

Engineers Comments Regarding Condition 5- Surface Water Drainage

Key

ADC comments 15/09/20

WSP Reply 12/10/20

ADC Further comments 13/10/20

Grey closed

WSP comments 19/10/2020

Plans have been submitted for the proposed surface water drainage scheme. The details submitted are insufficient, please can the applicant supply the following information:

1. Winter groundwater monitoring results.
 - a. In Groundwater monitoring information from Bellway Homes. *GW monitoring completed, gw at or near surface. Point closed.*
2. Winter infiltration testing results.
 - a. In Geo Report from Bellway Homes, refer to *Trial Pit Soakage Testing on page 2. Soakage testing failed. Point closed.*
3. Calculations supporting design. Calculations should be provided in both paper and mdx format. These should also include calculations of greenfield runoff rates.
 - a. Microdrainage file included and results are printed as .pdf, greenfield calculations also included. *Supplied. Comments below.*
4. Impermeable areas plan. Preferably in dwg format to facilitate paperless review.
 - a. As shown in Microdrainage model
 - b. Refer to drawing 1643-WSP-XXX-NBL-DR-C-0516 *okay.*
5. The proposed discharge rates are very low in some locations. A minimum permissible discharge rate of 2l/s is usually applied across the district because of the increased risk of blockage at lower flows. Please detail proposed aperture sizes so that this can be further reviewed.
 - a. The site has a total limit of 3.8 l/s and we have re-distributed the flow from each of the networks to mitigate the risk of blockage at the flow control devices as shown below.

Outfall	Flow Rate	Orifice Size
North West	1.1 l/s	50 mm
North East	1.1 l/s	50 mm
South	1.6 l/s	60 mm

Hydro International has confirmed the following:

"Yes, all those units fall within our BBA range. I also see the orifice sizes are above 50mm which should prove helpful."

Therefore the BBA certificate is valid and fabrication is possible. As a further protection measure, Hydro International supply a 'cage' (see included information) which we propose to fit in front of the flow control units. *What is the mesh size on the cage?*

Mesh is at 12mm x 20mm over 390mm square and protruding 75mm from the wall face as per the details submitted. We will add the visual inspection of the proposed meshes as part of the Hydrobrake chamber maintenance schedule but we anticipate that the rising and falling level of the water will dislodge debris from the mesh face.

6. Site specific construction detail drawings of the attenuation basins- at least two perpendicular cross sections must be provided per basin. Dimensions, levels, construction detail must all be shown.
 - a. As shown by section drawing 1643-WSP-XXX-NBL-DR-C-0516, construction details in 0512
 - b. Sections do not show a bank level equivalent to that in calculations or layout drawings. A minimum of 300mm freeboard must be provided to the pond, i.e. bank level all around basin must reach this minimum level.
Drawing 0518 updated and provided; please note that long sections passes through both basins.
 - c. Please provide invert levels and bank levels on these plans, i.e. provide 4 cross sections, 2 for each basin, similar to that provided on 0512.
As above
7. Site specific construction detail drawings of attenuation tanks.
 - a. As shown by details drawing drawings 1643-WSP-XXX-NBL-DR-C-0512 and 0519.
 - b. *Is the depth of soil above tanks sufficient to allow proposed landscaping? Please ensure minimum depths of topsoil for grass growth are provided.* 150mm provided above tanks as a minimum, greater depths provided where possible.
 - c. *Cover level of tank 2 does not match with that on plan.* Plan updated to include new level from landscaping over concrete
 - d. *Cover level of tank 3 does not match with that on plan.*
As above
 - e. *Remove/ amend note from drawing that states "100mm of coarse sand or non-angular granular material base, assumed ground water is not within 1m of the base of the structure."* 1m reference removed
 - f. *Show impermeable geomembrane wrapping around entire structure.* Membrane already shown round tank
8. Site specific construction details of all flow control devices and headwalls.
 - a. Typical details shown by drawings 1643-WSP-XXX-NBL-DR-C-0510 and 0511. Note that the mesh/cage will be added. Headwalls shown by 1643-WSP-XXX-NBL-DR-C-0518 *Drawing 0510 not provided, site specific hydrobrake chamber details required, as well as aqua swirl. Headwall drawings should be specific, i.e. which ones are you using, show invert level and pipe diameter, show invert of ditch, show bank top of ditch. Etc.* Apologies, 0510 issued in previous submission but should not have changed since then. We will review in light of other comments and re-issue. Drawing 1643-WSP-XXX-NBL-DR-C-0520 provided to show specific headwall drawings along with typical details from 0510.
9. Flotation calculations supporting the design.
 - a. Flotation calculations included for the attenuation basin included *Flotation calculations should be based on a displaced water depth of 1.8m not 1.1m (1.8= Initial ground level of 4.6- (basin invert level of 3.48- construction depth 0.68))* Flotation calculations should follow Eurocode 7. Revised Geo-synthetics calculations provided which consider Eurocode 7
 - b. Calculations on the tanks from SDS Ltd show under normal conditions there are no issues but with elevated water levels (i.e. the worst case scenario in the groundwater monitoring) there will be flotation. We have updated our information and calculations to show a concrete slab over. *Details will need to be provided of how maintenance will occur, including replacement of tanks if required- is this cost acceptable?* SDS has confirmed the tanks design life is 50 years in accordance with their BBA certificate and the system is designed to be non-entry for maintenance. Regular "maintenance" will only be to jet/CCTV the longitudinal pipe running

through the tanks. At the end of the design life, the replacement of the tanks will be subject to condition survey and relevant national policies at the time, and so is not assessable. Updated maintenance document provided

10. Details of how adequate treatment of surface water is being achieved prior to discharge to watercourse. Details should be in accordance with CIRIA C753 chapter 26, i.e. pollution hazard indices and mitigation indices fully detailed.

- a. The basin for the southern network will provide sufficient mitigation (see included simple pollution mitigation assessment). For the northern two networks, we propose the use of Aqua Swirl units; mitigation indices supplied by SDS Ltd. *Aqua swirl does not remove soluble pollutants, please detail how these are going to be removed.* It is noted that the northern tanks will discharge into open ditches, where UV sunlight and organic processes will be providing adequate treatment against soluble. However, in addition to the above we are proposing a filter trench downstream of the hydrobrakes to provide an additional measure for reduction of potential soluble contaminants.

11. A plan showing a 3m buffer to all watercourses. Note this buffer must be taken from top of bank.

- a. As shown by layout drawings 1643-WSP-XXX-NBL-DR-C-0517 *Okay, point closed.*

12. A plan showing a 3m buffer around basins. Note this buffer must be taken from top of bank.

- a. As shown by layout drawings 1643-WSP-XXX-NBL-DR-C-0517 *Okay, Point closed.*

13. Details of bed levels of ditches, including invert levels of pipes

- a. As shown by layout drawings 1643-WSP-XXX-NBL-DR-C-0501 and 0502. We have set the levels of the outfalls above the nearby culverts into which the ditches discharge. *Further information required. Not clear on current plans. Minimum of 150mm between ditch bed and invert level of outfalls required.* Drawing 1643-WSP-XXX-NBL-DR-C-0520 displays the level of the outfalls, all of which are above the lowest surveyed point of the receiving ditches. Although the levels are not 150mm above the lowest surveyed ditch level (which we assume was the water level /lowest safe level the surveyors could get to on the day), the ditch bed level will be lower than this. In addition, the outfalls from the ditches through the northern and southern culverts are at 2.48mAOD (north for outfalls 2 and 3) and 3.31m (south for outfall 1) respectively which are lower than our proposed headwalls.

14. A plan showing root potential areas and tanks. There must be no overlap between root potential areas and tanks and basins.

- a. As shown by layout drawings 1643-WSP-XXX-NBL-DR-C-0517. Arboriculture reports also included *Tank 1 appears to encroach within this. Trees appear to be proposed over tanks 4 and 2 and very close to the bank of the ponds. Please remove these proposed trees.* Layouts now show root barrier protection where necessary; note that the landscaping plans had been approved at reserved matters along with the drainage strategy which always had the pond in this location.

15. A maintenance manual.

- a. Maintenance as per information from manufacturers. Typical maintenance of the basin is included. *A fully detailed site specific maintenance manual must be provided including gullies, catchpits, pipe networks, tanks, basins, outfalls, aqua swirls. The maintenance manual must detail who will complete this maintenance and how it will be funded, e.g. maintenance company funded by charge on residents. Details of the ditch extents that Bellway has riparian ownership for must be included, along with details of maintenance required. An example of a maintenance manual can be provided if required. Manufacturers details and requirements for maintenance can be included within an appendix.* Information now included

16. Exceedance flow plans.

- a. As shown by layout drawings 1643-WSP-XXX-NBL-DR-C-0517. *Appears to be incorrect near site entrance.* Updated drawing provided
17. Evidence that land drainage consent has been applied for, for the connections to the ditches.
- a. Application in progress and we have received comments from Paul Cann. *Noted.*

Calculation/ Network Design Comments

- a. *Greenfield calculations are completed on an area that does not accord with the impermeable area. We will tolerate this on this occasion, but should be noted for future applications.*
- b. *Self-cleansing velocity of 1m/s should be achieved in all pipes.* Some pipes are storage pipes or have their discharge limited by flow controls, and will therefore not be capable of achieving self-cleansing velocities regardless of size or gradient. Other pipes meet the minimum gradients required by Sewers for Adoption/Building Regs which will not achieve 1m/s but these are commonly acceptable compromises.
- c. *Some inconsistencies in North Western network, i.e. drawings do not tally with calculations, please look at.* Discrepancies amended
- d. *SMH25 should be a catchpit. CP24 doesn't need to be a CP (i.e. swap).* Catchpits re-arranged in latest version
- e. *Catchpit should be located upstream of Tank 4.* Amended
- f. *Surcharged depth 0.3m only is applied. Please run a sensitivity test with water levels at top of bank level.* This would imply that the drainage system will need to be designed for exceedance events or drainage failure? Therefore we do not believe that that such an analysis is required for design principles, only for informing on exceedance routing. Please refer to the overland flow routes drawing for this information.
- g. *4m3 of flooding at CP21 near entrance (road falls to New Barn Lane). GFL levels nearby are lower than the cover level of CP21. Please provide gully levels and cover levels of the smaller network serving the housing here. It currently looks like flooding will either spread to the public highway or will go into garages, neither of these are acceptable. i.e. design fails to meet requirements of NPPF.* Flooding removed
- h. *Invert levels are 100mm out on the majority of the north eastern network, i.e. SMH27 to CP32* Drawings and model updated
- i. *Gully connection into aqua swirl shown on north western network- can this occur in reality?* Gully connection amended
- j. *Hydrobrake at SMH35A is referenced incorrectly on plans. Should be MD-SHE-0049-1100-1000-1100* references amended
- k. *Invert level of tank 2 is different on plan to in calculations. Can tank 2 be brought on line?* Tank 2 to remain as shown. Inverts confirmed
- l. *Please provide 300mm of freeboard above maximum water level in basins to top of bank.* Basin now amended to ensure 300mm of freeboard
- m. *Has the rain falling on the basins been included within calculations? No, the calculations do not include for rainfall on the basins as the time of concentration will be different. We do not believe that this affects the drainage network or philosophy of the drainage strategy.*
- n. *Please remove "potential" from Aqua swirl locations on plan.* Done