

MarkHobbs

From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 16 July 2019 15:37
To: Mark ABMH
Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Hi Mark,

Again, proposals okay. Please submit formal details to planning.

Kind Regards,

Laura Gibbons, MEng, GMICE
Engineer (Drainage & Coastal)

Laura Gibbons | Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre,
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From: Mark ABMH <[REDACTED]>
Sent: 10 June 2019 17:14
To: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Laura

Comments noted

Ok suggestion as follows:

WS1 GWL 49.28m AOD circa 0.52m BGL
Taking GWL @ 0.5m BGL = 49.30m AOD

Road Level kept @ 50m AOD
Formpave construction – top section (DBM/Shingle/Blocks) = 210mm
Sub base depth above GWL = $50 - 49.30 - 0.21 = 490\text{mm}$

I've chatted with Formpave and they and we normally use a voids ratio of 30% for the lower sub base material. However, in my experience and Formpave's, test certificates on Formpave's sub base grading give voids ratio of 37-38%

If we were to specify a voids ratio of the sub base of 35%, and get it certified at that, we'd need the following depths of sub base:

10yr 218mm
30yr 300mm
100yr 405mm

All include 40% cc and 10% urban creep!

This then results in

- Road level as shown @ 50m AOD
- Max sub base required @ 405mm = 49.385m AOD which is 85mm above GWL
- We'd still provide say 450-500mm depth of sub base giving us a bit up our sleeve!
- Sub base to be tested and certified prior to installation and approved by us and LPA to prove 35% voids ratio achieved/provided.

Trust OK – I like It !!! ☺

If not the only options we have are reduce the imp area a tad – but not sure that will do it to be fair!, or connection to SWS based on low imp area or high GWL.

Kind Regards
ABMH Civils Ltd

Mark Hobbs BEng(Hons) CEng MICE MCIHT Eur Ing
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From: Laura Gibbons [<mailto:Laura.Gibbons@arun.gov.uk>]
Sent: 10 June 2019 16:08
To: 'Mark ABMH' <mark.abmh@arun.gov.uk>
Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Mark,

I've had a chat with Paul and we wouldn't be keen on either land raising or getting rid of the DBM. More capacity must be provided or impermeable area draining into it reduced to ensure that the 1 in 30 year plus cc event is contained within the sub base above ground water level. Shallow crates such as permavoid, looking for any areas where storage can be increased.

Thanks,

Laura Gibbons, MEng, GMICE
Engineer (Drainage & Coastal)

Laura Gibbons | Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
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From: Laura Gibbons
Sent: 10 June 2019 09:46
To: 'Mark ABMH'
Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Hi Mark,

I would be hesitant about installing the formpave at the end of construction due to potential compaction reducing infiltration potential.

Could an area with 400mm deep crates underneath the permeable paving be provided to give the additional storage volume required? This would need to be connected to the wider permeable paving. Or shallower (150mm) crates over a larger area?

Thanks,

Laura Gibbons, MEng, GMICE
Engineer (Drainage & Coastal)

Laura Gibbons | Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre,
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From: Mark ABMH [REDACTED]
Sent: 03 June 2019 13:14
To: Laura Gibbons
Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Aura

Many thanks for your time reviewing the initial info sent through by ourselves.

I think the difference in GWL at the two monitoring points could be due to the following:

- Variation in SIR at the WS1/2 following heavy rainfall
- Surface water ingress into WS1 following heavy rainfall skewing results

However, given that GWL's between the two locations appear to correlate well the rest of the time I'm minded to view the differential as likely to be caused by surface water ingress into WS1 during heavy rainfall events.

Attached are 30yr modelled results, which show sub base depth of 342mm, which is higher than your 290mm sought.

Options as follows:

- Raise highway up and plots up by 50mm to effectively get to the level that your 290mm deep level would be, ie $290 + 50 = 340\text{mm}$ SRP + 40%CC give or take 2mm!
 - I'm reluctant to do this as I'm already raising the lowest part of the site up by about 250 already, but tying in well elsewhere with existing levels, and if we raise the road up higher we may impede existing rear garden flood flow routes – topo info a bit vague in the middle section at the moment!
- I think my preferred option would be to construct the formpave road at the end of the project, thus being able to omit the 80mm DBM layer (temp construction layer) and replace it with the upper sub base material instead, thus providing an additional 80mm gravel sub base, which would be in excess of the 52mm sought for the 30yrSRP

100yr events

We effectively need 500mm subbase for 100yr + 40%.

However, if we're saying that the lower 158mm will be below the GWL in this event (or greater than 30yrSRP) then storage could be provided within the site above the highway.

$158\text{mm} \times 30\% \text{ (voids ratio)} = 47\text{mm}$

We're proposing a kerb height of 50mm so this would potentially contain the excess water on site to a shallow depth within the highway.

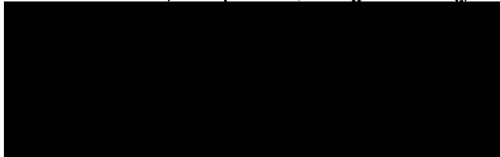
Exceedance routes

Yes the water will merely pool on the access road, until such time as it either infiltrates into the sub base, or flows off site onto Charlton Road or via the dropped kerb (adja Plot 6/8) and into the existing ditch on the eastern boundary. I've maintained the existing levels along this flow route, giving circa 350mm level diff between GL and FFL

Hope all makes sense

Kind Regards
ABMH Civils Ltd

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From: Laura Gibbons [<mailto:Laura.Gibbons@arun.gov.uk>]

Sent: 29 May 2019 14:27

To: 'Mark ABMH' <

Subject: RE: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design

Hi Mark,

Thanks for sending over the information. What do you think the difference in gw levels at the two monitoring points is a result of? They are quite close together.

It needs to be demonstrated that there is adequate capacity for the 1 in 30 year plus cc event to be stored within the sub base above 500mm below ground level, i.e. within 290mm depth of sub base. Is this achievable? We would then need to see kerb levels etc. that demonstrate water will be safely contained on site up to the 100 year plus climate change event. Given that finished floor levels are only 200mm above finish level of permeable paving I am hesitant to allow flooding of the site above the 1 in 30 year plus cc event, but I am struggling to think of an alternative solution. Can the FFLs be increased?

I also note that you are showing exceedance flow routes yet the finish level of the permeable paving is 50.0 pretty much throughout, is water not just going to pool on the surface?

Thanks,

Laura

From: Mark ABMH [REDACTED]
Sent: 21 May 2019 14:41
To: Laura Gibbons
Subject: 34-44 Carlton Avenue, Bognor Regis - Draft Drainage Design
Importance: High

Laura

Site: 34-44 Carlton Avenue, Bognor Regis
LPA Ref: AW/130/18/OUT

Further to the outline planning permission for the above site we attach a draft SW drainage design for discussion with the LPA Drainage department.

Basically proposing to use Formpave porous paving system as a blanket soakaway, with level formation, 500mm dp gravel sub base, and 80mm blocks on 50 shingle on 80mm temp running/construction layer

- Used lowest recorded SIR from SI
- Allowed the applicable SIR safety factors and urban creep factor of 10% to imp areas
- GWL assessment – see attached table

Attached fyi is as follows

- ADC planning consent
- Sewer Records
- Draft SW Drainage Layout FC2814/02 & 03
 - Windes calcs for 10/100 yr + 40% CC
- Draft External Levels FC2814/04 & 05
 - Also shows exceedance flow routes
- Prop Imp Areas and Geotech summary info FC2814/11
- GW monitoring
 - Site investigation GW Monitoring V2 by CE/Client (Excel file)
 - ABMH GW summary table with proposed corrections!
- Geotech data
 - CE Site investigation Report may 2018
 - CE Soakaway testing and SIR March 2019
 - SIR Test Results
 - Trial Pit Logs
 - SIR Trial Pit Plan

Hope all makes sense

Give me a call to discuss.

Basically the recorded GWL appear fairly well coincidental between the two boreholes, until the heavy rain in Dec 2018.

All works well based on you agreeing with my interpretation of the GWL in Dec 2018! The proposed Formpave formation would then coincide with the max recorded GWL in dec 2018.

I appreciate this is draft and we've a lot more info to submit, details/management strategy etc etc but I just want to get your thoughts on our proposal and thinking to date

Thanks

Kind Regards
ABMH Civils Ltd

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