

Arun District Council, Civic Centre, Maltravers Rd
Littlehampton, West Sussex, BN17 5LF
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From: Paul Cann <Paul.Cann@arun.gov.uk>

Sent: 23 November 2022 09:08

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

Cc: Jessica Riches <Jessica.Riches@arun.gov.uk>; Karl McLaughlin <Karl.McLaughlin@arun.gov.uk>

Subject: RE: Planning Consultation on: P/88/22/DOC

Further consultation comments from our consultant in respect of the above.

Regards

Paul Cann

Principal Drainage Engineer, Engineering Services

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

Sent: 26 October 2022 12:34

To: Paul Cann <Paul.Cann@arun.gov.uk>

Subject: FW: Planning Consultation on: P/88/22/DOC

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

Sent: Wednesday, October 26, 2022 11:33:45 AM (UTC+00:00) Monrovia, Reykjavik

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

Subject: Planning Consultation on: P/88/22/DOC

To: **Engineers (Drainage)**

NOTIFICATION FROM ARUN DISTRICT COUNCIL

TOWN AND COUNTRY PLANNING ACT 1990

Application No: P/88/22/DOC

Registered: 24th May 2022

Site Address: Land North of Sefter Road & 80 Rose Green Road Pagham

Description of Works: Approval of details reserved by condition imposed under P/134/16/OUT relating to conditions 10-surface water drainage, 12-maintenance and management of surface water drainage system, 14-foul drainage system, 16-external lighting, 17-Construction Management Plan, 22-setting out when roads, footpaths, cycleways and emergency routes are to be construction, 26-street lighting and 28 (part)-energy conservation and renewable energy.

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 **9th November 2022**.

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

Jessica Riches

Planning Case Officer- Arun District Council

Telephone: 01903 737852

Email: jessica.riches@arun.gov.uk

PLCOND00 (ODD) 2020

North of Sefter Road, Pagham – P/88/22/DOC Comments Tracker			Initial Issue Date: 12-10-2022 Issue Date: - Revision 1.0		
	ADC Drainage Comments 11-10-22	Applicants Response	ADC Drainage Comments 18-11-22		
	Initial/Planning:				
1.	The link to your updated drawing/calculations has expired so some comments raised below may have been addressed.	Updated link with drawings addressing comments below where required	Noted.		
2.	Please provide a copy of your final hydrological assessment report inclusive of groundwater monitoring.	Refer to 305035 L01	Noted.		
3.	Please provide a copy of your catchment area plans together with any classification of urban creep being applied. Please note the SW basin areas must be included.	Refer to 10768/1611 10% urban creep added on impermeable roofs. SW basin top bank areas added on network calcs. Runoff coefficient set to 1 for both summer/winter	Please annotate the top of bank areas and advise which node these are applied. The catchment plan does not coincide with the WSCC S38 plan where '100%' highway corridor shall be used (i.e. full service margins). Please provide confirmation from Andrew Howick's team if otherwise agreed.		
4.	Further to item 3 above, and the design evolution from the planning approved FRA, please qualify the QBAR rates are representative of the developed area being positively drained.	Qbar rates for each network and for the overall site generated. Total discharge flow does not exceed the calculated Qbar for the proposed impermeable areas.	As previously advised please provide an explanatory breakdown so we can verify QBAR (derived from area positively drained), plan 1611 cumulative areas and the 1D modelling cumulative areas.		
5.	In light of the above please also advise (via plan) on future phase catchment area allowances that have been annotated to ensure these are not underestimated.	Allowances for potential school site/care home/residential development at north-west corner of the site. Refer to 10768/1611 Also, relevant notes in drainage plan (10768/1602) and section 104 Agreement plan (10768/1140)	Noted & Closed.		
6.	Please confirm if further site investigations of the anti-tank ditch/culvert 'line & level' has been undertaken.	No line and level survey available. CCTV surveys undertaken to determine levels/status of anti-tank drain. Any repairs to the anti-tank drain to be undertaken by the land owner and this has been concluded as part of our land drainage consent.	Noted & Closed. It is noted that repairs are required and this in hand.		
7.	FEH data highlights a significant upstream catchment of the order of 1.66km ² . How have the risk of potential site-wide exceedance flow arriving along the northern boundary been assessed and mitigated. Noting the proposals elevate the site above natural ground further evidence is required to ensure overland flow conveyance is not compounded.	Development is bounded to the north by an existing ditch. EA Surface Water flood maps (high/medium/low probability) do not indicate any flood risk from surface water, and exceedance flows from northern catchment flows towards natural watercourses not affecting the proposed development. Approved FRA does not recommend storage allowance within our site for catchments beyond site's boundary and therefore these areas are excluded. Similarly, exceedance flow routes show surface water flowing towards attenuation ponds without posing any risk to adjacent developments. Proposed bunds along the southern line of proposed ponds will provide additional protection to the southern existing	The southern bund solution is generally accepted to protect existing dwellings, however with reference to drawing 1825/P8 to extend bund further around south-west low corner. It is not clear how the northern perimeter ditch conveys intercepted run-off around the development. Please update the drainage drawings to clarify the corridors, buffers, top of bank, bottom of banks, direction of flow, culverts etc. Where this ditch lies inside the development boundary upgrades and desilting may be necessary.		

		properties.	If this is proven to not compound flow conveyance this comment can be closed.		
	LPA Policy:				
8.	Engineering drawing must show 3.0m buffer zones from all SuDS features & the anti-tank ditch route.	Buffer zone hatched areas added on drawings 10768/1601-1607.	Agreed and closed.		
9.	Engineering drawing must show 5.0m easement zones from all ordinary watercourses. The existing watercourses are on the topographical survey, however are not clear; suggest these are subtly hatched to stand out.	Easement zones added on drawings 10768/1601-1607	Noted, however the existing ditch corridors are very faint on the pdf's. please can these be enhanced. (See note 7 above)		
10.	With reference to drawing 1602/P6 the buffer in between the diverted watercourse and SW basin 5 does not comply with the minimum 3.0m.	Proposed diversion and pond orientation adjusted to comply with 3m requirement.	Agreed and closed.		
11.	There should be at least a 1.0m service margin (max 1:20 slope) between the edge of footpaths and all SW basins top of bank. Basins 1, 4, 5, 6 may be affected.	Service margin added on drawings 10768/1601-1607. Maintenance of SuDS features does not form an issue.	Path 351 is very close to SW basin 5 top of bank. Drawing 1822/P7 illustrates the northmost level difference exceeds 600mm height or worse. Drawing 1634, section K-K does not identify this. This does not comply as commented previously. The path surface level alongside SW basin 6 is at 5.6m close to the top of bank being 5.35m.		
12.	None of the details advise as to whether the SW basins will be fenced or will require safety equipment. Please clarify.	Updated 528 plan and screenwall/fences drawings show 0.4m knee rail fence around ponds. We are currently in discussions with highways authority to decide the extent of fencing around ponds (if fencing goes around all ponds or just adjacent to footways/cycleways). Refer to drawings 10768/1130 & 10768/1811-1815	Noted, please advise final strategy once agreed with WSCC. (See note 11 above)		
13.	Permeable pavement shall be promoted where feasible. The eastern portion of the site appears to have very little areas utilised.	Permeable paving areas agreed through the planning process and are as shown on plans	We acknowledge the scheme adheres to the planning approved strategy but would welcome any further shared area designations such as the 3 No. shared drive areas alongside SW basins 2 & 3.		
	Flood Risk:				
14.	As you are no doubt aware there have been occurrences of historic flooding within the site and to neighbouring properties along the southern boundaries (catchment 1 FRA fig 3). Whilst a drawing 1610 denotes overland flow/exceedance routes the LPA requires further supporting evidence of the final surface level design. A few site cross sections would also assist in observing the extent of ground level raising.	EA Flood maps high risk show no flooding, medium risk show very localised flooding not exceeding 300mm depth, and low risk flood depth does not exceed 300mm. The risk to the future development as well as neighbouring properties will be mitigated through the proposed finished levels of the development as well as having SuDS basins at the lowest part of the site. As an additional measure, proposed bunds 500mm height running along the southern line of the proposed ponds will provide protection to the southern existing properties during events more severe than the design storm.	Agreed and closed.		

		For the design storm system does not flood at any point. For site sections refer to drawings 10768/1639-1640.			
15.	Please update drawing 1610 with colour level banding (and/or contours) and annotate ultimate low points.	Height bands and contours added on drawing 10768/1610	Agreed and closed.		
16.	In addition to the above please provide the elevation design and surface finish for the perimeter footpaths. It may be necessary to include further provision of subtle berms and low points to mitigate potential exceedance flow off site.	Refer to levels drawing 10768/1821-1826	Agreed and closed.		
	General:				
17.	SW pipe downstream of SWHM1.19 is 900mm diameter so headwall 8 is huge for an 8l/s flow restriction. Drawing 1504 shows the flow control manhole however does not advise as to which storm severity the weir crest level is breached and the additional flow conveyed during these short occurrences to inform the size.	Headwall design is based on depth of pond and pipe diameter. Flow is controlled in the manhole and not via the headwall. Weir crest level for all flow control chambers has been set as the maximum water level of the critical duration of 100yrs+40%CC. These levels obtained from Windes calculations. 900mm provided pipe used to prevent blockages in the culvert.	Agreed and closed.		
18.	Drawing 1620 to be updated to highlight flow control manholes.	10768/1620 schedules updated.	Agreed and closed.		
19.	Headwall schedule to be provided.	Headwall schedule added on drawing 10768/1502	Headwall 17 & 18 do not comply with WSCC S278/38 standards. Bagwork headwalls are only intended for gullies. These headwalls shall comply with WSCC detail 32 (dictated by pipe size).		
20.	SW outfall to the anti-tank 600mm diameter culvert at SWMH1.25 must be adjusted to be soffit to soffit.	The whole surface water drainage network has been set as high as possible, slightly compromising the minimum acceptable cover between ground levels and adoptable pipe soffits. Icosa Water has recognised this and accepted our proposals - technical approval has been issued. All pipes have been set at gradients to achieve a minimum of 1m/s self-cleansing velocity and as a result connections into the anti-tank drain are 150mm higher than the interpolated existing invert level. We also explored the option of using double pipes, however smaller pipe sizes require steeper gradients to achieve self-cleansing velocities and these gradients result in missing the outfall. Given that the proposed outfall manholes will be catchpit chambers with non-return valves fitted in last runs of the proposed network, we do not see the level difference being an issue. Impossible to achieve soffit to soffit level connection without pumping.	Disagree. The strategy has been set/accepted for the need to elevate the entire site and so would be designed from the ultimate outfall to head of run to conclude the final surface design. This would ensure best practise is achieved. It is noted that this outfall is only 150mm off from achieving a soffit to soffit connection. A slightly larger pipe size could also improve this or refinement of basin inverts given freeboard is healthy. Pumping would not be necessary here.		
21.	SW outfall to the anti-tank 600mm diameter culvert at SWMH21.7 must be adjusted to be soffit to soffit.	Response as above (comment 20)	We acknowledge this network has a few constraints, namely the triple pipe and OWC. The OWC must first be approved here.		

			We trust you will review the design with a view to elevate the outfalls, possibly Icosa can accepted subtle variations. Once the above process has been explored we can consider the lower invert via a catchpit installation.		
22.	The anti-tank ditch/culvert falls westerly however the incoming lateral angle from SWMH21.7 exceeds 90degrees; suggest SWMH17.10 is adjusted.	Manhole SWMH17.10 adjusted	Agreed and closed.		
23.	Proposed fence/gate post sit above 600mm diameter culvert just north of SWCP17.8; foundation may conflict with culvert which has reduced cover.	Post adjusted. Contractor to ensure fence foundation spans either side of culvert note added on drawings 10768/1601-1607	Agreed and closed.		
24.	Please provide details of WASTOP product.	To be installed at the bottom end of the outlet pipe where it joins with the outfall manhole. For product details refer to "Althon_Aquatic_WaStop_Data_Sheet_7"	Agreed and closed.		
25.	Drawing 1506 illustrates triple 225mm diameter pipes passing under a culverted watercourse. These pipes do not provide the same conveyance capability of one 600mm diameter pipe. SWCP17.6 show benching however the manholes schedule denotes a catchpit. Both manhole details show incorrect/non compliant benching to DCG.	Triple 225mm pipe has been used to overcome clashes. Having a 600mm pipe below the culverted section of diverted ditch will result in losing connection into the outfall, when coming above the culverted section will result in lifting all the levels around this area over a meter, which we do not consider as an effective solution. The site is relatively flat with false falls to achieve longitudinal gradients required so any changes around this area will cause a domino of changes. Icosa Water who is adopting the main drainage runs have accepted this proposal. Refer to sections on drawing 10768/1638 and 10768/1506 Manhole detail on 10768/1506 adjusted.	Agreed, however it is not clear if the 2 No. spines will be encased in concrete to mitigate long term settlement issues.		
26.	Attenuation tank 1 illustrates triple 225mm manifold. These pipes do not provide the same conveyance capability of one 600mm diameter pipe and may affect 1D modelling results.	Tank specification is Wavin (widely accepted for attenuation/infiltration) and maximum diameter of inlet/outlet pipe is 225mm. For larger diameters a manifold connection is used. Please refer to product brochure document "08528_WAV_AquaCell Core-R BBA Updates_PIM_Web" and our drawing 10768/1503.	The manifold solution is accepted, however the updated 1D calculations have not been provide to confirm the corresponding nodes/links.		
27.	Drawing 1502 notes are blighted. Nor this drawing or the cross section advise on the foundation/bedding requirements; please clarify.	Units should be bedded on minimum 150mm thick well compacted Class 6A or 6K* well graded granular material with a 50mm topping of fine material (Class 6L*) to ensure units are level and stable. *Manual of contract documents for Highway Works: Volume (MCHW1) specification for Highway Works, Series 600. Sections on drawings 10768/1630-1636 updated.	Agreed and closed, however further updates should ensure the bedding hatch is contrastingly different.		
28.	Drawing 1635 shows top of bank as 5.35m but section shows an odd steep section above which does not comply with a 1:3 maintainable slope.	Section M-M updated to comply with 1: 3 maintainable slopes	Agreed this now coincides with footpath levels as shown on drawing 1821/P7. Comment closed.		

29.	Drainage layouts show some permeable pavements areas with collector pipe, however no supporting detail. Further details of porous pavements are required and shall include full make-up, incoming inverts, check dams, etc. Diffusers are preferred and must be shown 5m clear of all structures.	External works private details show a section of permeable pavement with collector drain (10768/1901) and private drainage construction details shows the distribution tank detail within permeable paving (10768/1702). All diffusers are 5m from any structures.	Agreed and closed.		
30.	Please provide supplier details for all flow control devices/sump requirements.	Flow control devices design based on Hydro-International. Detailed plans and sections on drawings 10768/1504 – 1505 are based on supplier's dimensions.	Accepted subject to receiving supplier data sheets.		
	Landscaping:				
31.	Proposed tree pits conflict with the culvert outfall to SW Basin 5; planting is not accepted within the 3.0m buffer/easement.	Landscape proposals updated and further updates are pending (more to do with street lighting). Drawings will be updated accordingly when landscape design is finalised	Accepted subject to receiving final landscaping design coordination. Noting the S38 interests and planting restrictions will we also require evidence from WSCC.		
32.	Numerous proposed planting is shown above the SW drain between headwall 11 and SWMH1.22.	Landscape proposals updated and further updates are pending (more to do with street lighting). Drawings will be updated accordingly when landscape design is finalised	Accepted subject to receiving final landscaping design coordination.		
33.	Numerous proposed planting is shown within SW Basin footprints; no planting is permitted within 3.0m buffer.	Landscape proposals updated and further updates are pending (more to do with street lighting). Drawings will be updated accordingly when landscape design is finalised	Accepted, subject to receiving final landscaping design coordination.		
	Public Highway Approvals:				
34.	Please provide evidence to clarify the extent of S278 off site highway works and S38 on site road adoption under WSCC.	S278 by others - Paul Bashams Associates. S38 – Refer to 10768/1130. Agreement plan currently with Highways Authority for comments	Noted, we trust comments have been shared in respect of the S278. It is noted that all road gullies are to be adopted and comply to the WSCC 180sqm catchment/gully criteria as demonstrates on drawings 1132-1136.		
35.	Please advise on the status i.e. technical approval together with any highway bespoke drainage design.	Agreement plan currently with Highways Authority for comments	Noted.		
36.	The new S278 bellmouth shows a 450mm diameter culvert with 2 No. terminal gullies linking to the west headwall. This is not an acceptable arrangement if using pre-cast headwalls as elsewhere. An interim catchpit to WSCC S278/38 standard details would be preferable.	S278 outside our scope of works – Undertaken and got it approved by Paul Bashams Associates.	Noted, we trust comments have been shared in respect of the S278. It shall be noted OWC's must be coordinated with WSCC & the LPA.		
37.	S278 terminal gully positions to be checked once in receipt of levels design, catchments.	S278 outside our scope of works – GTA drawings reflect design by others	As above.		
	Public Sewer Approvals:				
38.	Please provide evidence to clarify the extent of S278 off site highway works and S38 on site road adoption under ICOSA.	S104: Refer to drawing 10768/1140 S38 : Refer to 10768/1130	Noted and closed.		

39.	Please advise if ICOSA are adopting the SW basins and if these comply with their design criteria/policy, in addition to DCG.	Icosa Water will not adopt attenuation ponds	Noted, with reference to conveyance drawing 1810 these area re to be 'privately managed land'. Please provide details of the management company arrangement in due course.		
40.	Please advise on the status i.e. technical approval together with any highway bespoke drainage design.	Icosa Water Technical approval for S104 S38 under review by Highways Authority	Noted and closed.		
	Treatment:				
41.	No comments.				
	Hydraulic Calculations:				
42.	Whilst an extract plan has been provided with the pipe numbers this is complicated to cross reference to the engineering plans; please add the references to a CAD plan. This must include porous car park nodes and headwalls.	For pipe numbers in relation to Windes calcs refer to S104 drawing 10768/1140	Noted and closed.		
43.	Network 1 PN1.016 has a self-cleansing velocity of 0.46m/s; this must comply to a minimum of 0.75m/s BRegs or 1.0m/s DCG.	PN1.016: Dummy pipe linking Headwall 1 -- Headwall 3 in detention basin 1	Noted and closed.		
44.	Network 2 PN3.000/PN1.005/PN1.008 have reduced self-cleansing velocity; this must comply to a minimum of 0.75m/s BRegs or 1.0m/s DCG.	PN3.000: Pipe running through attenuation tank 1 for jetting. PN1.005: Triple 225mm pipe used instead of 600mm pipe to overcome clashes. Selfcleansing velocity compromised as triple 225mm pipe is laid on 1:513 (1:556 is the flattest gradient achieving self-cleansing velocity for a 600mm pipe - Tables for the Hydraulic Design of Pipes, Sewers and Channels: 8th edition (Volume 2)). Refer to comment 25. Icosa has accepted this configuration PN1.008: Dummy pipe linking Headwall 13 -- Headwall 14 in detention basin 6	Noted and closed.		
45.	It is evident the anti-tank 600mm diameter culvert serves a significant site-wide local catchment, therefore calculations must be tested with a surcharged outfall. Due to the proximity of the site to the coast the downstream receiving network can be affected by the tide.	Outfall changed on calculations to surcharged outfall.	Noted and closed.		
46.	Calculations incorrectly model 'headwalls' as open manholes thus falsifying the available storage provision. Please correct the feature type and re-run. This can be accepted for the outfalls where surcharged outfalls are to be added.	Headwalls amended to junctions.	Noted and closed.		
47.	Engineering plans to denote footprint areas for porous paving and SW basins to correlate with calculations.	Drawings 10768/1601-1607 updated	Noted, however it is not clear where the SW basin areas are tallied.		
48.	Please provide calculations for 30yr +40% and summarise maximum water levels for each SW basin.	Calculations attached. Max water levels added on sections. Refer to drawings 10768/1630-1636	Noted and closed.		

49.	Please summarise the half drain down time to 50% for each SW basin and permeable pavement. This shall be for 10yr, 30yr, 100yr.	Calculations attached	Network 1/2 graph outputs appear to show all half drain down times exceed 24hrs; please clarify the 1D modelling depths and hrs in a tabulated response. Please note that compliance is required for at least the 10yr+CC storm.		
	Flotation Calculations:				
50.	Noting groundwater is very high at this location, please provide calculations for flotation for all SW basins based on the relevant recorded levels.	Flotation calculations for basins submitted. Also flotation calculations for adoptable manholes submitted and approved by ICOSA Water	Flotation calculations for the basins are based on current GW results which may vary yet have no safety factor which is concerning. Flotation for manholes have a suitable safety factor and are acceptable.		
51.	Please advise if there are any areas of permeable pavement affected by groundwater. Where applicable provide further calculations.	N/A	Noted, however the area denoted on drawing 1601 are lower lying; please qualify the GW levels and formations.		
	Drainage & Maintenance Manual:				
52.	The report does not advise the ownership and maintenance responsibility of the SW basins.	Paragraph 5.1.1 updated	Agreed and closed. (See above)		
53.	Please provide a schematic drawing to denote the extent/areas for future maintenance, this shall be included / reference therein and highlight key SuDS features.	Refer to 10768/1810 Conveyance Plan also attached in Appendix A	Agreed and closed. Please note it is expected WSCC will also require further updates to this drawing.		
54.	This report must also cover existing watercourses and culverts including the site specific anti-tank ditch. Please update section 6 accordingly.	Section 7 added	Agreed and closed.		
55.	In addition to the item above, please include a section for headwall, grills, trash screens, etc.	Section 8 & 9 added	Agreed and closed.		
	Further comments 18.11.2022				
56.	A footway crosses the existing watercourse in vicinity of detention basin No.6. Please provide further details including sections and tie-in gradients.				
57.	Drawings 1601/P9 & 1602/P9 shows the anti-tank culvert running underneath new S38 road. If the existing culverts are damaged or unsuitable for additional vehicle loading these may need to be replaced and/or protected.				
58.	All SW basin sections to be updated to denote fencing requirements agreed.				
59.	SW basin 6 has insufficient freeboard to top of bank. This should be at least 150mm for the 100yr plus CC event.				
60.	S104 drawing 1140/P12 & S38 drawing 1130/P7 show conflicting information. The SW sewer from SWMH17.1 to SWMH 17.9 is shown as 'highway drain' on the former and 'S104 sewer' on the latter? We assume ICOSA				

	are adopting this and the geocellular tank or the S38 will be invalidated.				
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