

From: Laura Gibbons
Sent: 25 April 2019 16:46
To: 'Adam Shephard'
Cc: Christian O'Brien; Rob Wilson; James Bragg; David Innes; Andrew Wood; Chris Harrison
Subject: RE: Windroos, Littlehampton

Hi Adam,

There are still some issues with the details:

1. There are inconsistencies between the modelled depths and depths shown on plan of soakaways. Furthermore, some of the soakaways have depths greater than the difference between the cover (nearby levels, levels not given at soakaway) and invert levels specified. Please ensure that minimum cover requirements are met and that details are consistent.
2. I am not happy with the infiltration rates used for soakaways 10 and 11. The nearest infiltration test gave a result of $1.04 \times 10^{-6} \text{ms}^{-1}$, this is what should be used in design not $1.16 \times 10^{-4} \text{ms}^{-1}$.
3. The calculation for 5 ring soakaways use a diameter of 3m. Yet 2.7m diameter is specified on plan. Again calculations and details need to be consistent.
4. Updated calculations for the 9 ring soakaways have not been provided and need to be.
5. Catchpits are not shown upstream of all connections into soakaways. These must be provided.
6. Cover levels at soakaways are not provided. These must be detailed.
7. Catchpits need to be labelled with sump depths.
8. Ring soakaway drawings need updating to show step irons, clean granular surround, geotextile, hole in base, etc. Please see attached document for an example.
9. Construction detail drawings need to be provided of pipe bed and surround, manholes and catchpits.

Overall, a lot of points are still outstanding. And I am unlikely to be able to dedicate further time to review for this app this week or next.

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: Adam Shephard [REDACTED]
Sent: 24 April 2019 17:45
To: Laura Gibbons
Cc: Christian O'Brien; Rob Wilson; James Bragg; David Innes; Andrew Wood; Chris Harrison
Subject: RE: Windroos, Littlehampton

Hi Laura

Further to our discussion earlier, please see attached the updated files and Microdrainage outputs with a $C_v=0.75$ and the Factors of Safety of 3, 4 and 6.5 (for <100m², 100m² to 1000m², and >1000m² respectively), for 1 in 10, 30 and 100 year + 30%.

The trench soakaway catchment area for trench 08 is now also showing.

Thea attached should address all your previous comments, but please feel free to discuss if you have any questions on this.

Kind Regards

Adam Shephard
Principal Engineer
BEng MSc CEng MICE



Fareham Office

From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 23 April 2019 13:24
To: Adam Shephard [REDACTED]

Subject: RE: Windroos, Littlehampton

Hi Adam,

Thank you for supplying the additional information. I have provided my comments in green:

- ~~1. Agreed below~~
- ~~2. Agreed below~~
3. All calculations are attached. Please provide calculations for the 1 in 30 year plus cc event and the 1 in 100 year plus cc event. Factors of safety etc. have changed since the previous calculations. These calculations are required in order to demonstrate adequate capacity is provided.
4. Catchment areas provided as attached drawings 147.5001.402 and 403. Catchments and destination infiltration structures are colour coded. Catchment areas are also provided that have been used for the calculations. The catchment area for SA08 isn't provided on the plan. I am currently experiencing problems with our plotters so haven't as yet managed to review catchment areas fully, I hope to do this later today or tomorrow (IT dependant).
5. Updated Microdrainage modelling calculations are attached. Each drained area total shown in 402/403 has had 10% added to allow for urban creep, which is the catchment area figure you will see in the outputs.
Okay.
6. As mentioned below, the PCC soakaways for the southern catchment have been amended to the appropriate depth. Okay.
7. The strategy for the northern catchment has been updated. We have proposed 5 no. PCC ring soakaways in the vicinity of TP2 and the drainage system for the northern catchment all route to these. The infiltration rate from the ground investigation has been applied and the outputs attached show an appropriate half-drain time. Half drain times will be reviewed again following point 9 being addressed. As detailed in point 3, please provide results from other storm durations to demonstrate adequate capacity.
8. The half drain times attached for the 1 in 10 year storm plus 30% climate change are all now acceptable for the PCC ring soakaways and the rear garden trenches. Half drain times will be reviewed again following point 9 being addressed.
9. All factors of safety have been updated and used in line with the Arun drainage guidance (i.e. 2 for <100m², 3 for >100m²<1,000m², and 5 for >1,000m²) These are shown in the attached Microdrainage outputs. Factors of safety need revising, you are using a Cv of 0.75 not 1.

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 5LP

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From: Adam Shephard

Sent: 18 April 2019 16:32

To: Laura Gibbons

Cc: Christian O'Brien; Rob Wilson; James Bragg; David Innes; Andrew Wood; Chris Harrison

Subject: RE: Windroos, Littlehampton

Hi Laura

Please see attached updates considering the previous comments. I have provided responses in the numbered list below- the numbers correspond to the numbers of the points you have raised previously in this thread. I haven't included all previous comments to avoid confusion:

1. Agreed below
2. Agreed below
3. All calculations are attached
4. Catchment areas provided as attached drawings 147.5001.402 and 403. Catchments and destination infiltration structures are colour coded. Catchment areas are also provided that have been used for the calculations.
5. Updated Microdrainage modelling calculations are attached. Each drained area total shown in 402/403 has had 10% added to allow for urban creep, which is the catchment area figure you will see in the outputs.
6. As mentioned below, the PCC soakaways for the southern catchment have been amended to the appropriate depth.
7. The strategy for the northern catchment has been updated. We have proposed 5 no. PCC ring soakaways in the vicinity of TP2 and the drainage system for the northern catchment all route to these. The infiltration rate from the ground investigation has been applied and the outputs attached show an appropriate half-drain time.
8. The half drain times attached for the 1 in 10 year storm plus 30% climate change are all now acceptable for the PCC ring soakaways and the rear garden trenches.
9. All factors of safety have been updated and used in line with the Arun drainage guidance (i.e. 2 for <100m², 3 for >100m²<1,000m², and 5 for >1,000m²) These are shown in the attached Microdrainage outputs.

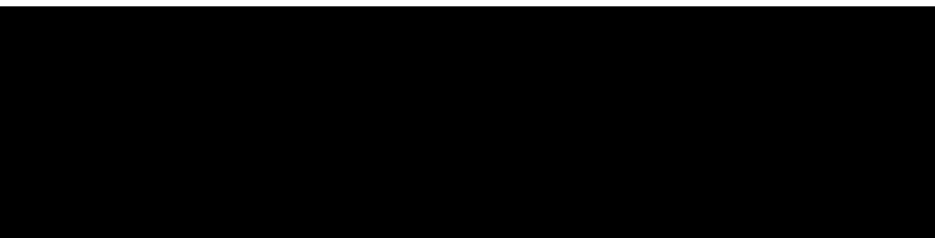
Hopefully the above provides the information required but please do let me know if you would like to talk through this at all.

Kind Regards

Adam Shephard
Principal Engineer
BEng MSc CEng MICE



Fareham Office



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

Sent: 12 April 2019 10:46

To: Adam Shephard [redacted]



Subject: RE: Windroos, Littlehampton

Adam,

Comments below in *green*.

Kind Regards,

Laura Gibbons | Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre,
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From: Adam Shephard [REDACTED]
Sent: 11 April 2019 16:10
To: David Innes; Laura Gibbons; Andrew Wood
Cc: Christian O'Brien; Rob Wilson; James Bragg
Subject: RE: Windroos, Littlehampton

Good afternoon Laura,

Further to your correspondence with David and Christian, they have asked me to forward on some further information to you. I have therefore provided below and attached some additional commentary and information which should provide you with the clarity that is required.

Please see attached the updated drainage layout plan and calcs. The updates include the following in order to address the comments:

- Changing the ring soakaway size to 2.4mØ x 3.6m dp which addresses the comment from about suitability of the strata. This is adequate in terms of modelling which is also attached.
- Updating the trench soakaway references to have specific numbering which tie in with the attached modelling outputs from Microdrainage for them

Whilst the Microdrainage calculations for the northern crate show that the half-drain time for the 1 in 100 year storm +30% storm is not adequate, the infiltration crates have been oversized to double what they need to be, in effect after the 1 in 100 year storm they are already half-drained/at half capacity. This is the same approach to the strategy as when it was consented which was agreed on the above basis. For this design, there has been no change in approach.

The other point regarding the factors of safety has also been previously explained by James, in that the factors of safety are appropriate for the number of soakage tests undertaken.

Hopefully this clarifies everything and I trust the attached files and the below comments in my previous email are adequate.

As a direct response to the list you queried on:

Thank you for sending over the revised information. I have the following comments:

1. No on site winter groundwater monitoring results have been provided. These must be provided. Email from David clarifies that the council accepted the previous results *Noted, please note I only previously accepted these results because Tom had put in writing that he had. In future this level of monitoring and infiltration testing will not be accepted.*
2. Infiltration testing has not been completed in the winter or at the depth of proposed structures. Again this is a standard requirement of this condition and must be complied with. Email from David clarifies that the council accepted the previous results. *Noted, please note I only previously accepted these results because*

Tom had put in writing that he had. In future this level of monitoring and infiltration testing will not be accepted.

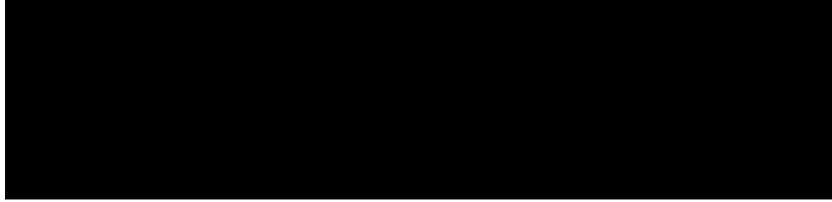
3. Three sets of calculations have been provided, yet many infiltrating structures are proposed. Calculations must be submitted of the entire proposed drainage scheme. We provided a 'worst case' gravel infiltration soakaway calculation in the report but have now attached all of the microdrainage outputs for the scheme. *Please always supply all calculations.*
4. A catchment area plan should be provided. A catchment area plan is not included in the checklist, as this is a detailed design the pipe layout shows where all the surface water is being channelled to, a catchment plan would provide no additional information on top of this. *I do not understand how this is difficult to produce and provide as you should have been using it in design anyway. It is common place for us to ask for a catchment area plan on larger developments, they expedite our review. Please provide this.*
5. One of the sets of calculations provided does not seem to equate to anything proposed on paper. I.e. the modelled dimensions are not reflected on plan. All the calcs had a reference against the design but hopefully the provision of all of the gravel trench soakaways clears this up.
Please ensure that all calculation dimensions match up with those shown on plan. There are inconsistencies in:
Northern soakaway
Trench soakaway 1
Trench soakaway 3
Trench soakaway 4
Trench soakaway 5
Trench soakaway 6
Trench soakaway 8
Trench soakaway 9
Trench soakaway 10 -Please also provide 1 in 10 year plus cc event half drain time results.
Trench soakaway 11.
Please also ensure that modelled cover and invert levels match with those shown on plan.
6. The ring soakaways are proposed to be located at 2m depth, yet rely on infiltration testing completed at 4.2m depth. The strata at these depths differs significantly. Again I stress the importance of completing winter infiltration testing at the proposed depth and location of infiltrating structures. We have provided a calculation for the specification of a ring soakaways at 3.6m depth with a 2.4m diameter, which is in the appropriate strata. The latter part of this point relates to the responses to points 1 and 2.
7. Having a half drain time in excess of 7 days is not acceptable. It must be demonstrated that proposed infiltrating structures half drain in less than 24 hours for the 10 year plus climate change event. If this cannot be demonstrated the design is unacceptable. The half drain time showed is for the 1 in 100 year storm. The strategy and specification for the northern crates has not changed from the consented scheme. We have previously provided commentary on this and mentioned that during a 1 in 100 year storm, the infiltration crates fill up to less than 50% volume and therefore are in effect half-drained. This was accepted for the consented scheme and the approach has not changed. *Please provide half drain times for the 1 in 10 year plus climate change event. If you cannot get this half drain time to meet our requirements please look at providing a high level overflow to an area where better infiltration rates have been observed. My comments are fully in accordance with building regs, CIRIA, and WSCC policy for surface water drainage.*
8. Infiltration is proposed at locations where infiltration rates have been found to be less than $\times 10^{-6} \text{ms}^{-1}$. This is not advised. The sizing proposed is commensurate with the nearest infiltration rate that we have for the scheme and are therefore appropriately sized. Again, this strategy was accepted previously and has not changed. *See point 7 response above.*
9. Factors of safety used in design should be in accordance with the values set out in our surface water drainage checklist. This is applicable to any structure where infiltration is proposed/modelled through the base. We've previously advised that the factors of safety are suitable for the number of tests, the same factors of safety have been approved previously. *Please use the values set out in the checklist, you have not completed infiltration testing in the winter or at the depth of proposed structures, you are utilising infiltration through the base of structures, my requirements are therefore completely in line with CIRIA and I will not accept lower factors of safety.*

Kind Regards

Adam Shephard
Principal Engineer
BEng MSc CEng MICE



Fareham Office



Fareham | Oxford | Bristol | Cambridge

From: David Innes [REDACTED]
Sent: 08 April 2019 14:52
To: [REDACTED]
Cc: [REDACTED]
Subject: Fwd: Windroos, Littlehampton

Hi Laura,

Further to your comments received requesting winter monitoring I have included an email from yourself that confirmed that no further winter monitoring and percolation tests would be required.

We had sought and received this confirmation last September from yourself prior to Dandara purchasing the site as it would be a critical issue given the need to discharge all the pre-commencement conditions and make a legal start on site prior to the end of April.

A meeting is taking place today to address your other points so either PBA or myself will be in touch.

Regards

David Innes



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Begin forwarded message:

From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Date: 14 September 2018 at 10:32:19 BST
To: [REDACTED]
Subject: RE: Windroos, Littlehampton LU/201/16/RES LU/229/10

Hi David,

Thanks for your email.

I can confirm that no further groundwater monitoring or percolation tests are required based on the information previously provided. A DOC application with the full surface water drainage scheme will need to be provided, which I will review.

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: Paul Cann
Sent: 10 September 2018 15:37
To: 'David Innes'
Cc: Laura Gibbons
Subject: RE: Windroos, Littlehampton LU/201/16/RES LU/229/10

Hi David

Good to hear from you!

My colleague Laura will be dealing with the application so I have copied her in so she can respond to you directly.

Regards

Paul Cann
Senior Engineer (Drainage & Coastal)

Paul Cann | Senior Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre,
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From: David Innes [REDACTED]
Sent: 07 September 2018 11:25
To: Paul Cann
Subject: Windroos, Littlehampton LU/201/16/RES LU/229/10

Hi Paul,

I hope you are well.

Further to the phone message I have been asked to check with you the position regarding the drainage requirements for the Windroos site. You will see in the email below that Tom Callaway confirmed that the level of groundwater monitoring was sufficient.

The infiltration design had been included in the reserved matters. I have also included Tom's email of 15 March 2017 confirming the solution and for a DOC application to be submitted. There is no further requirement for monitoring on the basis of earlier submissions as confirmed by Tom.

The application expires on 5 May and the developer is seeking to get the DOC application in the very near future.

Can you confirm that you agree with this position.

regards

David Innes

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--Forwarded Message Attachment--

From: [REDACTED]
To: [REDACTED]
CC: [REDACTED]
Subject: RE: Windroos Nursery -LU/229/10
Date: Thu, 10 Apr 2014 09:50:47 +0000

Dear Joseph

Thank you for forwarding the information.

I am happy with the amount of groundwater monitoring done, and if the wording of the condition needs to be adjusted I have no problem with that. Results from February 2014 are likely to show high groundwater readings, which would be sufficient to design to.

Any further soakaway testing should take place where you would hope to be installing the soakaways and at the same level that you would hope to be installing them. This should be at a greater level than the highest recorded groundwater level from the monitoring. We do not wish to see surface water being discharged to the sewer.

The detailed drainage design is required in advance of clearing the condition, and should show that the system can contain the 1 in 100 year storm event plus 30%, with a half-drain time of up to 24 hours. The base of the soakaways should not be below the highest recorded groundwater level. Soakaways should be designed to the slowest infiltration rate of the nearest test pit where possible.

I would recommend submitting a design with the revised soakaway test results so that it can be initially checked before submitting a DOC application.

Regards

Torn Callaway

Thomas Callaway | Drainage & Coastal Engineer, Engineering Services, Arun District Council | Location: Second Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

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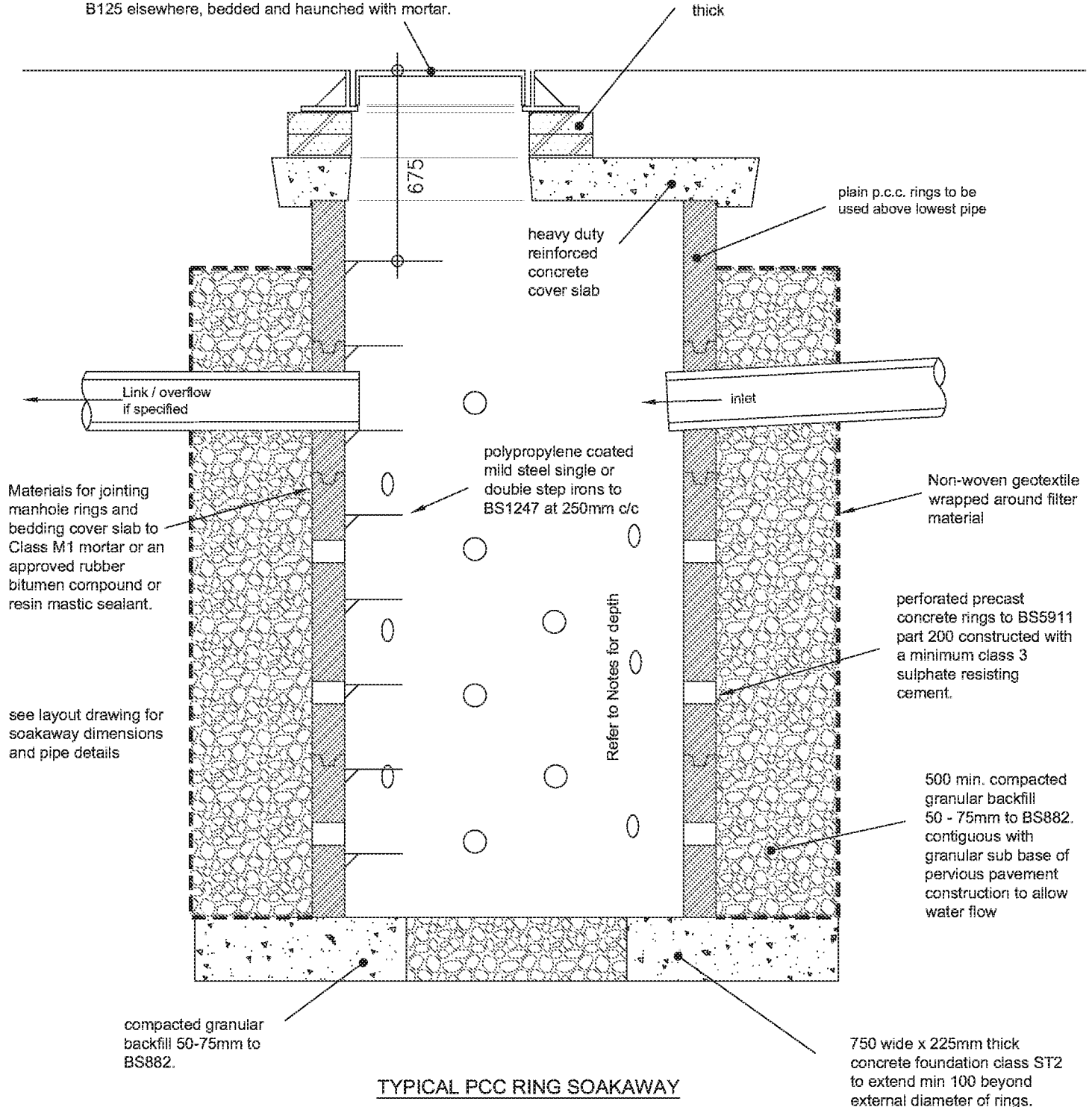
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600mmx600mm to BS EN 124 to be used in adoptable
highways and private roads and car parks with class
B125 elsewhere, bedded and haunched with mortar.

All brickwork to be Class B engineering to BS
3921 - 2 courses min; 4 courses max; 225mm
thick



Robert Clark Associates Ltd
Chartered Civil Engineers
Willow Cottage, Herne Lane
Rustington, West Sussex BN16 3EE

Client	Mrs Patricia Paul				
Project	36 Corbishley Road, Bognor Regis				
Rev.	Original	PC	RTFC	7.12.17	
Rev.	Description	App.	Chk.	Dm.	Date

Title		Concrete Ring Soakaway		
Scale	1:20	At original	A4	© Robert Clark Associates Ltd
Drawing Number	1767/D5.2			Revision
				-