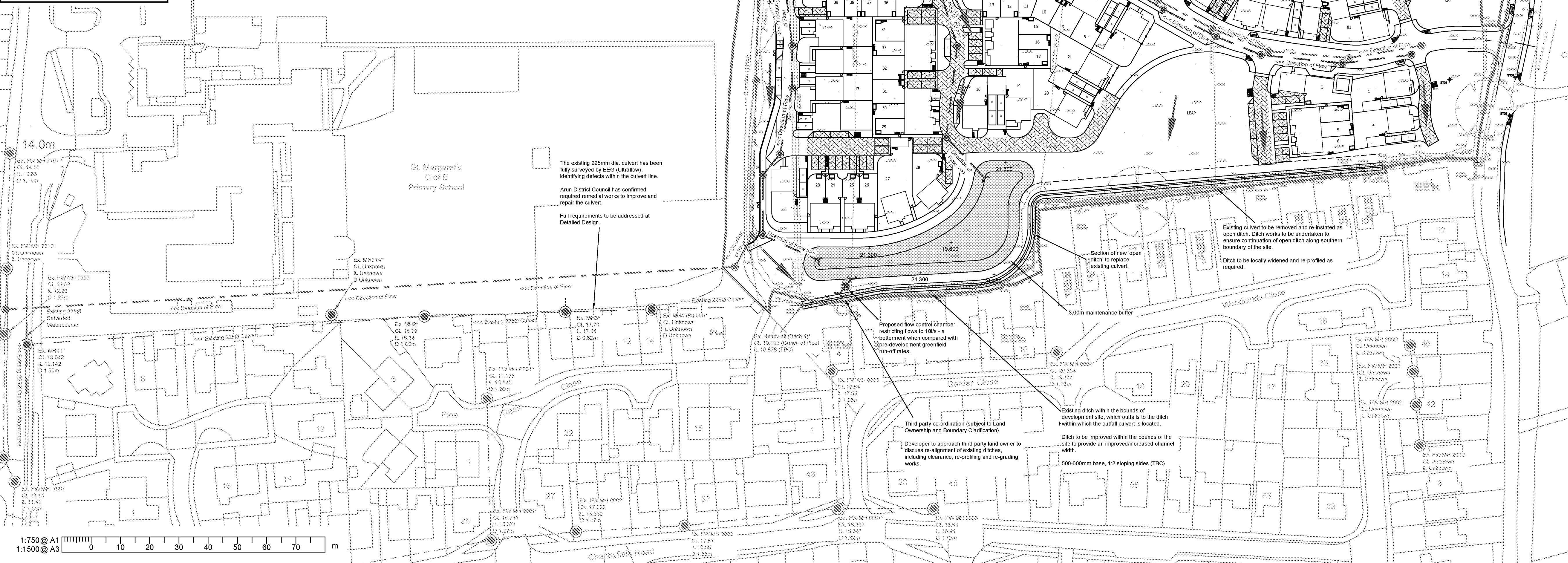


TECHNICAL NOTE

Appendix A2

- SURFACE WATER DRAINAGE-**
- Surface water disposal should be managed in view of the SuDS hierarchy;
 - Infiltration
 - Watercourse
 - Public Surface Water Sewer(s)
 - Preliminary infiltration test results indicate that infiltration is unlikely to be viable. In addition to this, initial groundwater monitoring results (March to May 2019) indicate groundwater at shallow depths.
 - Additional groundwater monitoring is to be conducted between November 2019 and March 2020, with readings to be assessed in January and February 2020 in order to verify whether additional infiltration testing will be required (subject to confirmation of 'peak' winter groundwater levels).
 - The surface water drainage strategy will utilise a connection to the 225mm dia. culverted watercourse located to the south-west of the site. The culvert has been fully surveyed by EEC (Ultraflow), whilst Arun District Council has been provided with the subsequent results, advising of necessary improvements and repairs to the culvert, should this connection be established.
 - The proposed improvements and repairs to the existing 225mm dia. culvert are to be fully evaluated at detailed design stage.
 - It is proposed that high level attenuated storage will be provided in the form of TANKED permeable paving (if infiltration is further proven to be unviable, owing to ground conditions and groundwater levels).
 - Permeable paving covering a plan area totaling 3,500m² will provide a volume of storage to the order of 504m³ (based on a 450mm sub-base, and 30% voids).
 - In addition to permeable paving, further attenuated storage will be provided in the form of a POND, which will be located to the south of the site.
 - The proposed attenuation pond has been sized to encompass 653m³ (base) with 1:3 sloping sides.
 - Flows will discharge from the attenuation pond to the open watercourse, located to the southern boundary of the site. Improvements to this section of watercourse are proposed as part of the overall development, including co-ordination with third party landowners downstream, where the existing headwall is located for the head of the culvert run.
 - Flows will be attenuated, to ensure that there is no increase in the rate of run-off leaving the site - greenfield run-off rates have been confirmed to be 13.6/s, whilst it is proposed post-development flows will be restricted to 10/s.
 - An Ordinary Watercourse Consent (OWC) application will need to be submitted to Arun District Council in order for flows to discharge to the open watercourse/culverted watercourse.
 - The surface water drainage strategy has been designed to accommodate a 1-in-100-year critical storm event, inclusive of an allowance of 40% where climate change is concerned.
 - An additional allowance has been made in view of Urban Creep, further to West Sussex County Council's 'Policy for the Management of Surface Water'.

- FOUL WATER STRATEGY-**
- Foul water disposal should adhere to the following hierarchy;
 - Public Sewer
 - Private Treatment Plant
 - Septic Tank and Drainage Field
 - Cesspool
 - It is proposed that foul flows generated by the proposed development will discharge to the public foul water sewer located in Arundel Road, to the west of the site.
 - A S106 application will be required in order to establish a connection, with approval from Southern Water, required.
 - Third party agreement will be required from St. Margaret's Church of England Primary School, as the proposed route of connection will cross third-party land.
 - Alternatively, a S98 Sewer Requisition will be required - and application for which would need to be submitted to Southern Water.
 - Post-development peak foul flows have been determined to be in the region of 3.89/s (based on Sewers for Adoption, 4000/day).



DRAINAGE KEY	
	Existing Foul Water Sewer
	Existing Foul Water Manhole
	Existing Culverted Watercourse
	Existing Surface Water Manhole
	Existing Headwall
	Proposed Surface Water Sewer
	Proposed Surface Water Manhole
	Proposed Flow Control Chamber
	Proposed Headwall
	Proposed Attenuation Pond
	Proposed Permeable Paving (TANKED)
	Proposed Foul Water Sewer
	Proposed Foul Water Manhole
	Indicative Overland Flow Routes (Exceedance)

NOTES

- This drawing is to be read in conjunction with all other RGP Design drawings, and with all relevant Architects and Engineer's drawings and specification. Any discrepancies found are to be reported immediately to the Engineer.
- RGP Design accepts no responsibility for inaccuracies in data provided by third parties such as topographic surveys or Ordnance Survey mapping.
- Do not scale work to figured dimensions only. All dimensions are in millimeters unless noted otherwise and all levels are in metres from the topographic survey datum.
- Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain.

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Rev	Date	Amendments	Drawn	Appr.
C	03/09/2020	Minor adjustment to layout	SPB	MJA
B	31/03/2020	Minor adjustment to layout	SPB	MJA
A	18/02/2020	Minor adjustment to layout	SPB	MJA
-	21/11/2019	Original issue	SPB	MJA

Client: Persimmon Homes

Project: Land at Dappers Lane, Angmering, West Sussex BN16 4EW

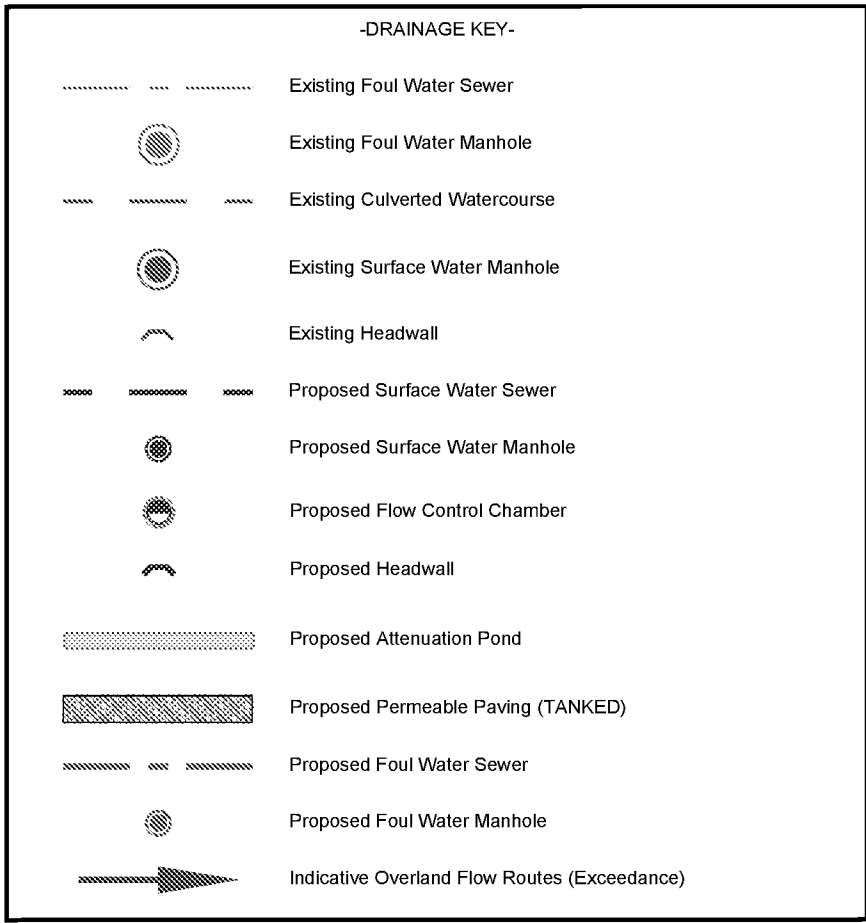
Drawing Title: Proposed Drainage Strategy

Scale	Drawn By	Checked By	Approved By
1:750	SPB	MJA	MJA

Date	Drawing No.	Rev.
November 2019	D1260-PL300	C

- SURFACE WATER DRAINAGE-**
- Surface water disposal should be managed in view of the SuDS hierarchy;
 - Infiltration
 - Watercourse
 - Public Surface Water Sewer(s)
 - Preliminary infiltration test results indicate that infiltration is unlikely to be viable. In addition to this, initial groundwater monitoring results (March to May 2019) indicate groundwater at shallow depths.
 - Additional groundwater monitoring is to be conducted between November 2019 and March 2020, with readings to be assessed in January and February 2020 in order to verify whether additional infiltration testing will be required (subject to confirmation of 'peak' winter groundwater levels).
 - If it is not possible to implement the primary drainage strategy as proposed on drawing PL300, should repairs and upgrades to the existing 225mm dia. culvert not be possible or viable, an alternative strategy has been devised, through discussion with Arun District Council, to lay a surface water sewer parallel to the proposed foul water sewer routing, to outfall to a new manhole downstream of MH01 (culverted watercourse), located in Arundel Road (the outfall location of the existing 225mm dia. culvert).
 - It is proposed that high level attenuated storage will be provided in the form of TANKED permeable paving, if infiltration is further proven to be unviable, owing to ground conditions and groundwater levels).
 - Permeable paving covering a plan area totaling 3,500m² will provide a volume of storage to the order of 504m³ (based on a 450mm sub-base, and 32% voids).
 - In addition to permeable paving, further attenuated storage will be provided in the form of a POND, which will be located to the south of the site.
 - The proposed attenuation pond has been sized to encompass 653m³ (base) with 1:3 sloping sides.
 - Flows will discharge from the attenuation pond to the proposed surface water sewer - which will connect to a new manhole downstream of MH01 (culverted watercourse) located in Arundel Road.
 - Flows will be attenuated, to ensure that there is no increase in the rate of run-off leaving the site - greenfield run-off rates have been confirmed to be 13.6/s, whilst it is proposed post-development flows will be restricted to 10/s.
 - An Ordinary Watercourse Consent (OWC) application will need to be submitted to Arun District Council in order for flows to discharge to the culverted watercourse located in Arundel Road.
 - The surface water drainage strategy has been designed to accommodate a 1-in-100-year critical storm event, inclusive of an allowance of 40% where climate change is concerned.
 - An additional allowance has been made in view of Urban Creep, further to West Sussex County Council's 'Policy for the Management of Surface Water'.

- FOUL WATER STRATEGY-**
- Foul water disposal should adhere to the following hierarchy;
 - Public Sewer
 - Private Treatment Plant
 - Septic Tank and Drainage Field
 - Cesspool
 - It is proposed that foul flows generated by the proposed development will discharge to the public foul water sewer located in Arundel Road, to the west of the site.
 - A S106 application will be required in order to establish a connection, with approval from Southern Water, required.
 - Third party agreement will be required from St. Margaret's Church of England Primary School, as the proposed route of connection will cross third-party land. Alternatively, a S98 Sewer Regulation will be required - and application for which would need to be submitted to Southern Water.
 - Post-development peak foul flows have been determined to be in the region of 3.89/s (based on Sewers for Adoption, 4000/day).



NOTES

- This drawing is to be read in conjunction with all other RGP Design drawings, and with all relevant Architects and Engineer's drawings and specification. Any discrepancies found are to be reported immediately to the Engineer.
- RGP Design accepts no responsibility for inaccuracies in data provided by third parties such as topographic surveys or Ordnance Survey mapping.
- Do not scale work to figured dimensions only. All dimensions are in millimetres unless noted otherwise and all levels are in metres from the topographic survey datum.
- Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain.



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Rev.	Date	Amendments	Drawn	Appr.
C	03/09/2020	Minor adjustment to layout	SPB	MJA
B	31/03/2020	Minor adjustment to layout	SPB	MJA
A	18/02/2020	Minor adjustment to layout	SPB	MJA
-	20/11/2019	Original issue	SPB	MJA



Client: Persimmon Homes

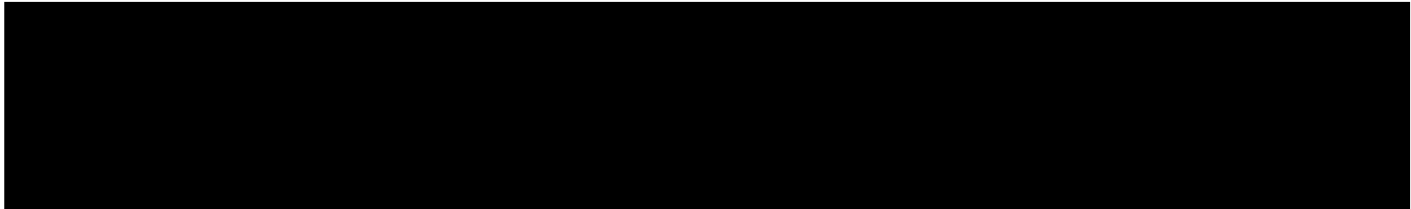
Project: Land at Dappers Lane, Angmering, West Sussex BN16 4EW

Drawing Title: Proposed Drainage Strategy Alternative Solution

Scale	Drawn By	Checked By	Approved By
1:750	SPB	MJA	MJA
Date	Drawing No.	Rev.	
November 2019	D1260-PL301	C	

1:750 @ A1
1:1500 @ A3

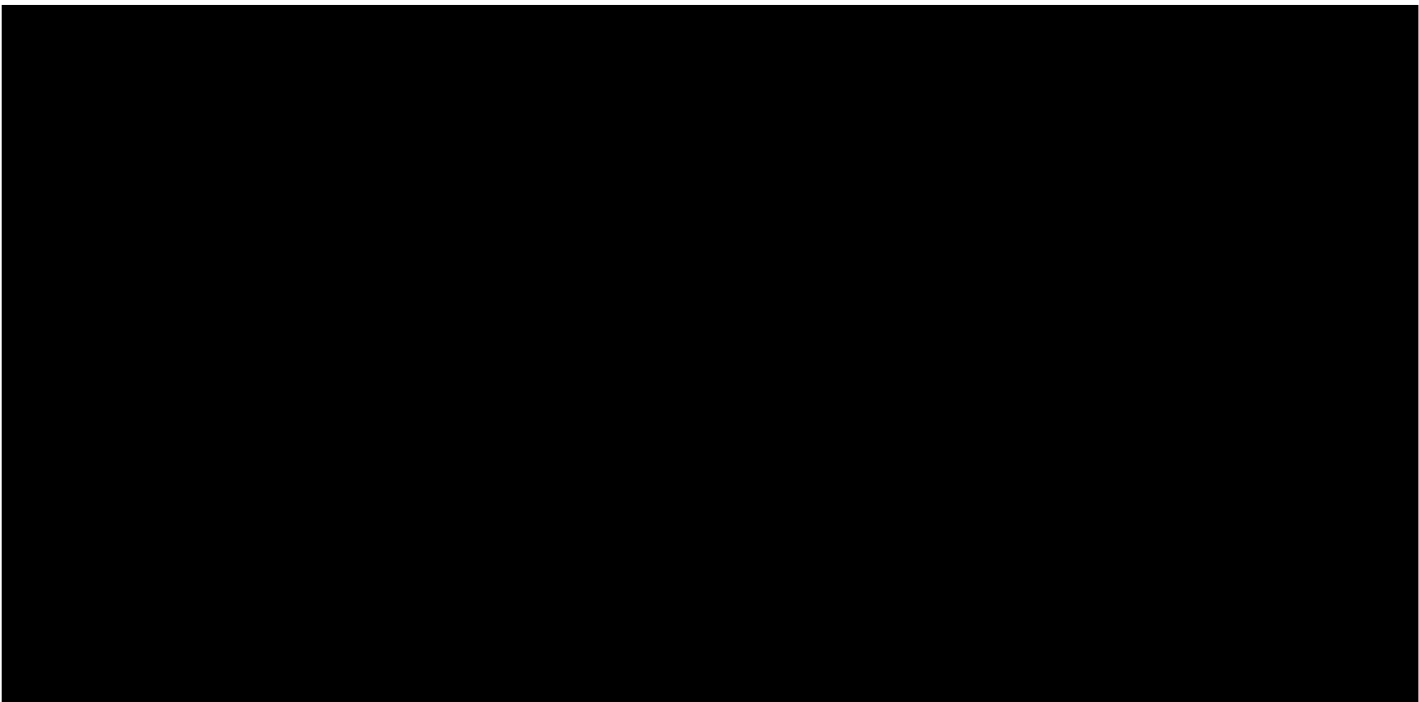
Appendix A3



Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF

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From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 01 June 2021 15:36
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Cc: Michael Eastham <Michael.Eastham@arun.gov.uk>
Subject: RE: Planning Consultation on: A/85/21/DOC

Dear Michael,

Thank you for consulting us on this discharge of conditions application, we have the following comments.

Condition 17

We note that significant land raising of circa 1m is proposed. We do not support this and will need to carefully consider the impacts of any such proposals on adjacent sites in terms of surface water runoff and groundwater levels.

Condition 18

1. Please supply an updated drainage strategy and calculations to evidence that the surface water drainage design meets policy requirements.
2. Please supply flotation calculations.
3. Layouts must detail; finish and formation level of permeable paving, invert and cover level of manholes, pipe diameters and falls, storage feature dimensions, flow control devices- with unit references clearly specified, etc.
4. Attenuation basins must have maximum side slopes of 1 in 3 and have a clear 3m buffer around them.
5. A review of construction details will be completed once more information has been supplied.

The applicant should refer to our surface water drainage checklist for details on the information that is required to support a discharge of conditions application.

Condition 19

Please supply a maintenance manual.

Condition 21

An application for land drainage consent should be made. Evidence of this application must be supplied with this DOC application.

Given the amount of information that is missing on this application we would recommend that the applicant either withdraws the application or that the application is refused. The applicant should refer to our checklist for details on the information that is required to support a discharge of conditions application.

Kind regards,

Laura Gibbons

Drainage Engineer

Please note that I work Tuesdays 08:00-16:00 for Arun only.



Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF

From: Planning.Responses <Planning.Responses@arun.gov.uk>

Sent: 05 May 2021 14:43

To: Land Drainage <Land.Drainage@arun.gov.uk>

Subject: Planning Consultation on: A/85/21/DOC

To: **Engineers (Drainage)**

NOTIFICATION FROM ARUN DISTRICT COUNCIL

TOWN AND COUNTRY PLANNING ACT 1990

Application No: A/85/21/DOC
Registered: 30th April 2021
Site Address: Land at Dappers Lane Angmering Littlehampton
Description of Works: Approval of details reserved by condition imposed under ref A/76/20/PL relating to Condition Nos 17 - existing & proposed ground levels, proposed finished floor levels, levels of any paths, drives, garages & parking areas & the proposed completed height of development & any retaining walls, 18 - surface water drainage, 19 - maintenance & management of surface water drainage, 21 - discharge flows to watercourses and 22 foul drainage system.

The Council have received the above application to discharge conditions. I shall be pleased to receive any observations you may wish to make in respect of those conditions relating to your field of expertise.

[Click here to view the Discharge of Condition application](#)

[Click here to view conditions on original application - click on decision tab](#)

Should you wish to make any comments click on the link www.arun.gov.uk/planning and click into ?Enter Comment? or if this is not possible email your response to planning.responses@arun.gov.uk by **19th May 2021**.

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.

Yours sincerely

Michael Eastham

Planning Case Officer- Arun District Council

Telephone: 01903 737772

Email: michael.eastham@arun.gov.uk

PLCOND00 (CDB) 2020

Appendix A4

Scott Marshall

Subject: FW: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)

Importance: High

From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>

Sent: 20 July 2021 10:00

To: Scott Marshall <ScottMarshall@bannersgate.com>

Cc: Castle, Daniel <daniel.castle@persimmonhomes.com>; david.dawson@persimmonhomes.com

Subject: FW: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)

Importance: High

Hi Scott,

Thanks for sending this over. Please see my comments in *red* below.

Thanks,

Laura Gibbons

Drainage Engineer

Engineering Services

Please note that I work Tuesdays 08:00-16:00 for Arun only.



T: 01903 221374

E: laura.gibbons@arun.gov.uk or laura.gibbons@adur-worthing.gov.uk

Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF

From: Scott Marshall <[REDACTED]>

Sent: 13 July 2021 17:47

To: Laura Gibbons <Laura.Gibbons@arun.gov.uk>

Cc: Castle, Daniel <[REDACTED]>; Dawson, David <[REDACTED]>

Subject: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)

Importance: High

CAUTION: This email originated from outside of the organisation. You should take extra care when clicking links or opening attachments - if you are unsure the content is safe contact the IT Helpdesk before clicking or opening.

Dear Laura,

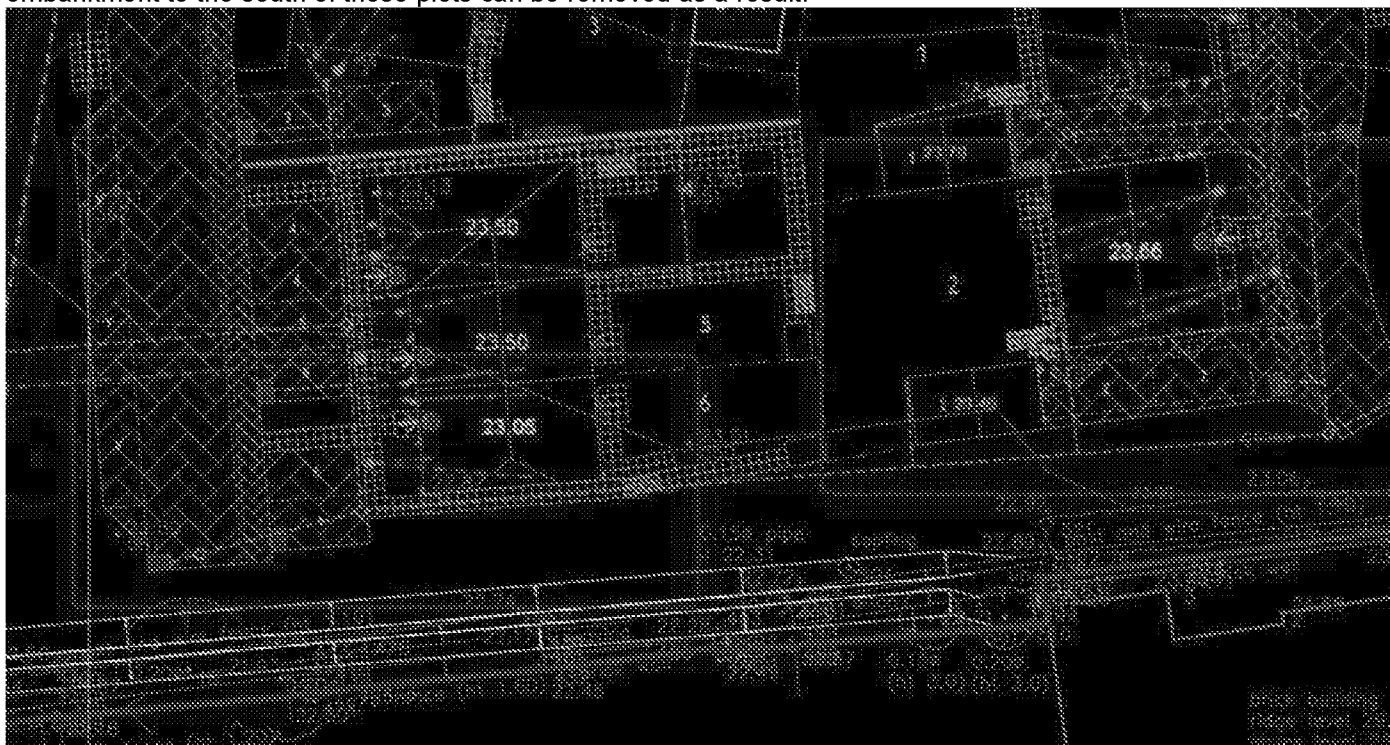
You may recall we had a brief discussion regarding the Discharge of Conditions application (A/85/21/DOC) for this development a couple of weeks ago.

We have further considered your comments and prior to formally submitting a new application thought it prudent to engage with you, informally, to ensure the information submitted is satisfactory.

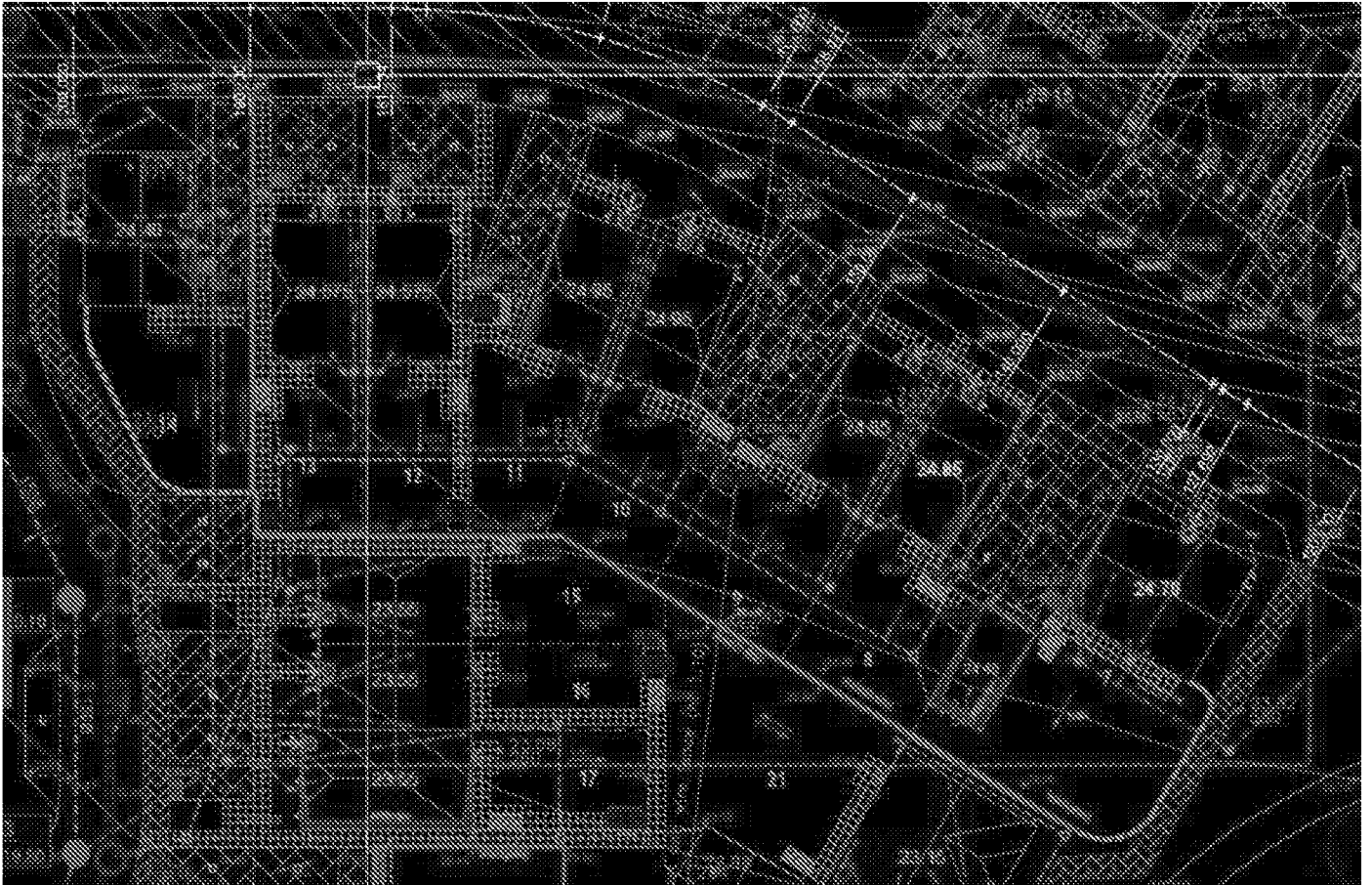
Condition 17:

No development shall commence until plans of the site showing details of the existing and proposed ground levels, proposed finished floor levels, levels of any paths, drives, garages and parking areas and the proposed completed height of the development and any retaining walls have been submitted to, and approved in writing by, the Local Planning Authority. The details shall clearly identify the relationship of the proposed ground levels and proposed completed height with adjacent buildings. The development thereafter shall be carried out in accordance with the approved details.

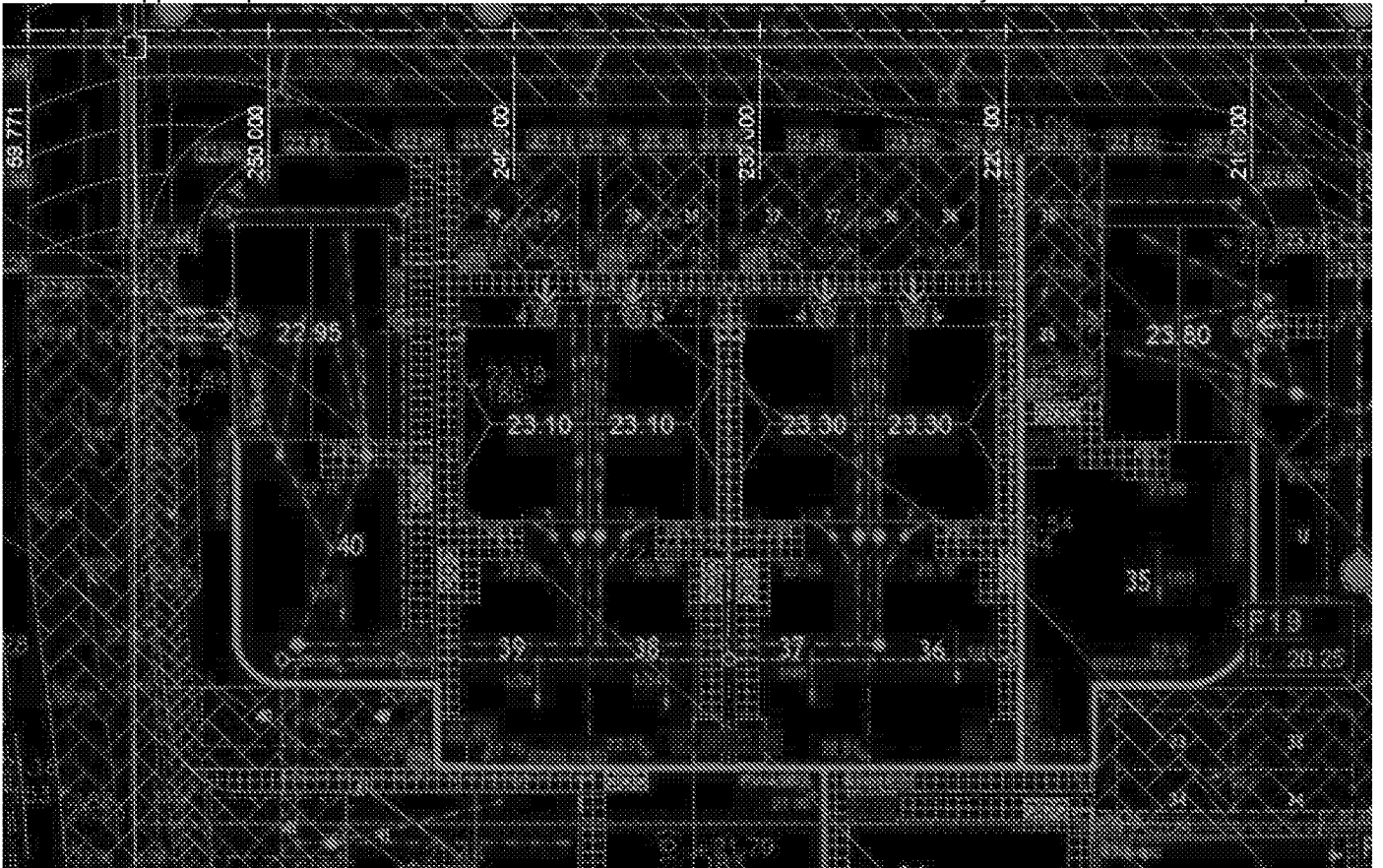
We have reviewed the land raising areas of concern and have identified by relocating the cellular storage previously located to the front of plots 3-6, further west (under the LEAP area) the finished floor levels of plots 2 and 6 can be reduced (as shown below in red revision clouds) by 0.35m and 0.45m respectively. The previously proposed embankment to the south of these plots can be removed as a result.



For the remainder of the site we acknowledge that plots 7-14 (centrally located) are approximately 1m higher than existing ground levels. However, we cannot reduce the proposed levels of these plots without adversely impacting other areas of the site (due to the topography) or by introducing steps and tanking which is undesirable. We therefore propose to retain these plots at the previously proposed levels.



The same applies to plots 35-40 as these finished floor levels are also constrained by the main road back of footpath.



We trust the above explanations satisfactorily explains the reasoning behind proposed levels, and the undertaking to lower plots 2 and 6, which are nearest to the site boundary and existing properties, will be acceptable? Okay. Please provide a plan which shows proposed and existing levels adjacent to site boundaries.

Condition 18:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

An updated Drainage Strategy Plan and supporting calculations are attached for your consideration. The Attenuation Basin has been amended to 1 in 3 side slopes with a 3m 'buffer' zone provided around the perimeter.

With regards to floatation calculations, attached are the nearest site investigation logs to the Attenuation Basin (WS3 and TP6). These suggest that the top of the London Clay Formation in the southwest corner of the Site is approximately 1m to 1.1m below ground level. We understand that the groundwater data reported by LEAP Environmental relates to a perched water table (Head Deposits). As the base of the proposed Attenuation Basin is to be constructed within the London Clay Formation can you please confirm that floatation calculations are not required for the basin as the London Clay Formation would not have any groundwater issues? Can you also please advise whether you require the basin to be lined? *Please provide floatation calculations for both the tank and basin. Groundwater monitoring evidenced that groundwater was at between ground level and 0.35m depth. Your structures must be lined and must be able to resist buoyancy forces. This has been discussed with the council's principal drainage engineer who is in full agreement.*

- 1. Please provide greenfield runoff calculations.*
- 2. Please provide 30 year calculation results.*
- 3. Please include details of flow control devices within causeway printouts.*
- 4. Please provide cover levels on plans.*
- 5. Please detail all pipe diameters and falls on plan.*
- 6. Please detail pipe networks from housing on plan.*
- 7. Please detail gully levels.*
- 8. Please clearly show permeable paving extents, finish and formation levels of these areas, and how they connect to the wider drainage network.*
- 9. Please provide details of how your proposals will ensure adequate water quality prior to discharge. And how they provide treatment at source and via a treatment train as is required.*
- 10. Please provide a catchment area plan. Please clearly show where urban creep allowances have been applied.*
- 11. Please provide an exceedance flow route drawing.*
- 12. Please make the attenuation tank on line rather than off line.*
- 13. Please provide a catchpit upstream of the tank.*
- 14. Please provide construction details of the attenuation basin, this should include a minimum of two perpendicular cross sections.*
- 15. Please provide full construction detail drawings.*
- 16. 300mm of freeboard must be provided all around the basin. If an emergency spillway is provided, this should be set a minimum of 300mm above maximum predicted water levels.*
- 17. Can design be adjusted to ensure no flooding? Otherwise, please provide a plan which clearly shows flood extents, surrounding kerb levels and FFLs.*
- 18. Please refer to our checklist for full details of our requirements for a discharge of conditions application.*

Specific details of manholes, pipes, storage features and construction details will be provided in support of the formal discharge of conditions application.

Condition 19:

Development shall not commence until full details of the maintenance and management of the surface water drainage system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The manual is to include details of financial management and arrangements for the replacement

of major components at the end of the manufacturer's recommended design life. Upon completed construction of the surface water drainage system, the owner or management company shall strictly adhere to and implement the recommendations contained within the manual.

We discussed the need for including all drainage elements within the Management Plan or only those that will be retained by the resident funded management company. We propose to include all elements for the purposes of discharging the planning condition with a caveat that any features subsequently adopted by a Sewerage Undertaker would be operated and maintained in accordance with the Undertakers procedures which may differ from those included within the Management Plan. Can you please confirm this is acceptable? Maintenance and management should be per industry standard, if undertakers wish to differ from the management plan they would need to submit a revised maintenance and management manual.

Condition 21:

The development shall not proceed until details have been submitted to and approved in writing by the Local Planning Authority for any proposals: to discharge flows to watercourses; or for the culverting, diversion, infilling or obstruction of any watercourse on or adjacent to the site. Any discharge to a watercourse must be at a rate no greater than the pre-development run-off values. No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site.

We discussed and agreed that the improvements proposed to the existing watercourse flowing along the southern boundary of the site are considered a benefit to the local area and do not directly influence the proposed development. Consequently, so long as a Land Drainage Consent for the works is submitted prior to or alongside the discharge of conditions application this condition will be discharged. There is no requirement to obtain the consent prior to the condition being discharged. After consultation with the principal drainage engineer we would require the consent to be granted prior to recommending discharge of this condition. There is no reason why this cannot be applied for now. Your proposals rely upon there being sufficient easement between watercourse top of banks and the attenuation basin, etc. Therefore we need to see details of your proposals now to ensure that they are implementable with the drainage strategy and wider development.

Should you wish to discuss further then please do not hesitate to contact me, otherwise we look forward to receiving your comments/acceptance in due course so that a new discharge of conditions application can be made.

Regards,

Scott

Scott Marshall

Senior Civil Engineer

Banners Gate Ltd

Civil, Structural and Architectural Design Services

Cavendish House, 10-11 Birmingham Street, Halesowen, West Midlands, B63 3HN

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Appendix A5

Banners Gate Limited
Cavendish House
10-11 Birmingham Street
Halesowen
B63 3HN

Our REF: 211025/002

5th August 2021

RE: DAPPERS LANE ANGMERING – GROUND MODEL

For the attention of: Steve Foxall

1 INTRODUCTION

Banners Gate Limited have requested Arena Geo Limited to provide a ground model in order to allow the civil engineering design to progress for a proposed development to the west of Dappers Lane Angmering, West Sussex. The existing site is 3.7Ha and comprises an area of south westward sloping open grass land which is used for grazing horses. It is proposed to redevelop the site with 88 No. 2 storey residential properties with private gardens and areas of publicly accessible open space, with a new attenuation pond in the south-west corner of the site.

2 PREVIOUS WORK

The following reports have been made available to Arena Geo Limited as part of this assessment:

- Leap Environmental Limited – Phase I Desk Study, Site Reconnaissance & Phase II Site Investigation Report (ref: LP1877, dated May 2019).
- RGP Design Limited – Land at Dappers Lane, Angmering Flood Risk Assessment (ref: D1260/FRA 1.3, dated March 2020).

Hereafter, these reports are referred to as the Ground Investigation Report and the FRA respectively.

3 FINDINGS OF THE REPORTS

3.1 Soil Profile

The original ground investigation report comprised a combination of 9No. trial pits and 4No. windowless sample boreholes (WS1, WS2, WS3 and WS5) with groundwater monitoring installations.

From the desk study information, the geology comprises a veneer of variable thickness of Head deposits, occasionally with shear surfaces formed by solifluction processes under periglacial conditions, overlying the London Clay Formation (typically grey silty clay with characteristic selenite crystals).

The ground investigation findings largely supported the desk study findings with regards to the site hydrogeology and geology. Head deposits were encountered to a maximum depth of 1.40m, underlain by stiff grey Clay of the London Clay, grading into extremely weak laminated Mudstone.

As part of the FRA, an additional ground investigation by Leap Environmental, under appointment by Persimmon Homes Thames Valley, comprising 2No. extra groundwater monitoring installations (WS101 and WS102). The letter report is factual and does not include any interpretation of the ground conditions.

3.2 Groundwater

The hydrogeology is summarised as the Head deposits being a Secondary Undifferentiated Aquifer, whilst the London Clay Formation is an Unproductive Strata. The site is not in a groundwater source protection zone (SPZ) and there are no groundwater abstractions within 1000m.

In terms of groundwater, no strikes were recorded in any of the trial pits or boreholes during the intrusive fieldwork period (February 2019). Site photographs appended to the report show no groundwater strikes, or evidence of water bearing strata in spoil heaps in trial pits, or soil samples from boreholes. A land drain was recorded in trial pit TP9 at 0.55m bgl.

The groundwater monitoring wells were monitored for 6 separate visits over fortnightly intervals during March to May 2019. The first visit did not record any groundwater levels.

Subsequent visits post 1st March 2019 recorded water levels between 0.14 and 1.04 m bgl. The ground investigation report author interprets this rise as attributable to surface water inundation of the wells following significant precipitation during 3rd to 18th of March 2019.

The preliminary risk register included in Appendix D of the ground investigation report assesses the likelihood of high groundwater on the site as “negligible” and though the impact is “high”, it therefore has a “Trivial” risk rating.

Monitoring of the additional boreholes (WS101 and WS102) undertaken as part of the FRA recorded no groundwater strikes during the intrusive works (22 November 2019). However, by the time the first monitoring is undertaken a week later, the groundwater monitoring results are very shallow (circa 0.15m below ground level).

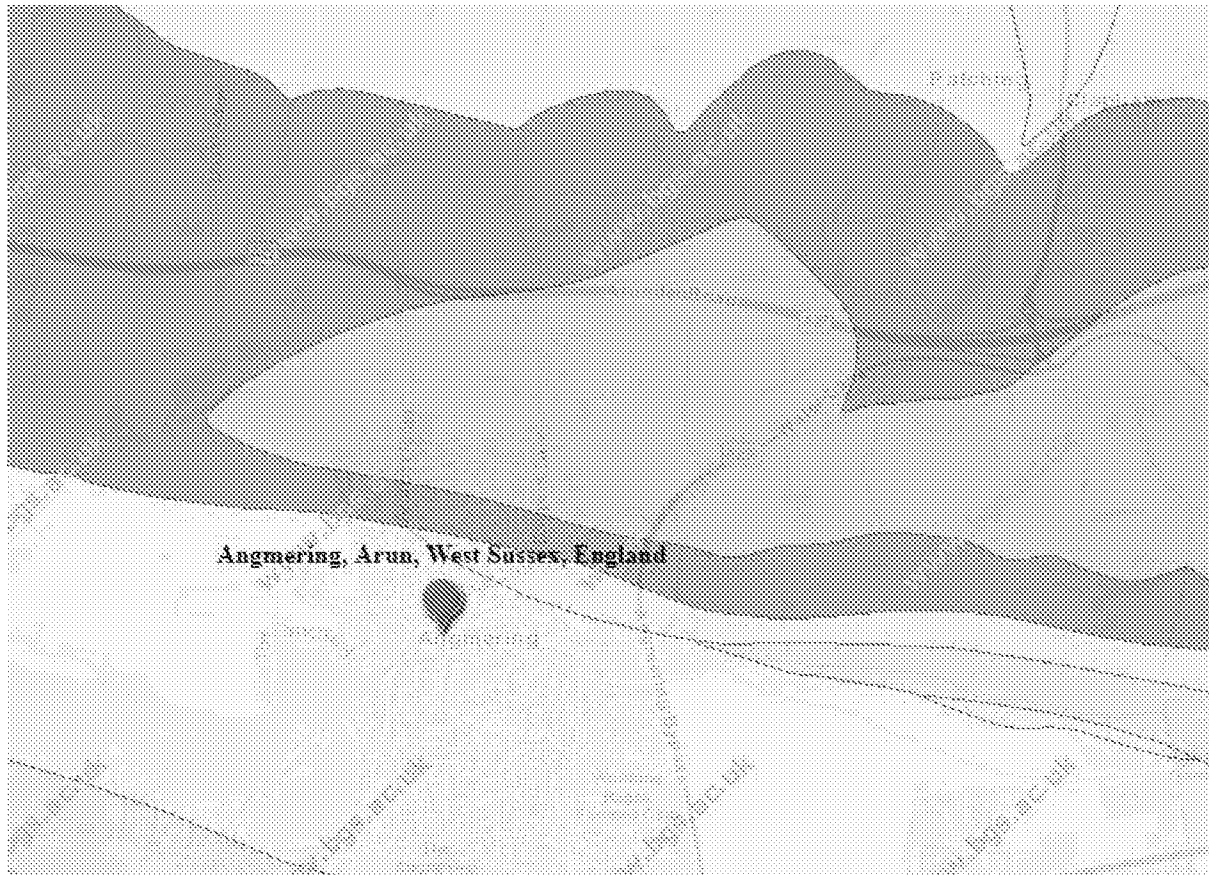
4 GROUND MODEL

4.1 Rationale

Interpretations of geological strata are not provided on the logs in either the original ground investigation or the supplementary FRA boreholes. AGL have undertaken an independent assessment to classify the strata on the following rationale:

- Head deposits - are generally soft or loose (low SPT N values, typically below 10) as they were formed by transportation by water and gravity flows downhill, and therefore are not well compacted / consolidated. As result of their downslope mass movement, the soils will not have a discernible structure (laminations etc.) and may have shear surfaces due to slips (note, that it is not easy to observe shear surfaces in the field – particularly in boreholes – so their absence on the logs does not imply they are not present).
- London Clay - by contrast is an overconsolidated soil and will be firm becoming stiff consistency and as result will have higher recorded pocket penetrometer or SPT N values. As the weathering profile decreases with depth, it will grade into hard clay then weak mudstone. Where weathered at shallow depths, some relict structure will be seen (laminations), and often contains angular mudstone gravel, with characteristic selenite (gypsum) crystals growing along partings or fissures. The London Clay in this area commonly contains sand bands and flint gravel beds, particularly at the base of the stratum. With reference to the geological map of the area on the British Geological Survey (BGS) Geology of Britain website (<https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/> accessed 5th August 2021) it is likely that the London Clay thins towards the south of the site, as the older succession of the Lambeth Group which underlies the London Clay, and outcrops a short distance to the south to the site. The Lambeth Group, in turn is underlain by the Chalk (see Figure 1 below – light brown is London Clay; orange, Lambeth; and green, Chalk).

Figure 1: Geological Map (reproduced from BGS Geology of Britain website)



4.2 Historical boreholes

There are several boreholes available on the BGS website in two areas that do include interpretation of geological strata.

To the east of the site, the Lambeth Group (formerly known as Woolwich Beds) are shown at shallow depths. This implies the London Clay is close to the base of the stratum in this area, and is supported by the geological map.

To the north of the site several boreholes are available that were undertaken for the A27 highway. These show that head deposits are either thin or absent.

http://scans.bgs.ac.uk/sobi_scans/boreholes/569718/images/12185938.html

http://scans.bgs.ac.uk/sobi_scans/boreholes/569717/images/12185937.html

http://scans.bgs.ac.uk/sobi_scans/boreholes/569716/images/12185936.html

4.3 Ground Summary

Using the above rationale and with reference to the findings of the nearby historical borehole information, Arena Geo have interpreted the depths to the base of the Head deposits as below in Table 1.

4.4 Groundwater

AGL have independently obtained freely available nearby borehole information from the British Geological Survey (BGS) which indicates that the groundwater is likely to be at a depth that would not be impacted by the development, examples below:

http://scans.bgs.ac.uk/sobi_scans/boreholes/569956/images/12186254.html

http://scans.bgs.ac.uk/sobi_scans/boreholes/569954/images/12186252.html

In these boreholes, groundwater was struck at 61.6m and 54.6m bgl respectively (a small seepage noted at 11.2m bgl in the second). This depth generally corresponds to the to the top of the Chalk.

Note that the Chalk Aquifer is too deep below the site to be impacted by the works. BGS borehole records TQ00SE6 TQ00SE4 and TQ00NE63, all situated within 400m of the site, indicate resting groundwater levels between 11.28 and 24.95m below ground level (bgl).

Table 1: Depths to London Clay / base of Head Deposits

Exploratory hole	Top of London Clay / base of Head deposits (m bgl)	Notes
WS1	1.80	Boundary uncertain, conservative depth provided
WS2	1.00	
WS3	1.10	Close to proposed basin, high PP and SPT indicate London Clay
WS5	1.40	
WS101	1.50	Different logger, not consistent with 2019 logs
WS102	2.00	Different logger, not consistent with 2019 logs
TP2	2.20	Boundary uncertain, conservative depth provided
TP3	1.30	
TP4	1.30	
TP5	1.60	Boundary uncertain, conservative depth provided
TP6	1.00	Close to proposed basin, high PP and SPT indicate London Clay
TP7	1.30	Location not shown on plan, as 2No. TP8
TP8	1.00	Location uncertain, as 2No. TP8
TP9	1.60	Boundary uncertain, conservative depth provided
TP10	0.15	Head absent

5 RECOMMENDATIONS

It is understood that the proposed attenuation pond will need to be designed to counteract the effects of buoyancy due to the presence of groundwater.

It is our opinion with consideration of the historical borehole data and groundwater strikes recorded during the site specific ground investigation, that the groundwater monitored on site is likely to be perched water, as a result of the relative impermeability of the London Clay compared to the normally consolidated Head deposits (known as an aquiclude).

This means that if excavations for the basin are taken to the top of the London Clay then groundwater uplift does not need to be accounted for in the design.

However, perched water does present a consideration for the temporary works design as it may enter the excavation and so it will need to be carefully managed on site.

Following review of the site specific and historical nearby boreholes, we suggest that for design purposes, the Head deposits should conservatively be assumed to a maximum depth of 2m below ground level. There may be an opportunity to apply an observational approach on site to reduce this depth of excavation, although this is likely to create uncertainty for design purposes and may have programme consequences. Additional trial pit investigation in the area may provide greater confidence.

I trust this satisfies your current requirements, but if you should require further clarification on anything, please do not hesitate to contact me.

Kind regards,

A black rectangular box redacting the signature of D M Treanor.

D M Treanor MSc CGeol EurGeol FGS

Geotechnical Specialist

Appendix A6

From: Laura Gibbons
To: Scott Marshall
Subject: RE: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)
Date: 24 August 2021 11:45:28
Attachments: image009.png

Hi Scott,

Thanks for supplying this information, please see my comments below in blue.

Kind regards,

Laura Gibbons

Drainage Engineer
Engineering Services

Please note that I work Tuesdays 08.00-16.00 for Arun only.



T: 01993 221874

E: laura.gibbons@arun.gov.uk or laura.gibbons@adur-worthing.gov.uk

Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LP

From: Scott Marshall <ScottMarshall@bannersgate.com>
Sent: 11 August 2021 17:50
To: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Subject: RE: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)

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Hi Laura,

Thank you for your email dated 20 July regarding the above development.

My colleagues have considered your comments and have provided this link to an updated submission pack:

[20079_Dappers Lane_Inferral Resubmission](#)

I understand a Land Drainage Consent application was submitted on 05 August concerning Condition 21.

Please do not hesitate to contact me should you wish to discuss further, otherwise we look forward to hearing from you in due course.

Regards,

Scott

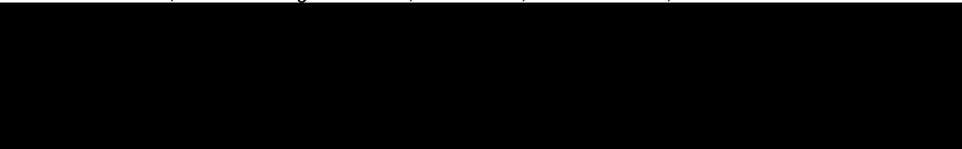
Scott Marshall

Senior Civil Engineer

Banners Gate Ltd

Civil, Structural and Architectural Design Services

Cavendish House, 10-11 Birmingham Street, Halesowen, West Midlands, B63 3HN



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From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 20 July 2021 10:00
To: Scott Marshall <[REDACTED]>
Cc: Castle, Daniel <daniel.castle@arun.gov.uk>; [REDACTED]
Subject: FW: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)
Importance: High

Hi Scott,

Thanks for sending this over. Please see my comments in *red* below.

Thanks,

Laura Gibbons
Drainage Engineer
Engineering Services
Please note that I work Tuesdays 08.00-16.00 for Arun only.



T: 01903 221374
E: laura.gibbons@arun.gov.uk or laura.gibbons@adur-worthing.gov.uk
Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LP

From: Scott Marshall <[REDACTED]>
Sent: 13 July 2021 17:47
To: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Cc: Castle, Daniel <[REDACTED]>; Dawson, David <[REDACTED]>
Subject: 20079: Land at Dapper's Lane, Angmering (A/76/20/PL)
Importance: High

CAUTION: This email originated from outside of the organisation. You should take extra care when clicking links or opening attachments - if you are unsure the content is safe contact the IT Helpdesk before clicking or opening.

Dear Laura,

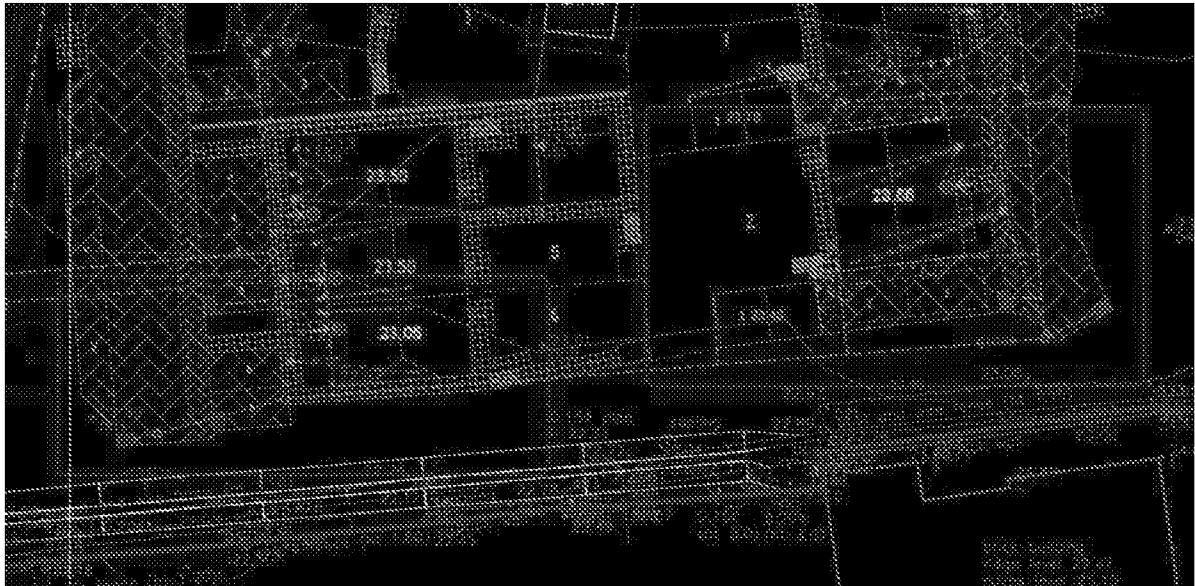
You may recall we had a brief discussion regarding the Discharge of Conditions application (A/85/21/DOC) for this development a couple of weeks ago.

We have further considered your comments and prior to formally submitting a new application thought it prudent to engage with you, informally, to ensure the information submitted is satisfactory.

Condition 17:

No development shall commence until plans of the site showing details of the existing and proposed ground levels, proposed finished floor levels, levels of any paths, drives, garages and parking areas and the proposed completed height of the development and any retaining walls have been submitted to, and approved in writing by, the Local Planning Authority. The details shall clearly identify the relationship of the proposed ground levels and proposed completed height with adjacent buildings. The development thereafter shall be carried out in accordance with the approved details.

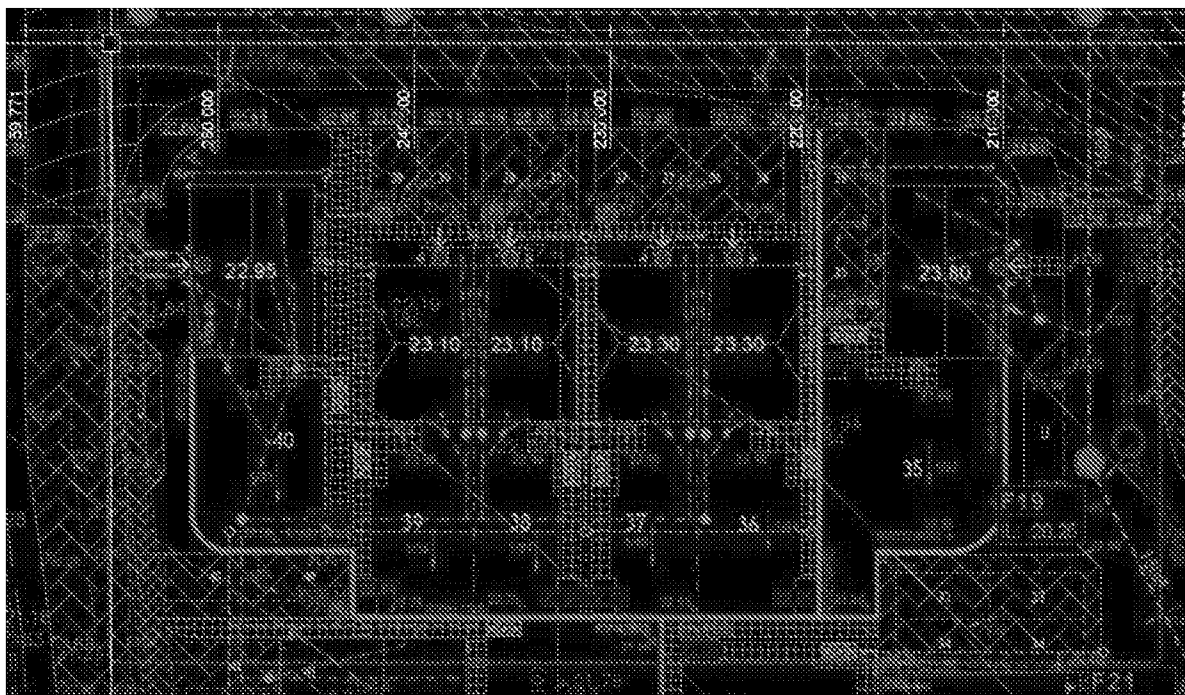
- We have reviewed the land raising areas of concern and have identified by relocating the cellular storage previously located to the front of plots 3-6, further west (under the LEAP area) the finished floor levels of plots 2 and 6 can be reduced (as shown below in red revision clouds) by 0.35m and 0.45m respectively. The previously proposed embankment to the south of these plots can be removed as a result.



For the remainder of the site we acknowledge that plots 7-14 (centrally located) are approximately 1m higher than existing ground levels. However, we cannot reduce the proposed levels of these plots without adversely impacting other areas of the site (due to the topography) or by introducing steps and tanking which is undesirable. We therefore propose to retain these plots at the previously proposed levels.



The same applies to plots 35-40 as these finished floor levels are also constrained by the main road back of footpath.



We trust the above explanations satisfactorily explains the reasoning behind proposed levels, and the undertaking to lower plots 2 and 6, which are nearest to the site boundary and existing properties, will be acceptable? *Okay. Please provide a plan which shows proposed and existing levels adjacent to site boundaries.*

Condition 18:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any infiltration drainage. No building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

An updated Drainage Strategy Plan and supporting calculations are attached for your consideration. The Attenuation Basin has been amended to 1 in 3 side slopes with a 3m 'buffer' zone provided around the perimeter.

With regards to floatation calculations, attached are the nearest site investigation logs to the Attenuation Basin (WS3 and TP6). These suggest that the top of the London Clay Formation in the southwest corner of the Site is approximately 1m to 1.1m below ground level. We understand that the groundwater data reported by LEAP Environmental relates to a perched water table (Head Deposits). As the base of the proposed Attenuation Basin is to be constructed within the London Clay Formation can you please confirm that floatation calculations are not required for the basin as the London Clay Formation would not have any groundwater issues? Can you also please advise whether you require the basin to be lined? *Please provide floatation calculations for both the tank and basin. Groundwater monitoring evidenced that groundwater was at between ground level and 0.35m depth. Your structures must be lined and must be able to resist buoyancy forces. This has been discussed with the council's principal drainage engineer who is in full agreement. No floatation calculations have been provided, a further statement from a geotechnical company has been provided, this does not alter our previous requests for features to be lined and for floatation calculations to be provided. The majority of Angmering sites in this area have groundwater at around 1m depth or shallower, design must demonstrate that groundwater will be kept out of attenuation features now and for the lifetime of development.*

1. *Please provide greenfield runoff calculations.* Not provided, please provide. I note you have an impermeable area of 1.587ha, according to UKSuDS this gives a QBar rate of 3.19l/s. Please provide justification for your discharge rate, including calculations.
2. *Please provide 30 year calculation results.* Provided.
3. *Please include details of flow control devices within causeway printouts.* Provided, okay.
4. *Please provide cover levels on plans.* Cover levels of attenuation tanks should be provided on layout plan too. CL of CC12 is incorrectly detailed on plan. Please also see comment 6 below.
5. *Please detail all pipe diameters and falls on plan.* Not provided, please provide for Private Drainage network.
6. *Please detail pipe networks from housing on plan.* Cover levels and invert levels, pipe diameters and falls all need to be shown on plan as per checklist requirements. I would also request that more of the network is modelled to evidence that appropriate pipe sizes and falls are being provided and that flooding does not occur.
7. *Please detail gully levels.* Okay.

8. Please clearly show permeable paving extents, finish and formation levels of these areas, and how they connect to the wider drainage network. . Broadly okay, greater network detail is required, with invert levels of collectors very clearly shown along with the accompanying network.
9. Please provide details of how your proposals will ensure adequate water quality prior to discharge. And how they provide treatment at source and via a treatment train as is required. Not elaborated on. How is satisfactory treatment being provided, e.g. for highways that are not permeable.
10. Please provide a catchment area plan. Please clearly show where urban creep allowances have been applied.
Provided
11. Please provide an exceedance flow route drawing. Provided.
12. Please make the attenuation tank on line rather than off line. Both tanks are offline, please make these online.
13. Please provide a catchpit upstream of the tank. A minimum of 300mm sump is required in manholes upstream of tanks.
14. Please provide construction details of the attenuation basin, this should include a minimum of two perpendicular cross sections. Provided.
15. Please provide full construction detail drawings. Please provide construction detail drawings of catchpits, ACO drains, permeable paved roads, etc.
16. 300mm of freeboard must be provided all around the basin. If an emergency spillway is provided, this should be set a minimum of 300mm above maximum predicted water levels. Okay.
17. Can design be adjusted to ensure no flooding? Otherwise, please provide a plan which clearly shows flood extents, surrounding kerb levels and FFLs. No flooding shown in network that has been modelled, as requested in point 6 above a greater network extent should be modelled.
18. Please refer to our checklist for full details of our requirements for a discharge of conditions application.
19. I note that a 300mm high bund is proposed along the northern and western boundary to "divert overland flows away from the development". It will need to be evidenced that this will not increase flood risk off site.

Specific details of manholes, pipes, storage features and construction details will be provided in support of the formal discharge of conditions application.

Condition 19:

Development shall not commence until full details of the maintenance and management of the surface water drainage system is set out in a site-specific maintenance manual and submitted to, and approved in writing, by the Local Planning Authority. The manual is to include details of financial management and arrangements for the replacement of major components at the end of the manufacturer's recommended design life. Upon completed construction of the surface water drainage system, the owner or management company shall strictly adhere to and implement the recommendations contained within the manual.

We discussed the need for including all drainage elements within the Management Plan or only those that will be retained by the resident funded management company. We propose to include all elements for the purposes of discharging the planning condition with a caveat that any features subsequently adopted by a Sewerage Undertaker would be operated and maintained in accordance with the Undertakers procedures which may differ from those included within the Management Plan. Can you please confirm this is acceptable? Maintenance and management should be per industry standard, if undertakers wish to differ from the management plan they would need to submit a revised maintenance and management manual.

Condition 21:

The development shall not proceed until details have been submitted to and approved in writing by the Local Planning Authority for any proposals; to discharge flows to watercourses; or for the culverting, diversion, infilling or obstruction of any watercourse on or adjacent to the site. Any discharge to a watercourse must be at a rate no greater than the pre-development run-off values. No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site.

We discussed and agreed that the improvements proposed to the existing watercourse flowing along the southern boundary of the site are considered a benefit to the local area and do not directly influence the proposed development. Consequently, so long as a Land Drainage Consent for the works is submitted prior to or alongside the discharge of conditions application this condition will be discharged. There is no requirement to obtain the consent prior to the condition being discharged. After consultation with the principal drainage engineer we would require the consent to be granted prior to recommending discharge of this condition. There is no reason why this cannot be applied for now. Your proposals rely upon there being sufficient easement between watercourse top of banks and the attenuation basin, etc. Therefore we need to see details of your proposals now to ensure that they are implementable with the drainage strategy and wider development.

Should you wish to discuss further then please do not hesitate to contact me, otherwise we look forward to receiving your comments/acceptance in due course so that a new discharge of conditions application can be made.

Regards,

Scott

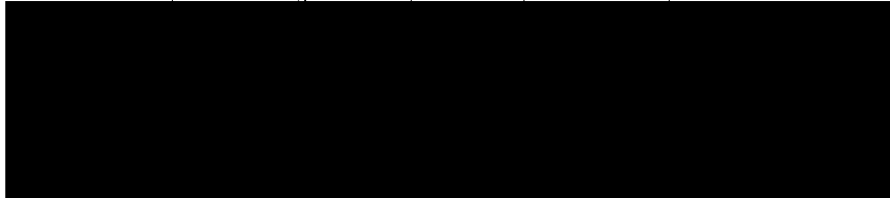
Scott Marshall

Senior Civil Engineer

Banners Gate Ltd

Civil, Structural and Architectural Design Services

Cavendish House, 10-11 Birmingham Street, Halesowen, West Midlands, B63 3HN



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Appendix A7

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Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF
www.arun.gov.uk

Sign up to our newsletter **[here](#)**



From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 21 September 2021 11:49
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Cc: Michael Eastham <Michael.Eastham@arun.gov.uk>
Subject: RE: Planning Consultation on: A/188/21/DOC

Engineers Comments Regarding Surface Water Drainage

We do not recommend discharge of conditions 18, 19 or 21 at this time.

Comments Regarding Condition 18

The below is a detailed comment log regarding this application. The information submitted shows that the proposals could result in internal flooding to on site dwellings as well as an increased risk of flooding offsite. Furthermore, it is not clear how the proposals are constructable.

Key

ADC Comments 01/06/21 and 20/07/21
ADC comments 24/08/21

BGC response 30/08/21
ADC comments 21/09/21

No flotation calculations have been provided, a further statement from a geotechnical company has been provided, this does not alter our previous requests for features to be lined and for flotation calculations to be provided. The

majority of Angmering sites in this area have groundwater at around 1m depth or shallower, design must demonstrate that groundwater will be kept out of attenuation features now and for the lifetime of development. BGC 30/08/21 - Attenuation Basin floatation calculations illustrated on drawing; 20079/211. Cellular Storage floatation calculations illustrated on word document; 20079 – Cellular Storage Floatation Calculations – 2021.08.04.

Calculations should apply a factor of 0.9 to resisting forces, and a factor of 1.1 to destabilising forces. Furthermore the concrete cover slab to crates will also displace groundwater, this has not been accounted for in calculations and design.

Concrete slab of 600mm depth leaves insufficient depth of topsoil to ensure adequate grass establishment. A minimum depth of 250mm of topsoil is required.

Cost of 600mm deep concrete cover slab and the cost likely involved in replacing this tank at end of design life will be very significant and an unfair burden upon residents. Shallower drainage design should be considered.

Concrete cover slab must be shown on construction detail drawing.

It is unclear how it will be possible to excavate 4.5m below the base of the attenuation basin and line it with an impermeable liner. Groundwater will make construction exceptionally difficult, if not impossible. The proximity of the basin to the adjacent watercourse will also prevent adequate batter, and will necessitate significant temporary works to stabilise excavations. Cost of replacement of liner at end of design life is an unfair burden upon residents. Also unclear how it will be possible to construct the basin with such varying liner depth accurately.

1. Please provide greenfield runoff calculations. Not provided, please provide. I note you have an impermeable area of 1.587ha, according to UKSuDS this gives a QBar rate of 3.19l/s. Please provide justification for your discharge rate, including calculations. BGC 30/08/21 – Greenfield runoff calculations provided within re-submission, please refer to 1109-20079_ReFH2-Dev Area.pdf. In addition to this, we would like to add that the RGP Design Flood Risk Assessment (D1260/FRA 1.4 dated 08/09/2020) states that post-development flows are not to exceed 13.6l/s (the calculated Qbar rate). Document referred to does not appear to have been provided. Please provide, and please not RGP design at Full planning was not approved.

~~2. Please provide 30-year calculation results. Provided.~~

~~3. Please include details of flow control devices within causeway printouts. Provided, okay~~

4. Please provide cover levels on plans. Cover levels of attenuation tanks should be provided on layout plan too. CL of CC12 is incorrectly detailed on plan. Please also see comment 6 below. BGC 30/08/21 – Cover levels of attenuation tanks added to plan & CC12 cover level corrected, see drawings; 20079/1005104 & 20079/116-118. See below comments.

5. Please detail all pipe diameters and falls on plan. Not provided, please provide for Private Drainage network. BGC 30/08/21 – All pipe diameters added and falls illustrated, see drawings; 20079/116-118. Okay. Please connect pipes which drain more than one property to the main network via manholes rather than junctions, e.g. plots 71-72, 77-78.

6. Please detail pipe networks from housing on plan. Cover levels and invert levels, pipe diameters and falls all need to be shown on plan as per checklist requirements. I would also request that more of the network is modelled to evidence that appropriate pipe sizes and falls are being provided and that flooding does not occur. BGC 30/08/21 – All pipe diameters added and falls illustrated, see drawings; 20079/116-118. PS126, PS150, have no cover level stated.

PS170, PS200, PS202, PS294, PS300 have inconsistent cover levels between modelled network and layout drawing.

~~7. Please detail gully levels. Okay.~~

8. Please clearly show permeable paving extents, finish and formation levels of these areas, and how they connect to the wider drainage network. .

Broadly okay, greater network detail is required, with invert levels of collectors very clearly shown along with the accompanying network. BGC 30/08/21 – All Permavoid collectors have invert levels and connections to sewer network illustrated along with the accompanying network, see drawings; 20079/101-103 for sub-base formation

levels and 20079/116-118 for Permavoid collector invert levels and connection to drainage network along with the accompanying network levels. *Okay. As per comments to floatation calculations, you may wish to look at a shallower drainage solution here, i.e. utilising the storage within permeable paving.*

9. *Please provide details of how your proposals will ensure adequate water quality prior to discharge. And how they provide treatment at source and via a treatment train as is required. Not elaborated on. How is satisfactory treatment being provided, e.g. for highways that are not permeable.*

BGC 30/08/21 – We have reviewed the SuDS Manual in regard to Surface water treatment and as per Table 26.2 and Table 26.3 below we can advise the following; The proposed development consists of 'Residential roofs' and 'Individual driveways, car parks & low traffic roads', the anticipated 'total suspended solids', 'Metals' and 'Hydrocarbons' are no greater than the treatment we are providing. For example, the total expected 'TSS' 'Low traffic roads' provides a pollutant index of 0.5. As per Table 26.3 the basin provides a pollutant mitigation index of 0.5 which will counter act the anticipated 'TSS'. *Okay.*

~~10. Please provide a catchment area plan. Please clearly show where urban creep allowances have been applied. Provided.~~

~~11. Please provide an exceedance flow route drawing. Provided.~~

12. *Please make the attenuation tank online rather than offline. Both tanks are offline, please make these online.*

BGC 30/08/21 – The tanks must remain offline as this is to the adopting authorities' requirements (ICOSA) and to make them online would mean no infrastructure drainage can be put forward for adoption.

13. *Please provide a catchpit upstream of the tank. A minimum of 300mm sump is required in manholes upstream of tanks. BGC 30/08/21 – As per above response to comment 12. Catchpits must be provided upstream of attenuation tanks.*

~~14. Please provide construction details of the attenuation basin, this should include a minimum of two perpendicular cross sections. Provided.~~

15. *Please provide full construction detail drawings. Please provide construction detail drawings of catchpits, ACO drains, permeable paved roads, etc.*

BGC 30/08/21 – Full set of Construction Details provided within latest submission including ACO drains and permeable paved roads. Please refer to drawings; 20079/311, 20079/315, 20079/316, 20079/320, 20079/321, 20079/322, 20079/326, 20079/327, 20079/330 & 20079/331.

Please see earlier comment regarding showing concrete cover slab on tank detail.

Please detail what bed and surround requirements are for pipes outside of adoptable highways.

Overflow levels at CC12 and CC28 appear to be below 100 year plus 40% cc water level.

~~16. 300mm of freeboard must be provided all around the basin. If an emergency spillway is provided, this should be set a minimum of 300mm above maximum predicted water levels. Okay.~~

17. *Can design be adjusted to ensure no flooding? Otherwise, please provide a plan which clearly shows flood extents, surrounding kerb levels and*

FFLs. No flooding shown in network that has been modelled, as requested in point 6 above a greater network extent should be modelled. BGC

30/08/21 – Master Drainage Network calculations provided for 2 Year, 30 Year & 100 Year + 40% Climate Change. Minor flooding (Less than 3.0m³) occurs across the network within the 15 min duration 100 Year + 40% CC event, flood routing plan illustrates flood routing paths, see drawing; 20079/161. It should be noted that in most cases where minor flooding occurs, it is within close proximity to permeable paving which will intercept flood paths. Where this does not occur, our levels design and drawing demonstrate the flood routing to either the attenuation basin and / or the proposed ditch.

Calculations show flooding at PS-286, where cover level is the same as adjacent property FFL, please removed flooding or revise FFL in this area.

Flooding is shown at PS-260 where adjacent garage FFL is 300mm lower than cover level. Please remove flooding.

Flooding is shown at PS-240 where adjacent FFL is 100mm lower than cover level. Please remove flooding.

Flooding is shown at PS-214 where adjacent FFL is 100mm lower than cover level. Please remove flooding.

Flooding is shown at PS102 where adjacent garage FFLS is 100mm lower than cover level. Please remove flooding.

18. Please refer to our checklist for full details of our requirements for a discharge of conditions application. BGC 30/08/21 – Checklist reviewed and no further comments / actions.

19. I note that a 300mm high bund is proposed along the northern and western boundary to "divert overland flows away from the development". It will need to be evidenced that this will not increase flood risk off site. BGC 30/08/21 – The 300mm high bund simply diverts any existing overland flows away from the development and imitates the current pre-development situation. *Unclear how this replicates the predevelopment situation, topographic survey does not identify a bund in this location currently. Proposals will mean the diversion of overland flows off site and will increase off site flood risk. Please remove bund.*

Comments Regarding Condition 19

No maintenance manual has been supplied with this application.

Comments Regarding Condition 21

Land drainage consent has not been granted to date. Furthermore, it is unclear how current proposals for the basin can be delivered without significant impact upon the ordinary watercourse.

Kind regards,

Laura Gibbons

Drainage Engineer

Engineering Services

Please note that I work Tuesdays 08:00-16:00 for Arun only.



T: 01903 221374

E: laura.gibbons@arun.gov.uk

Arun District Council, Civic Centre, Maltravers Rd, Littlehampton, West Sussex, BN17 5LF

From: Planning.Responses <Planning.Responses@arun.gov.uk>

Sent: 07 September 2021 12:04

To: Land Drainage <Land.Drainage@arun.gov.uk>

Subject: Planning Consultation on: A/188/21/DOC

To: **Engineers (Drainage)**

NOTIFICATION FROM ARUN DISTRICT COUNCIL

TOWN AND COUNTRY PLANNING ACT 1990

Application No: A/188/21/DOC

Registered: 3rd September 2021
Site Address: Land at Dappers Lane Angmering Littlehampton
Description of Works: Approval of details reserved by condition imposed under ref A/76/20/PL relating to Condition Nos 17 - existing & proposed ground levels, 18 - surface water drainage, 19 - maintenance & management of surface water drainage, 21 - discharge flows to watercourses and 22 - foul drainage system

The Council have received the above application to discharge conditions. I shall be pleased to receive any observations you may wish to make in respect of those conditions relating to your field of expertise.

[Click here to view the Discharge of Condition application](#)

[Click here to view conditions on original application - click on decision tab](#)

Should you wish to make any comments click on the link www.arun.gov.uk/planning and click into ?Enter Comment? or if this is not possible email your response to planning.responses@arun.gov.uk by **21st September 2021**.

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.

Yours sincerely

Michael Eastham

Planning Case Officer- Arun District Council

Telephone: 01903 737772

Email: michael.eastham@arun.gov.uk

PLCOND00 (CDE) 2020

Appendix A8

Planning Authority: Arun District Council
 Application Reference: A/188/21/DOC
 Planning Consultee: ADC Drainage Engineers
 Consultee Comments Received: 19 October 2021
 Response Date: 22 October 2021

Ref	ADC Drainage Engineer Comment	Applicant Response
Condition 18		
(18)1	<i>It is unclear how it will be possible to excavate 4.5m below the base of the attenuation basin and line it with an impermeable liner. Groundwater will make construction exceptionally difficult, if not impossible. The proximity of the basin to the adjacent watercourse will also prevent adequate batter, and will necessitate significant temporary works to stabilise excavations. Cost of replacement of liner at end of design life is an unfair burden upon residents. Also unclear how it will be possible to construct the basin with such varying liner depth accurately.</i> <i>Please see comments of 12/10/21, awaiting full response. Excavating over 6m only 3m away from the watercourse, and the acceptability of proposals throughout the lifetime of development, are seriously questioned.</i>	Refer to Contractors Risk Assessment & Method Statement.
(18)2	<i>Please provide greenfield runoff calculations. Our requirements are for discharge rate to be based upon the area positively drained. At no stage during the full planning application did we state that the drainage strategy should be approved.</i>	The Greenfield runoff rate has been calculated using the developable area of the Site (the positively drained area) as depicted on Banners Gate drawing: '20079/SK21.10.21'. Areas of open space within the Site that will have a runoff response similar to the pre-development scenario (remaining within the catchment of the watercourse flowing along the southern site boundary) have been excluded from the Greenfield calculation. Runoff coefficients within the proposed calculations have been set to 100% and 0% for impermeable and permeable surfaces respectively.
(18)3	<i>Please detail all pipe diameters and falls on plan. PS106 does not tally with where the pipes are connected to the network.</i>	PS-106 is provided as a change of direction chamber only.
(18)4	<i>Please detail pipe networks from housing on plan. Cover levels and invert levels, pipe diameters and falls all need to be shown on plan as per checklist requirements.</i> <i>There is still an inconsistency at PS202.</i>	PS-202 inconsistency corrected, refer to drawing: '20079/118 B'
(18)5	<i>Please detail what bed and surround requirements are for pipes outside of adoptable highways.</i> <i>Only appears to show class S bedding, are you confident that cover depths everywhere within private extents are sufficient to not require concrete bed and surround?</i>	Concrete Bed and Surround detail added to drawing: '20079/326 E'
(18)6	<i>I note that a 300mm high bund is proposed along the northern and western boundary to "divert overland flows away from the development". It will need to be evidenced that this will not increase flood risk off site.</i> <i>The bund does not appear to replicate the predevelopment situation, unless evidence can be supplied to the contrary the bund should be removed.</i>	Bund removed, refer to drawings: '20079/101 F' '20079/161 D'

Condition 19		
(19)1	<i>Please include details of the replacement of features at the end of their lifetime. I.e. please indicate lifetimes of elements and the requirements for replacement at the end of their life. This should also include the regular inspection of impermeable liners.</i> <i>We query the construction cost stated for the attenuation basin.</i> <i>We also note that an annual maintenance budget of 1% of the costs indicated is very low.</i> <i>The maintenance manual should include the requirements for riparian maintenance of the watercourse, this should include detail of the monitoring, regular maintenance and occasional maintenance as well as a statement of why riparian maintenance is required. Reference should be made to a drawing showing the extents of watercourses for which the management company will have responsibility for maintaining.</i>	Comments addressed within Drainage Maintenance Manual Rev 01. - Service Life Details included (Section 5). - Construction Costs updated (Section 5). - Annual Maintenance Budget (PHTV). - Existing watercourse included (Section 4.6).
Condition 21		
(21)1	Land drainage consent has not been granted to date. Furthermore, it is unclear how current proposals for the basin can be delivered without significant impact upon the ordinary watercourse. <i>Please supply evidence of land drainage consent.</i>	The wording of condition 21 is as follows: <i>The development shall not proceed until details have been submitted to and approved in writing by the Local Planning Authority for any proposals: to discharge flows to watercourses; or for the culverting, diversion, infilling or obstruction of any watercourse on or adjacent to the site. Any discharge to a watercourse must be at a rate no greater than the pre-development run-off values. No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site.</i> There are no proposals to: 1. Discharge flows to the watercourse. 2. Culvert the watercourse. 3. Infill or obstruct any watercourses. 4. Restrict the current (Persimmon Homes) and future (Management Company) from undertaking their riparian responsibilities. Consequently, we consider this condition can be discharged. We acknowledge that a Land Drainage Consent application has been submitted, as improvements to the existing watercourse are proposed. However, this application is unrelated to this condition.

Appendix B