Ray Drabble
Flood Risk Engineer (Sustainable Drainage)
Residents Services Highways & Transport
T. 0330 222 4077
F. 01243 836901
Ray.Drabble@westsussex.gov.uk
www.westsussex.gov.uk

Western Area Office
Drayton Depot
Drayton Lane
Drayton
Nr Chichester
West Sussex
PO20 2AJ

Andrew Picton
Tully De'Ath Consultants
Sheridan House, Hartfield Road
Forest Row
East Sussex
RH18 5EA

28 February 2017

References:

A. WSCC LLFA letter to Ben Daines, Adur-Worthing Council dated 5 Jan2017.
B. Email: Andrew Picton (Tully De'Ath) Ray Drabble (WSCC LLFA) dated 8 Feb 17.
C. Email Ray Drabble (WSCC LLFA) Andrew Picton (Tully De'Ath) dated 9 Feb 17.
D. Tully De'Ath (Feb 2017) High Groundwater Scenario (No filtration).
E. JBA Consulting (Feb 2017) New Salts Farm Road, Shoreham Modelling Report and appended Flood Estimation Report

Dear Andrew,

Pre-Application Query: Tully De'Ath Flood Risk Assessment for The Hyde Group; Further Evidence Review

West Sussex County Council (WSCC) in its statutory capacity as Lead Local Flood Authority (LLFA) has been approached by Tully De'Ath (Reference B) for comments on further evidence (References D and E) provided in support of Hyde Homes' proposal to develop New Salts Farm.

WSCC LLFA has now reviewed the additional evidence and this letter summarises our comments / questions.

1. High Groundwater Scenario (No filtration)

Storage estimate

1.1 The scenario estimates the storage for the above to be 11,950m^3. Following further discussion with Tully De'Ath, the LLFA has estimated the storage required using a CIRIA method based upon calculation of storage on a 1m^2 basis that produced a figure of 6,086m^3. It is noted, however, that the half empty time is 32 hours. In order to satisfy the half empty rule, a minimum capacity of 6,853m^3 would be required, particularly recognising that for a worst case scenario, discharge to the Lancing Brooks may not be possible (see assumptions in modelling in section 2, below and EA Surface water flood map).

Ground raising / flood risk to adjacent properties

1.2 At a meeting attended by Tully De'Ath, Bowyer Planning and WSCC LLFA, the documentation supporting the above scenario was provided in hard copy and discussed. It was explained that some ground-raising would be necessary towards the south east of the site by 0.4-0.5m to achieve the levels necessary to drain the site by gravity. How would such ground raising be achieved without increasing flood risk to the adjacent existing properties and what construction / profile is envisaged for the boundary?

Detention basin in relation to groundwater levels

1.3 The scenario shows the base level of the detention basin to be 0.9mAOD. Analyses of a selection of the borehole data commissioned by Tully De'Ath has shown the ground water level to be frequently higher than 0.9m AOD (see Table 1 below).

Date	Time	Level 107AOD	Level 108AOD	Level109AOD	Level5AOD
13/01/2017	02:00:00	1.364	no data	1.374	1.316
20/11/2016	06:00:00	1.31	no data	1.262	1.267
14/01/2017	03:00:00	1.296	no data	1.219	1.335
12/01/2017	14:00:00	1.271	no data	1.219	1.236
17/11/2016	04:00:00	1.201	no data	1.072	0.94
20/11/2016	07:00:00	1.199	no data	1.258	0.906
16/10/2016	14:00:00	1.185	no data	0.979	1.167
19/10/2016	16:00:00	1.184	no data	0.9	1.271
12/01/2017	13:00:00	1.183	no data	1.001	1.552
16/11/2016	15:00:00	1.179	no data	1.052	1.096
13/01/2017	03:00:00	1.179	no data	1.34	0.91
17/11/2016	16:00:00	1.177	no data	1.072	0.996
16/11/2016	03:00:00	1.17	no data	1.077	0.962
17/11/2016	03:00:00	1.167	no data	0.794	1.345
14/01/2017	04:00:00	1.16	no data	1.249	0.891
17/10/2016	15:00:00	1.143	no data	0.989	1.015
17/10/2016	02:00:00	1.14	no data	0.83	1.285

Table 1; Selected analyses of borehole data

1.4 The highest 17 ground water level readings for WLS107 (selected arbitrarily) are shown against data for WLS 109, and WLS5; there was no data available for WLS 108. The following can be noted;

- During October and November 2016 and January 2017, groundwater levels exceeded the proposed base level of the detention basin of 0.9 AOD;
- There is reasonable correspondence between the groundwater levels across Area 1; indeed, it is suggested that differences probably relate to a time lag in the tidal influence than to any other factor; (e.g. the readings for 13/01/2017 for WLS 5 for midnight, 0100 and 0200 are 1.633, 1.541 and 1.316, respectively).
- The tidal influence extends across the whole of Area 1.

- If infiltration drainage were to be deemed feasible, then best practice suggests that the base of any ground infiltration should be at a minimum elevation of 2.3m AOD[1].
- For the purposes of storage design, the base of the detention basin cannot be lower than 1.3mAOD.

1.5 The data in Table 1 also needs to be taken in context, having been recorded when ground water levels reached their lowest levels for many years. Winter conditions more typically are illustrated by plates1 and 2 below that show saturated groundwater conditions.

Plate 1 taken near WLS111 winter 2015.

Plate 2 taken west of WLS109 winter 2015.

[1] CIRIA Report 156 paragraph 4.4 (g).

1.7 Based upon the above, for design purposes, Tully De'Ath would need to establish the seasonal high groundwater levels based upon best available knowledge over recent years.

Other Design Considerations

1.8 Tully De'Ath is also requested to demonstrate how its design for highways and parking areas will satisfy recommended best practice for water quality treatment in chapter 26 of the SuDS Manual.

1.9 The scheme shows swales designed with a slope of 1/500; this is outside the design recommendations of the SuDS manual that states longitudinal slopes should be constrained to 0.5%-6%. How does Tully De'Ath justify this diversion from best practice guidance?

2. New Salts Farm Road, Shoreham Modelling Report

2.1 Section 2 of the above report states:

> *An existing 1D ISIS model of the area had been developed to inform the 2XXX Surface Water Management Plan. This model was based on cross section topographical survey and run for steady state flow estimates that did not appear to be based on any recognised method of flow estimation. The model was not suitable for the purposes of supporting a site-specific Flood Risk Assessment. Therefore, a new model and new hydrology was required.*

2.2 Notwithstanding whether or not the original model was accurate, the LLFA disputes the limited catchment used by the current model as being representative of the inputs to the Lancing Brooks.

2.3 Section 2.1 of the above report refers to the Catchment boundary as follows:

> *The catchment boundary was based on two neighbouring FEH catchments which are located within in the proposed development site. These are identified as the south-western and south-eastern FEH catchments in Figure 2-1 below. The entire Lancing Brooks catchment was not used as it was considered too large an area and may not represent the sites characteristics as accurately.*

2.4 The LLFA challenges this assumption and considers that the limited catchment used by the model does not accurately reflect inputs to the Lancing Brooks drainage network.

2.5 Section 2.1 further states:

> *The Lancing SWMP indicates that surface water runoff from the A27 drains via a series of outfalls into the Lancing Brooks. However, this will flow south and eastwards from the A27 into the Northern catchment area shown in Figure 2-1. As the outflow for this FEH catchment is*

approximately 1km to the north-east of the site, the outflow from the A27 was not considered in the model.

2.6 The LLFA is not prepared to accept the above assumption without robust evidence to underpin this challenge to previous studies.

3. Notes on Flood Estimation Report (Appendix A to Modelling Report)

Observations are as follows:

Re: 1.7 Other data available; this is very sparse, given the range of previous studies for the site;

Re: 1.8 Hydrological Understanding of Catchment; provides insufficient detail to explain model inputs and outputs.

Re: 2.1-2.2 What does Catch 1 relate to in the figure shown at the top of Section 2? No area is given. Also it refers in 2.3 to the area as being of 'low relief' but the Lancing Brooks catchment includes Lancing Hill at 81m.

Re: 5.2 Assumptions, limitations and uncertainty

…it is assumed that the 2D direct rainfall boundary accounts for the area that contributes the runoff to the relevant section of the Lancing Brook system that presents flood risk to the site.

The LLFA considers this to be an invalid assumption. Our evidence indicates that the catchment draining to the southern outfall includes the whole catchment shown on the figure incorporated in section 2 of the document although it is acknowledged that a proportion of the flow from Honeyman's Hole flows east and out through the Northern outfall.

Other watercourse – it is assumed that the remainder of the Lancing Brook with a channel gradient draining away from the site do not contribute to flood risk to the site. This includes much of the drainage to the west and north of the airport and all areas north of the A27.

As above, the LLFA does not consider this to be a valid assumption.

The LLFA is also interested to know how the A27 runoff has been taken into consideration as this represents a separate sub-catchment and to which the principal run-off coefficient would not apply.

4. Additional Comments

4.1 The LLFA comments need to be considered alongside comments from the District Engineer and the Environment Agency both of which have a statutory regulatory role with regard to proposed development in relation to flood risk and drainage. Details of this proposal have been circulated to these bodies.

4.2 In view of the above, any further iterations of the proposed drainage strategy should be forwarded to the Local Planning Authority which is the body responsible for undertaking detailed technical review of applications.

Yours sincerely

Ray Drabble
Flood Risk Engineer (Sustainable Drainage)
West Sussex Lead Local Flood Authority

Copies to: Ken Argent, Adur-Worthing Council
Ben Daines, Adur-Worthing Council
Adrian Jackson, Environment Agency
Dinny Shaw, Bowyer Planning

Internal: Caroline West, West Sussex County Council