

From: Laura Gibbons
Sent: 13 February 2019 15:09
To: 'James Massingham'
Cc: Laura Humphries; Yuved Bheenick (Linden Homes); Gareth Hardwick; Michael Eastham
Subject: RE: Walberton - Today's Development Team Meeting

James,

Thank you for sending through the additional information. I have the following comments:

1. Please provide a location plan showing the new groundwater monitoring locations.
2. As you state, infiltration rates are highly variable, therefore infiltration testing must be completed at the proposed locations and depths of the ponds. Without this I will not be recommending the condition is discharged. Please supply me with the infiltration testing results as soon as these are available.
3. The proposals for the culvert along Tye Lane show that the culvert will be set to the existing invert level. The ditch needs to be cleared of vegetation and silt. Invert levels need to be provided of the upstream and downstream culverts. The appropriate invert level will be determined from this. A better location plan needs to be provided.
4. The construction details of permeable paving show that a type 1 sub base is specified. Type 1 is not permeable, please remove this to allow infiltration to occur where groundwater is not a concern. Where proposed formation levels are close to groundwater levels I am happy for the sub base to remain, i.e. the permeable paving near SW12.0 and SW13.0.
5. A 10% allowance for urbanisation needs to be applied to the impermeable areas.
6. The water falling directly onto the ponds should also be included, i.e. treat these areas as impermeable please.
7. Invert level and bank elevations of swales need to be stated on plan.
8. There is a discrepancy between the cover level modelled and that shown on plan at SW9.3.
9. Please provide formation levels and finish levels on plan of the permeable paving.
10. The porous car park at SW9.4 has a finish level of 16.8mAOD, maximum water level at the node is 16.854, i.e. water is going to emanate onto the surface from the permeable paving area. There are also discrepancies at SW9.0, SW2.0 (modelled water depths don't appear to be a concern) and SW3.0 (modelled water depths don't appear to be a concern). Please ensure that the cover levels modelled are actually the lowest finish levels for respective areas of permeable paving.
11. The permeable paving at SW9.9 appears to fall away from the connection, please reduce maximum volume depths to take account of this or revise formation levels.

12. Please provide construction detail drawings of how the permeable paving connects to the surface water drainage network.
13. Half drain time is not provided within the calculations. Please provide this.
14. Please can you provide me with details of the proposed kerb levels etc. where it is identified exceedance flow will ultimately end up. For example kerb levels around the permeable paving at SW9.4.
15. I cannot see a note on the drawings that states that Linden homes have riparian responsibility for the ditch in Tye Lane and that they will clear it of vegetation and silt. Notes should be added to drawings to reflect this.
16. The invert level of the infiltrating areas of the ponds is the same as the incoming pipe invert levels. I would like to see a minimum of 150mm between these levels. Please revise details and calculations to reflect this. And please ensure that the invert level of the incoming pipe is provided on the pond cross sections.
17. Please can you provide two further cross sections of the ponds, i.e. one perpendicular to A-A and one perpendicular to B-B.
18. Please provide site specific swale drawings. Some swales may need to be lined in areas of high groundwater.
19. Please provide construction details for catchpit manhole.
20. Please provide a manhole schedule.

I have made some comments in green below, however these are all covered above, this was just completed for ease of review process.

Kind Regards,

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

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Save the environment - think before you print.

From: James Massingham [REDACTED]
Sent: 08 February 2019 12:46
To: Laura Gibbons
Cc: Laura Humphries; Yuved Bheenick (Linden Homes); Gareth Hardwick
Subject: RE: Walberton - Today's Development Team Meeting

Good Afternoon Laura G,

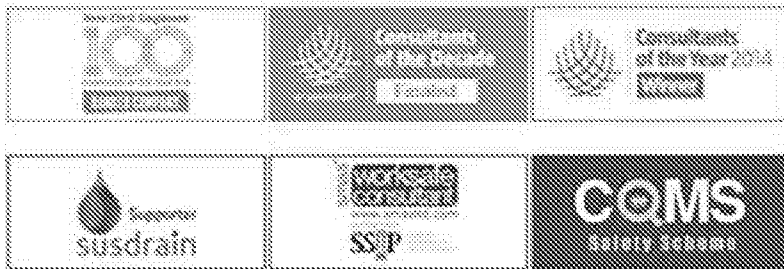
Thank again for the meeting earlier this week, I believe we managed to iron a few things out. As discussed, attached via the WeTransfer link below is the updated pack to supplement the comments in red below.

<https://we.tl/t-NBXOgEWkGj>

Any issues with the file transfer or if you require any further info from us, please let us know and we will sort it for you.

Have a lovely weekend,

James Massingham
Principal Engineer



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From: Laura Gibbons <Laura.Gibbons@arun.gov.uk>
Sent: 31 January 2019 12:02
To: Laura Humphries
Cc: Michael Eastham
Subject: RE: Walberton - Today's Development Team Meeting

Hi Laura,

Thank you for sending through that information. I have now had a chance to look through the information provided, and have the following comments:

1. Winter groundwater monitoring was completed 30th January 2017 to 11th April 2017. This does not cover the full period of October to March inclusive. It appeared that GI works were being undertaken this morning. Please confirm this is the case and the extent of these activities.
Additional ground water monitoring attached carried out between December 2018-Jan 2019. Locations not provided.
2. No location plan has been provided with the groundwater monitoring results, making my review of the wider surface water drainage scheme not possible. Please provide a plan clearly showing the location of these monitoring points. If more monitoring is being completed, I will require a location plan with these too. Location plan for site investigation works attached within the SI (located directly before Appendix A sheet). Location of new monitoring points not provided.
3. Infiltration testing was reportedly carried out in December 2015. No results have been supplied, I cannot obtain if these tests were completed at the correct depths or locations. Please supply these results with accompanying plan.
Infiltration tests attached within the SI (section 5.2). Please note we are also in the process of producing localised BRE 365 tests at the required depths for the exact locations of the ponds given the uncertainty within the SI about localised clay areas within the river terrace deposits strata. We will forward this info on

with revised plans (if required) as soon as we have it. Definitely required. Please supply full testing results, not just the final infiltration rate.

4. I cannot review the adequacy of the surface water drainage design without having these results available. However, I have provided as many comments below as possible.
Noted, please review against information above. As stated, I will not be approving this DOC until new testing results have been provided.
5. Given the prevalence of clay within the borehole logs supplied I am surprised by the half drain times in the calculations supplied.
Based on the infiltration tests we have, these are the results we are getting. Whilst there is a prevalence of clay in some of the boreholes, these areas can be quite localised as mentioned within the SI. This can be further proven by the infiltration tests; TP1 & TP4 had an insufficient head drop to allow a rate to be calculated, whereas TP2, TP5 & TP6 have rates in the region of 7.7×10^{-6} to 6.75×10^{-4} . The closest tests to the proposed pond locations are TP2 (West) & TP5 (East), hence the half drain times are relatively low. This will of course be updated once we have the infiltration tests from the exact location of the pond. Half drain times not provided on printout.
6. Calculation methodology is insufficient, please model ponds and networks together along with swales and permeable paving.
These have been included within the model and can be found on the attached calcs. Please note that to keep the WinDes model stable, we have not modelled every headwall and break in the swale in certain sections. Some areas on the plan will be referred to as only one 'pipe' within the WinDes calcs. Noted.
7. The calculation printouts are insufficient, please can it be ensured that all inputs are provided in printouts. I.e. impermeable areas, time area diagrams if this methodology has been used, pipe network details, manhole schedules, pond dimensions and infiltration rates, permeable paving dimensions and infiltration rates, rainfall details, simulation criteria.
All attached within the calcs. Okay.
8. Please ensure all PNs are clearly shown on plan. So that the accuracy of what is modelled can be compared with details shown on plan.
The revised plan can be found attached. Please note my comment in 6 above. Okay.
9. Due to the fall of the site, exceedance flow routes must be provided. There is a significant risk to land to the south of the development. Methods of containing water on site need to be detailed.
These have been shown on the revised plan. Exceedance routes have been provided, but the methods for containing water on site have not.
10. Pond sections do not seem to be drawn to scale/ accurately. For example section A-A has a straight horizontal line with an elevation of 12.941mAOD at one end, and 13.641mAOD at the other. Please can all cross sections be drawn accurately.
These have been updated and can be found on the attached plans. The invert level of the infiltrating sections of the ponds is the same as the incoming pipe. I would like to see a minimum of 150mm between these levels.
11. The interlinkage between the permanently wet area of the pond and the wetland area is not clearly shown.
The permanent wet pond will be located at a level below that of the inlet headwall to allow this to fill up with run-off volume as a storm hits. This water will be contained here as the pond will be lined to make it impermeable. Once the storm water flow exceeds the level at the top of this permanent wet level / inlet IL, the water will begin to spill over into the infiltration basin and infiltrate into the ground. We have drawn this with more clarity on the sections mentioned in point 10. You are going to be surcharging your outlet to get water into the infiltrating areas. Please ensure 150mm minimum difference as stated in point 10.
12. The volume associated with the permanently wet areas of pond should be excluded from calculations.
We have only modelled the infiltration pond with infiltration on the side. No allowance has been made for storage volume within the permanent wet pond. Please can you provide two further cross sections of the ponds, i.e. one perpendicular to A-A and one perpendicular to B-B.
13. Please clearly define the extents of the impermeable liner within the ponds. Drawing styles do not clearly show that this isn't present within the wetland areas.
Please refer to the updated section on the revised GA. Okay.
14. Permeable paving construction details need to show permeable geomembrane fully wrapping around the subbase.

The paving detail has been revised to show a permeable membrane as discussed at our meeting this week with a note added about the wrap around the sub-base detail. Type 1 is shown beneath this, this is not permeable. Please remove.

15. All other construction details must be provided with the DOC application, not just reference to Sewers For Adoption.

Attached as part of this pack on drawing 183240-013. Please provide construction details for catchpit manhole.

16. Cross sections of swales need to be provided.

We have attached the WSCC details for swales. Please provide site specific drawings. Some swales may need to be lined in areas of high groundwater.

17. The maintenance manual does not detail that Linden Homes have riparian responsibility for the ditch and culvert network to the west of the development. Please can the manual be updated to include this.

18. Any footpaths crossing the ditch will require land drainage consent (forms attached).

Noted we were aware of this, however please note the exact number and location of the footpath links are still to be confirmed. Once confirmed we will go through the standard process with the ULFA. Okay.

19. The ditch along Tye Lane, which Linden homes have riparian responsibility for is in a bad condition and requires clearing of vegetation and silt. Notes should be added to drawings to reflect this.

This has been added to the plan with details and sections shown on drawing 183240-012. I cannot see that this has been referenced on the drawings, please ensure note is added.

20. If ground investigations reveal a connection is required to the ditch, full investigations and consent will be required.

Noted, however we are hopeful this will not be required pending final infiltration testing noted above.

Agreed, let us hope this is not required.

I hope these comments can form the basis of discussions on Tuesday. As I stated this morning I cannot be certain that larger pond areas/ revised scheme will not be required until full monitoring and infiltration test results are provided. I.e. I believe we will not be able to resolve this until April (after winter monitoring has concluded).

I have also attached our formal checklist, it would expedite my future reviews if this can be completed and supplied with any revised submissions.

Kind Regards,

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

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