

**RE: Hollin Cross Farm, Woodplumpton Road, Burnley, Habergham Eaves, Lancashire, BB11 3RS - FUL/2022/0149**

Dear Lancashire County Council,

Aegaea have been asked to review the submitted documents and consultee responses to Burnley Borough Council planning application FUL/2022/0149 for the proposed development of Hollin Cross Farm with focus to Flood Risk and Surface Water Drainage. For the benefit of the reader, the format of this letter is as follows; 1. documents reviewed, 2. identification of planning policy relevant to this development and 3. discussion on the findings of the reports against the various policies.

## 1. Documents Reviewed

For the purposes of this review, the following documents have been reviewed to understand the risk of flooding to the site.

- Flood Risk Assessment, Report Ref: 680259-R1 (02) FRA
- Drainage and Levels Assessment, Report Ref: 21061
- Geo Environmental Investigation Report Pt 1, Report Ref: 21061/GEIR
- Geo Environmental Investigation Report Pt 2, Report Ref: 21061/GEIR
- Drainage Query Clarification Report, Report Ref: 21061, dated 20/12/2022
- LLFA Response dated 15/08/2022
- LLFA Response dated 11/10/2022
- LLFA Response dated 06/01/2023

## 2. National and Local Policy Review

It is important to review The National Planning Policy Framework (NPPF) and Burnley Local Plan<sup>1</sup> (July 2018) against the submitted documents and the information presented within them. Key paragraphs of the NPPF and Burnley Local Plan in relation to this development are listed below;

### National Planning Policy Framework

*159: Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*

*162. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development*

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<sup>1</sup> <https://burnley.gov.uk/wp-content/uploads/2022/04/Burnleys-Local-Plan-Adopted-Version-Final-With-erratum-28-Sep-2018.pdf>

*in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.*

*167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment<sup>55</sup>. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

<sup>55</sup> *A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.*

*169. Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

- a) take account of advice from the lead local flood authority;*
- b) have appropriate proposed minimum operational standards;*
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
- d) where possible, provide multifunctional benefits.*

## **Burnley Local Plan (2018)**

### **Policy CC4: Development and Flood Risk**

*1) The Council will seek to ensure that new development does not result in increased flood risk from any source or other drainage problems, either on the development site or elsewhere.*

2) *No development should take place within 8m of the top of the bank of a watercourse either culverted or open, unless this approach is supported by the Environment Agency or Lead Local Flood Authority. Proposals involving the creation of new culverts (unless essential to the provision of access) will not be permitted.*

3) *Culverts should be opened up where possible to improve drainage and flood flows.*

#### **Sequential Test**

4) *New development on sites not allocated for the use proposed in this Plan, or which do not comprise minor development or changes or use, should be located within Flood Zone 1 unless the Sequential Test as set out in the NPPF and NPPG has been satisfied.*

#### **Exception Test**

5) *Development in Flood Zones 2, 3a or 3b on allocated or unallocated sites will only be acceptable where it is of a compatible type as set out in the NPPG (Tables 2 and 3), satisfies the Exception Test set out in the NPPF and NPPG and meets criteria 6b ii) to vi) below.*

#### **Site Specific Flood Risk Assessments**

6) *Development proposals on allocated or unallocated sites:*

a) *of 1 hectare or greater in Flood Zone 1, or in an area within Flood Zone 1 which has critical drainage problems or includes an ordinary watercourse; or*

b) *in Flood Zones 2, 3a or 3b; should be supported by a site specific Flood Risk Assessment taking account of the Council's Strategic Flood Risk Assessment (or the most up to date flood risk information available) along with any evidence from the Lead Local Flood Authority (Lancashire County Council), and the Environment Agency to establish whether the proposed development:*

*i) is likely to be affected by current or future flooding from any source, taking into account the increased risk associated with climate change;*

*ii) will increase flood risk elsewhere or interfere with flood flows;*

*iii) can provide appropriate mitigation measures to deal with potential risks and effects;*

*iv) would be likely to preclude the future implementation of necessary flood risk measures, including the improvement of flood defences;*

*v) can reasonably maintain access and egress at times of flood; and*

*vi) can be accommodated within the capacity of the water supply, drainage and sewerage networks.*

7) *Where flood defences exist that protect development sites, any site specific Flood Risk Assessment required should also assess the risk overtopping of defences in extreme events and possible breach analysis evidence.*

8) Where mitigation is required to make any identified impacts acceptable, these will be secured through conditions and/or legal agreement, including where necessary through planning contributions.

**Policy CC5: Surface Water Management and Sustainable Drainage Systems (SuDS)**

1) In order to assist in minimising surface water run-off from sites:

- a) Existing green infrastructure should be retained and integrated and where possible enhanced in line with Policy SP6; and
- b) The use of permeable materials should be maximised.

2) Surface water should be managed at source and not transferred and discharged. The following order of priority for any water discharge should be adopted:

- a) A permeable soakaway or some other form of infiltration system
- b) An attenuated discharge to a watercourse
- c) An attenuated discharge to surface water sewer
- d) An attenuated discharge to combined sewer (this should be considered the last resort)

3) In respect of major developments, SuDS will be required and surface water discharges from developed sites should be restricted to QBar rates (mean annual greenfield peak flow).<sup>127</sup> A drainage strategy should be submitted detailing the following:

- a) The types of SuDS and/or measures;
- b) Hydraulic design details/calculations;
- c) Pollution prevention and water quality treatment measures together with details of pollutant removal capacity as set out in the current CIRIA SuDS Manual C753 or equivalent and updated local or national design guidance; and
- d) The proposed management and maintenance regime for the lifetime of the development.

### 3. Discussion

#### Flood Risk

Aegaea have reviewed the FRA and can confirm that the site is within Flood Zone 1 using the EA Flood Map for Planning which shows the flood zones of rivers and seas. The site is larger than 1ha and therefore should conform with paragraph 167 and footnote 55 of the NPPF. Further analysis of flooding from other sources demonstrates that there is a risk of surface water flooding but this is considered low overall. The EA surface water map, Figure 4.3, of the submitted FRA does demonstrate that to the north of the redline application boundary, ponding of surface water could occur and that this is an area of Medium risk.

A topographic survey was appended as Appendix B of the FRA. Review of the topography demonstrates

that the highest levels (circa 259m AOD) are to the south of the redline application boundary falling to the north where the topographic levels are the lowest (circa 234m AOD). The area where surface water risk is medium (in the north of the site) has levels of approximately 238.02m AOD to 239.29m AOD.

Of interest on the Topographic Survey is that pooling of water was recorded in the north of the site, near the area identified as medium surface water risk. The date of the survey was 23.04.2021. To better understand the risk of flooding at this location of the site, it is also prudent to review groundwater flooding at this location.

The geo-environmental report provides summary statements on ground conditions and groundwater. It is important to note that the date of the report is September 2021.

<b>Ground Conditions</b>	<i>Topsoil deposits have been identified over the majority of the site proven to a maximum depth of 0.4m bgl but generally the topsoil is present at a thickness of 0.2m. The topsoil within locality WS04 was noted to have some very minor fragments of brick. The underlying natural strata comprises of glacial till which is firm to stiff sandy gravelly clays which have been proven to a maximum depth of 3.7m bgl. Bedrock comprising of mudstone and sandstone has been encountered across the majority of the site at depths ranging between 0.2 – 1.9m bgl.</i>
<b>Groundwater</b>	<i>Groundwater ingress has been recorded within positions TP02 and WS04 at depths of 0.8 – 1.2m bgl. The walkover has also identified extremely soft boggy ground conditions within the site indicating the presence of large amounts of surface water. The site also contains large drainage brooks which also contain significant amounts of ground water therefore a program of groundwater management should be considered for the development phase.</i>

The accompanying FRA goes on to state that the ground investigation report suggests that, ‘evidence of large amounts of groundwater has been identified within the site’ and, ‘it is anticipated that excavations within the site will be inundated with perched water.’

The ground investigation report para 4.2.3 further states - *The ground conditions identified within the investigations are considered to be representative of the conditions generally present over majority of the site area. The locations of each investigation point are indicated upon the appended ground investigation location plan and are shown in relation to site features at the time of the investigation.*

Of further concern is Paragraph 5.6.2 and 5.12.1:

*5.6.2 Evidence of large amounts of groundwater have been identified within the site and it is anticipated that large amounts of groundwater will be present within the site during inclement periods of the year. It is anticipated that excavations within the site will be inundated with perched water.*

*5.12.1 The presence of effectively impermeable clay strata and large amounts of surface water across the whole site area suggests that a ground infiltration system of surface water drainage will be inappropriate. It is our opinion based upon the results of these investigations that this site will need to utilise traditional sewers for surface water disposal.*

It is appreciated that a series of intrusive works was conducted including 26 trial excavations, 6 window sample boreholes and 3 rotary boreholes. However, no winter groundwater monitoring has been conducted and this of concern especially when in April pooling of water was observed in the September report – no date has been provided for the walkover. However based on the dates of the Topographic Survey (April) and Geo-Environmental Investigation Report (September), given that groundwater is potentially present even in the Summer months which would suggest the groundwater risk is high and that the surface water risk to the north of the site is much greater than the surface water risk map has represented.

It should be noted that the EA has provided information on the suitability of the Risk of Flooding from Surface Water dataset for assessing risk, and details of the model inputs. Key input parameters are

summarised below:

- The RoFSW mapping is based on a national surface water model for England and Wales.
- The model was built using JFlow software in 2013.
- The ground elevations were represented by a 2.0m resolution Digital Terrain Model (DTM).
- All drainage systems (sewers, highway drains, culverts etc.) were assumed to be at capacity and therefore could not convey any surface water flows.

Paragraph 4.1.1 of the Environment Agency What is the Risk of Flooding from Surface Water map? Report Version 2.0 dated April 2019. States that:

The nationally produced surface water flood mapping only indicates where surface water flooding could occur as a result of local rainfall. It does not fully represent flooding that occurs from:

- ordinary watercourses
- drainage systems or public sewers caused by catchment-wide rainfall events
- rivers
- groundwater.

It is therefore considered that the surface water risk and groundwater risk in combination to the site and surrounding area has not been accurately represented. A detailed model to further determine the risk is suggested especially given that the groundwater levels are high/shallow within the redline application boundary and to demonstrate that the development does not increase flood risk elsewhere in accordance with the NPPF, Paragraph 159.

## Surface Water Drainage Strategy

Consideration of SuDS has been submitted. The drainage strategy does not appear to consider once more the risk of the groundwater flooding at the site. The strategy promotes that an attenuation pond should be provided to the north of the site where the pooling has been observed by independent consultants and is of medium surface water risk as identified by the EA.

The attenuation pond promoted has been designed to have a bed level of 236.80m AOD. Existing levels are approx. 238.13m AOD to 238.99m AOD. Excavations could therefore be as great as 2.19m. The concern with the design of the pond is that groundwater has been recorded within positions TP02 and WS04 at depths of 0.8 – 1.2m bgl. Of the two positions TP02 is closest in location to the proposed pond.

Position	Approximate ground level	Depths	Approx Groundwater below ground level (1.2m)	Proposed Pond Bed Level
TP02	238.70m AOD	0.8m-1.2m bgl	237.5m AOD	236.80
WS04	243.10m AOD	0.8m-1.2m bgl	241.9m AOD	236.80

It can be observed from the above table, that the groundwater level is likely to be greater than the bed level of the pond – even using the lower level of 237.5m AOD at TP02. No groundwater monitoring has been undertaken and no evidence of how the excess groundwater unable to occupy the northern area proposed

for the pond will be mitigated effectively. There is concern that groundwater could ingress into the pond (if not lined) and thus reduce storage capacity for runoff, but also the impact of the feature (if lined) on groundwater regime/ flows at the site. The pond will become an artificial feature in the landscape and prevent the existing natural process for the groundwater to occupy this space. No consideration for the potential impact elsewhere has been considered post construction from this source.

Further the potential displacement of the groundwater could increase the risk of contamination / failure of the existing nearby septic tanks. The drainage query clarification report, December 2022, states:

*The drainage system for the site (extract below) is being designed to enable the existing septic tanks to remain in situ and we understand that Prospect will be allowing the owners of the septic tanks access over Prospects land to enable the owners to maintain and service the tanks. Given the large area of public open space to work with in this area, this give flexibility over the siting of necessary drainage and service infrastructure to ensure that there is no interference with the operation of the septic tanks.*

Without detailed groundwater monitoring or modelling of constructing the pond the proposed mitigation and overflows could be subject to change.

Finally of concern is that the LLFA identified in their first response dated 15/08/2022, that they had groundwater concerns. Since the first review the concerns with the groundwater have not been included in the consultation response. We question why this has occurred, given that the drainage strategy has not changed greatly in terms of its overall design. Therefore, in accordance with Burnley Local Plan Policy CC4 it is questioned how the application could be approved in absence of groundwater data that could in turn change the design and layout of the site and current arrangement to mitigate surface water.

Furthermore, the LLFA have provided comments and in accordance with paragraph 169, Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

- a) take account of advice from the lead local flood authority.

This does not appear to have been adhered to.

**Groundwater Concerns** – *The applicant proposes to locate the attenuation basin in an area with very high groundwater levels. Historic records of groundwater levels, or ground investigations, should be checked to ensure that during periods of high groundwater, the storage capacity of the basins is retained and that hydraulic connectivity between the surface water runoff and groundwater is acceptable from a water quality perspective. If a liner is used, there is a risk that the liner may 'float' during periods of high groundwater levels. A seasonally high groundwater table may not always impede the proper functioning of the facility, but it can result in a muddy base that may be considered unattractive if not developed into a permeant water feature. This will impact the proposed use of the basin as an amenity space during times of low rainfall.*

*The applicant also proposes to locate a geocellular storage tank in the area of anticipated high groundwater. It is recommended that attenuation tanks are installed above the groundwater table, because groundwater pressure significantly increases lateral loads on the walls of the tank, and even a small defect in the surrounding waterproof geomembrane or pipe joints can result in groundwater entering the tank and filling the design storage volume. Where a storage tank has to be installed either close to or below the groundwater table, the possibility of floatation should be prevented by ensuring that the combined weight of the tank and the soil over the top is greater than the uplift buoyancy force due to the groundwater (with an appropriate safety factor (The SuDS Manual (C753) Section 21.4.1–Step 3). Alternatively, specialist geotechnical advice should be sought on possible anchor systems.*

**The Local Planning Authority should satisfy themselves that the proper functioning of the SuDS can be achieved for the lifetime of the development before agreeing to the site layout.**

## 4. Conclusion

From review of the documentation provided, it is viewed that greater consideration to the surface water flood risk to the site and groundwater risk are provided in combination, as the ground conditions observed from the site walkover and topographic survey both identify that the ground was flooded or boggy. Detailed intrusive investigations have further confirmed that the groundwater is shallow/high. The risk of groundwater flooding needs to be considered in greater detail and its impact on surface water flows to not increase flood risk elsewhere if the site is to be developed. The current maps used to quantify the risk are not as representative as they could be especially for a major application of 200 dwellings.

It is noted that the revised drainage document has incorporated additional drainage features for exceedance but this is based on there being no groundwater risk. It is therefore considered that additional investigations are required to confirm that the development does not increase flood risk elsewhere from any source or other drainage problems, either on the development site or elsewhere, in accordance with the Burnley Local Plan policy CC4.

The proposed surface water drainage strategy has promoted an attenuation pond however no consideration to the groundwater levels or groundwater monitoring has been considered on the impact of excavating approximately 1.5m to 2.0m of earth in this location, subject to profiling of the pond. The pond is an artificial feature which does not allow groundwater to ingress. It is questioned where the existing groundwater could be displaced to post-development?

Groundwater monitoring is required across the site to inform the foundation design of the properties, buoyancy calculations for SuDS such as tanks and the performance of swales if they are not lined.

The Drainage Strategy States that the site will be regraded, but no consideration has been provided on the overland flows of surface water, interaction / impact of groundwater or a drainage strategy adopting the regraded site levels. A detailed model of surface water flows, groundwater levels and how the drainage infrastructure (SuDS) will interact is required to show the existing conditions baseline (excluding SuDS) and proposed (including SuDS) to provide a surface water drainage strategy and scheme that conforms to Chapter 14 of the NPPF as well as the Burnley Local Plan Policy CC4 and CC5.

We trust the review of the Site and suggestions provided will be reviewed in good faith and presented to the case officer and LLFA / Flood Risk Officer for their review.

Yours faithfully,



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