22236 New Monks Farm – Response to ADUR District Council Comments dated 12 February 2020

Comment / Query		Response from Applicant
1	**Condition 8**	
	Prior to the commencement of development, the detailed drainage calculations submitted in support of the overall drainage strategy to demonstrate that the development will not increase flood risk offsite for events up to and including the 1 in 100 year plus 40% climate change event shall be submitted to and approved in writing with the LPA. Thereafter the drainage strategy shall be implemented in full accordance with the approved details. *Reason: To meet the requirements of the National Planning Policy Framework (NPPF) and adopted Local Plan Policy 36.*	
1.1	Please provide a linked MicroDrainage model with the 12 networks, ditches and control included. Individual calculations supplied are insufficient as they do not take account of the water level within the receiving watercourses, flows from other networks and the flow constriction on the wider network.	A linked model of the onsite Lancing Ditches including the proposed surface water drainage networks has been compiled and submitted. There are 11 surface water systems 1-12 (there is no network 7)
1.2	A surcharged outfall should also be modelled with water levels set to a pre agreed level. This is a point for further discussion.	The linked model includes a surcharged outfall mimicking tidally influenced water levels at the outfall based on recorded data with outfall restriction set to $1m^3/s$ for all design periods. Model run with tidal offsets at four time periods. 0 minutes 180 minutes 360 minutes and 540 minutes.
1.3	It is stated that the critical storm duration is the 6 hour event. This is based upon observed outflows from the network during varying tidal conditions. However, the applicant is proposing on introducing a penstock, the critical storm duration should be assessed for zero outflow, i.e. if human error leads to the penstock being closed.	Storms up to 48 hour duration have been modelled based on the criteria noted above.
1.4	Further detail evidencing that the proposed surface water drainage scheme will be adequate for the lifetime of development should be submitted. I.e. the effects of sea level rise must be examined.	Sea level rise will have no significant effect on the duration of tide locking within the Lancing Ditches between the outfall from the site and the outfall to the Tidal Estuary at Norfolk Bridge through the tidal Flap Valves at the Dogs Trust to the south of the site. This has also been queried previously by McCloy Associates and responded to on 17 January 2018. These comments were subsequently accepted by McCloys. A copy of the 17 January 2018 response is attached for reference.

1.5	Calculations of required storage volume are based upon impermeable areas draining to the watercourses. This is an underestimation and oversimplification. Water that falls on the permeable areas will also contribute to the watercourses, granted this will take a longer duration to enter the watercourse, but it will still have an impact, especially in saturated ground conditions. Please submit evidence demonstrating that there is sufficient storage for all water entering the watercourses.	Greenfield runoff from the Country Park has been included within the linked MicroDrainage model. The model confirms that sufficient storage volume for a range of events up to and exceeding the design storm event of 100 years plus Climate Change is available.
1.6	Evidence must be submitted demonstrating that the flow leaving the site is no greater than the pre-development flows leaving the site. Stating that the existing culvert limits this is insufficient. There are 8 principal flow types through culverts, the upstream water level does impact upon the amount of water that is conveyed.	As noted the linked model includes a surcharged outfall mimicking tidally influenced water levels at the outfall based on recorded data with outfall restriction set to $1m^3/s$ for all design periods. This is achieved by modelling a lower height culvert at the outfall representative of having wound the penstock at this location down.
1.7	It is unclear if the storage volume quoted will in reality be available. Observed peak groundwater levels and site observations indicate that the ditches will seasonally fill with groundwater. Evidence must be submitted demonstrating that sufficient storage is available above peak recorded groundwater levels. The peak water level assumed in the report is also incorrect, the appendices to the FRA evidence that a water level of 1.483mAOD was recorded, yet a base level of 1.2m is used in design. Furthermore, water was observed within a ditch with a bed level of 2.1mAOD, indicating that water in the wider network does in fact far exceed 1.2m. The use of observed water levels is also questionable given the exceedance probability event designed for. If completing a statistical analysis for the purpose of obtaining 1 in 100 year water levels the duration of input data should be a minimum of 30 years.	The linked model satisfies this query. It should also be noted that additional pond areas on the site have not been included in the model and the model clearly demonstrates that sufficient storage is available.
1.8	Fully detailed long sections and cross sections of all watercourses are required to enable verification of quoted volumes and to ensure that construction is completed in accordance with details.	These were issued on 10 February 2020.

2	**Condition 9**	
	Prior to the commencement of development, a detailed Phasing Plan shall be submitted to and approved in writing with the Local Planning Authority. The Phasing Plan shall identify those works proposed prior to the construction and first use of the pumping station hereby approved and mitigation works necessary to allow any backfilling of existing ditches to prevent any increase in offsite flood risk. These details shall include calculations demonstrating that adequate capacity and conveyance of water will be provided at all times so as to not increase offsite flood risk. Thereafter, the development shall only proceed in accordance with the approved Phasing Plan, unless a variation is otherwise approved in writing by the Local Planning Authority. *Reason: To control the development in detail and to avoid increased flood risk offsite, to comply with Local Plan Policy 35 and the NPPF.*	
2.1	It is clear there are further watercourses to those shown on the consent plan. Discussions regarding these and how they may impact upon the phasing plan is required. Please can further details of the watercourses be provided so that volumes quoted can be verified. These can be in dwg format.	Phasing plans have been updated and submitted with existing and proposed volumes between 0.65m AOD and 1.2m AOD together with existing and proposed volumes between 1.2m AOD and 2m AOD as discussed. Copies of the updated watercourse phase plans are attached.
2.2	No information regarding conveyance has been provided. This must be provided. Further comments are:	Conveyance calculations for a 900mm diameter culvert with a roughness value of 0.6mm laid at a bed gradient of 1:2,000 confirm an unsurcharged full bore capacity of 438.7l/s per pipe. In the event that capacity is reached a surcharge at the upstream end of the culvert will occur and the hydraulic gradient will be increased. For a single 900mm culvert to pass 1,000 l/s under full bore conditions a hydraulic gradient of 1:390 would be required. Laid at a bed gradient of 1:2000 the above criteria would be satisfied for the 10m long culverts when the upstream end of the culvert is surcharged by 21mm and for the 20m long culverts when the upstream end of the culvert is surcharged by 41mm. There are always a minimum of two conveyance routes available throughout the phased works.
2.2.1	Stage 1	Applications for Temporary Ordinary Watercourse Consents have been made for all the following stages since the receipt of these comments.
	• Cross sections and long sections are required.	

	• Two consentable activities- new temporary watercourse and new temporary culvert	
	• Is there/ was there any existing connectivity between the northern channel and the mash barn lane channel? If so, is this being severed?	
	• Will the new excavation for storage not just fill with groundwater?	
	• The method sequence states that a culvert will be installed between the highway drainage outfall and watercourse 1 to allow for safe passage of plant and equipment. Details of this culvert will be required.	
2.2.2	Stage 2	
	• Two consentable activities- two bunds	
	• Cross sections and long sections are required	
	• Only one watercourse bund is shown on plan. Please show the bund to the east of the existing site entrance.	
	• Where will water from eastern A27 outfall go during this stage?	
2.2.3	Stage 3	
	• Cross sections and long sections are required.	
2.2.4	Stage 4	
	• Three consentable activities- two temporary 900 dia pipes, new section of temporary watercourse from storage area, and bund.	
	• Cross sections and long sections are required.	
	• Bund location needs to be clearly shown on plan	
2.2.5	Stage 5	
	• Two consentable activities- bund near Ikea, and bund under bailey bridge.	

	• Cross sections and long sections are required.	
	• Bund location needs to be clearly shown on plan	
2.2.6	Stage 6	
	• Cross sections and long sections are required.	
2.2.7	Stage 7	
	• One or two consentable activities?- bund on watercourse two	
3	**Condition 10**	
	No phase of the development shall commence until precise details of the surface water disposal identifying the treatment train prior to discharging to the water course shall be submitted to and approved in writing by the Local Planning Authority. A quantitative approach as per the methodology set out within CIRIAC753 shall be used to demonstrate adequate treatment prior to discharge to the watercourses. *Reason: To comply with Local Plan Policy 35 and best practice set out in the Sustainable Drainage Systems (SuDs) Manual.*	
3.1	Networks, 8, 10 and 11 appear to discharge downstream of the treatment areas and it therefore seems that no treatment is proposed for these areas. Sufficient hazard mitigation must be achieved prior to discharge to watercourse from all outfalls.	These are within the section of the scheme for which outline planning has been granted. Detailed design has not yet been undertaken within the associated areas. It is the intension to include discharge from these areas into the head of the treatment areas proposed at detailed design.
3.2	In paragraph 4.1.4 there is no reference made to the fact that there are also roads within the proposed development which will have greater than 300 vehicular movements a day, i.e. areas of a medium pollution hazard level. With pollution indices of 0.7, 0.6 and 0.7 for Total Suspended Solids, Metals and Hydrocarbons respectively. This paragraph must be updated and evidence must be submitted that a sufficient hazard mitigation index is being achieved through the design.	Noted. We attach an updated Surface Water and Water Quality Treatment Summary v1.2 which includes an update noting the medium risk carriageway.

3.3	It is unclear what the pre-treatment ditch areas are being defined as, with reference made to swales, bio retention systems, detention basins and ponds and what mitigation indices are being claimed. Please clarify.	We define the system as a wetland. These definitions as you are aware are open to some interpretation and the proposed system could also be classed as a bioretention system or potentially a pond, if you use the full length. We have included the calculations for 9 minutes of retention from a 1 year rainfall event within the updated document for each area. A wetland, bioretention system or pond all meet the required mitigation indices for a medium risk.
3.4	Cross sections of treatment areas are required.	Noted. These have been included on drawings 1-241 B, 1-242 B and 1-243 B, copies attached.
3.5	Levels need to be provided on drawings.	Noted. These have been included on drawings 1-241 B, 1-242 B and 1-243 B, copies attached.
3.6	No control is being constructed in pre-treatment wetland areas and they are set lower than the adjacent main channel. They may be inundated with groundwater or have high water levels due to back water effects. A dilution effect rather than treatment may therefore occur. Evidence must be submitted demonstrating that water will be contained within these treatment areas prior to discharge to the wider network for at least the 1 in 1 year event.	9+ minute retention times have been established for the 1:1 year return period storm. This is in accordance with the guidance of the SuDS manual.
3.7	Calculations of water elevation within treatment channels are based upon manning's equation only, they do not take account of interconnected network and backwater effects of control structures. This item could be addressed through design modifications to also resolve point 6.	There are no control structures within these areas.
3.8	Sedimentation calculations have only been undertaken for silicate particles. Silt particles are a lot smaller than silicate particles; their density is also less than that used in calculations. The drop out time of these particles is as a result a lot longer (over 20,000 times longer for the finest silt particles). Please submit calculations and evidence to demonstrate that finer particles will be removed and that hydrocarbons will also be removed via the proposed treatment swales.	As 3.6 above, 9+ minute retention times have been established for the 1:1 year return period storm. This is in accordance with the guidance of the SuDS manual.
3.9	The proposed rock filled gabions will likely sediment up in a very short duration. If this was to occur a weir system will be formed. Bed reinforcement measures downstream of the second gabion berm are required.	This is highly unlikely to occur given the 9+ minute retention time and sediment dropout, however a further rock gabion can be installed flush with the bed level downstream of the second gabion to ensure this cannot occur.
3.10	Please confirm maintenance proposals for the basins. This should include the arrangements for silt removal and reconstruction of gabions.	As noted in the New Monks Farm Drainage and Flood Management Plan.

4	**Condition 17**	
	No Phase of the development shall commence until a scheme for the provision and management of a minimum 3.5 metre buffer zone alongside all ditches measured from the top of the bank within the Phase has been submitted to and agreed in writing by the Local Planning Authority. Thereafter, the development shall be carried out in accordance with the approved scheme and any subsequent amendments shall be agreed in writing with the Local Planning Authority. The buffer zone scheme shall be free from built development and garden areas other than footpaths or access roads which can be used to assist the management and access to the remodelled water courses. The schemes shall include: • plans showing the extent and layout of the buffer zone. • details of any proposed planting scheme (for example, native species). • details demonstrating how the buffer zone will be protected during development and managed/maintained over the longer term including adequate financial provision and named body responsible for management plus production of a detailed management plan. • details of any proposed highway, footpaths, fencing, lighting etc. Reason: In the interests of ensuring the appropriate management and maintenance of ditches to prevent future flooding.	
4.1	Please clearly indicate the buffer zone on all plans.	Updated Buffer Zone Drawings noting the top of bank line in the key are attached.
4.2	Planting scheme- must clearly indicate where access to watercourse via mechanical means can be made. We do not want lines of trees along watercourse banks preventing access.	There are no trees forming a barrier to entry.
4.3	Two separate contradicting maintenance documents have been supplied, which is the correct one? Please provide one maintenance document that encompasses all requirements.	The Watercourse and Flood Defence Bund Management Plan is for the maintenance of watercourses and ditches. The HED Document is for the maintenance of the vegetation and ecological area. For the Watercourses the Watercourse and Flood Defence Bund Management Plan takes precedent.

6	**Condition 18**	
	No Phase of the development, except remediation, demolition, archaeological and drainage works in accordance with the agreed Phasing Plan shall commence until a detailed watercourse management plan, in accordance with the approved Draft Watercourse and Flood Defence Bund Management Plan dated 12th December 2017, including long-term ecological objectives, management responsibilities and maintenance schedules for all of the ditches within that Phase, has been submitted to and approved, in writing, by the Local Planning Authority. The water management plan shall be carried out as approved and any subsequent variations shall be agreed in writing by the Local Planning Authority. The scheme shall include the following elements: • details on how water levels in the ditches shall be maintained to achieve the long term ecological objectives of the plan. • details of maintenance regimes and management responsibilities. • details of eel passage through hydrological barriers as required by Eel Regulations. • details of monitoring and adaptive management. *Reason: To safeguard the ecological objectives for the watercourse and wider area.*	
6.1	The maintenance document for this condition needs to match up with the maintenance document for condition 17.	The Watercourse and Flood Defence Bund Management Plan is for the maintenance of watercourses and ditches. The HED Document is for the maintenance of the vegetation and ecological area. For the Watercourses the Watercourse and Flood Defence Bund Management Plan takes precedent.
6.2	The watercourse and flood defence bund management plan states that it is not envisaged that the watercourses will require dredging. Given the history of the site and the proposed inflows this is not correct. Please specify silt removal frequency and further details for this. Specific details of maintenance requirements and frequency required for; gullies, pipes, outfalls, treatment areas, culverts, ditches.	Comment is not understood given the 9+ minute retention time. Silt removal is NOT anticipated to be routine but inspection will be added to the maintenance document to alleviate these concerns.
6.3	Requirements must also clearly indicate how money will be raised for maintenance and the company responsible for maintenance. Provision for reconstruction of elements must be included. For example, what is the design life of the pumps, penstocks, etc. You must make reference to the requirement for replacement.	This element is provided for within the S106 Agreement for the site. The Watercourse and Flood Defence Bund Management Plan sets up the parties involved.

6.4	Strategy and Specification for landscape maintenance HED-1171-LA-902 states that dredging of watercourses will occur every 5 years by hand. Is it really realistic to state that this will occur by hand? Given the sizes of the watercourses and the scale of the network this seems unrealistic.	The siltation areas are small enough to allow hand de silting if and when required with minimal disruption to the ecology of these areas. This is desirable and is considered appropriate.
7	**Condition 19**	
	No works to the ditch network within any Phase of the development shall take place until a detailed scheme of the proposed alterations to the ditches within that Phase has been submitted to and approved, in writing, by the local planning authority. The scheme shall be carried out as approved and any subsequent variations shall be agreed, in writing, by the Local Planning Authority. The scheme shall include the following: • scaled plan and section drawings of channel profiles. • details of how profiles and features have been incorporated to maximise • ecological benefit. • details of the design of the reed bed pond. • details of the design of the sedge bed wetland. *Reason: To safeguard the ecological objectives for the watercourse and wider area.*	
7.1	Plans and sections will have to be revised to accommodate treatment areas, revised arrangements and previously undocumented watercourses.	Noted and included.
7.2	Please supply watercourse plans and sections in dwg format.	Noted and copies attached.
7.3	Has consideration been given to extending the two stage channel extents?	Yes, but the current proposals are sufficient for conveyance and ecology.
7.4	Ditch profile implications upon maintenance. Will mechanical plant be able to complete maintenance from 1:3 slopes? Slope lengths of 10-14m- digger unable to reach ditch bed from top of bank.	1:3 slopes will in no way preclude the use of appropriate mechanical plan where required.