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Our ref: 46830
Your ref: Breadsell Lane

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**By email only, no hard copy to follow**

Dear Kerry

Thank you for consulting Natural England on the Breadsell Lane surface water strategy by Monson Engineering that was submitted by Kember Loudon Williams and please accept our apologies for the delay in replying.

Below we have briefly set out our understanding of the site and the concerns we have over the potential impact of the development on the hydrological regime of the site and the SSSI.

## 1. Background

Hastings Borough Council (HBC) has been considering the site at Breadsell Lane for a greenfield housing development. The site is immediately adjacent to and partially overlaps Marline Valley Woods SSSI, a wetland site sensitive to any hydrological changes.

Natural England has consistently opposed the development due to potential risks posed to water quality, quantity and the hydrological regime. In order for it to be shown that the development will not detrimentally affect the hydrological regime upon which the SSSI is dependent NE has requested monitoring to gather a baseline understanding of the site hydrology.

In 2009, Rigare Ltd completed a scoping level hydrological and hydrogeological assessment of the site, commissioned by HBC. This report is very informative and has improved understanding of the site hydrology.

In 2012, Monson Engineering Ltd reduced the site area, designed a new masterplan, and developed a surface water strategy. In the strategy they have responded to some of the potential hydrological impacts raised by the Rigare hydrological scoping report.

## 2. Site Description

The new masterplan includes the northern part of the Marline Valley Woods SSSI, namely Conneyburrow Wood and Birchen Wood, within the site boundary. The SSSI is a steep sided stream valley fed by a number of tributary streams along the length of the SSSI. The Atlantic bryophyte vegetation important within the SSSI requires humid conditions to persist.

### 2.1 Geology

The site overlies the Wadhurst Clay in the north and west, and elsewhere the Ashdown Beds sandstones. The overlying superficial soils are characterised by silty, clay rich soil.

### 2.2 Catchments

There are 4 main catchments feeding the SSSI (Rigare, Section 3.2.3). The majority of the area covered by the new masterplan is within catchment 1, with the southern part of the site extending into catchments 2 and 3. Table 1 below shows the estimated percentage of surface water runoff to

groundwater baseflow for the catchments, based on hydrological statistics from the nearby area (Rigare, Section 3.2.5).

**Table 1 Scoping level average annual runoff percentages per catchment**

| Catchment | Area ($m^2$) | Surface runoff | Groundwater baseflow |
|---|---|---|---|
| Marline Valley (entire catchment) | 1,687,530 | 71% | 29% |
| 1 | 369,904 | 71% | 29% |
| 2 | 78,519 | 73% | 27% |
| 3 | 192,425 | 71% | 29% |

### 2.2 Hydrology

The hydrological conceptual model of the site outlined below is summarised from the Rigare report, section 4.1.2.

- The average slope gradient over the site is around 10%, which combined with the poorly permeable topsoils results in a higher proportion of the effective rainfall running off over the surface (60-75%) than infiltrating to groundwater (25-40%).
- The Marline Valley Stream running through the SSSI has a quick/flashy response to rainfall.
- During periods of low rainfall the catchment discharge to the stream will be low.
- There are a number of ephemeral springs feeding water into the catchment.
- There is most likely a continuous groundwater baseflow to all but the upper parts of the Marline Valley Stream.
- The topographic ridge on site stores groundwater and is thought to at least partially source the ephemeral springs.
- The spatial and temporal variation of groundwater levels and flow is complex, and will largely be controlled by the surface/subsurface lithology and permeability which controls surface infiltration, and groundwater storage and flow.

## 3. Potential Hydrological Impacts

The Rigare hydrological scoping report lists 4 main potential impacts of developing the site:

1) Risk of altering the distribution and quantity of surface water runoff through acceleration and redirection from hard-standing and drainage networks.
2) Risk of the addition of contaminants to surface water runoff will damage water quality.
3) Risk of changing the distribution of groundwater recharge, flow and discharge due to low permeability surfaces.
4) Risk of the addition of contaminants to groundwater will damage groundwater quality.

## 4. Surface Water Strategy

The Monson surface water strategy details how runoff from the development can be managed to prevent pollution entering the Marline Valley Stream. The design utilises Sustainable Urban Drainage Systems (SUDS) with the aim of replicating the green field situation.

The SUDS are summarised below:

1) All parking and driveways will infiltrate to groundwater
2) All roof water will infiltrate to groundwater
3) All spine roads will be constructed with Swales to allow water to infiltrate to groundwater
4) Any excess surface water runoff will go to additional storage and infiltrate to ground
5) Any water exceeding the capacity of the infiltration system will be transferred to attenuation ponds, which will have a controlled outlet to the SSSI
6) The attenuation ponds could be used to feed water into the SSSI at low flows

The surface water strategy also briefly details two mitigation measures:

1) Construction of a borehole to supply water to the SSSI at low flows
2) Possible installation of reed beds at the edge of the existing eastern housing development

**5. Natural England Concerns**

5.1 Entire Site Area
The site is split across Hastings and Rother councils. It is vital for the understanding of the site and the protection of the SSSI that the site hydrology is considered for the site as a whole and is not split across the administrative boroughs.

5.2 Water Quality
The proposed SUDS start to answer the Potential Hydrological Impacts relating to water quality. If these SUDS are correctly designed and properly implemented as well as continuously maintained, they should remove substantial levels of pollution from the water.

There is one concern here, which is the outflow of water from the attenuation ponds to the SSSI. During a storm event, water will not have had time to infiltrate into the ground; also it may not have passed through any of the SUDS membranes. Therefore polluted water could become resident within the attenuation ponds, although over time natural attenuation should occur through the reeds and vegetation, if water is discharged directly to the SSSI shortly after a storm event this water could be polluted. It must not be possible to discharge polluted water from the attenuation ponds to the SSSI.

5.3 Surface Water Runoff vs Groundwater Infiltration
Whilst the proposed SUDS should protect groundwater and surface water from pollution they will significantly change the distribution and quantity of surface water runoff. Currently in the order of 70% of water feeding the stream is from surface water runoff. The SUDS will collect surface water and allow it to infiltrate to groundwater which will fundamentally change the site hydrology.

The part of the SSSI most at risk is the northern part, Conneyburrow Wood and Birchen Wood, which lies completely within catchment 1. Catchment 1 has a very high percentage area proposed for the development and is therefore most at risk due to changes to the hydrology. This northern part is fed by 2 tributaries marked on the OS 1:10,000 map as Issues. The OS defines Issues as "The source of a stream which is a natural emission from an agricultural drain, or where the stream re-emerges from underground." This indicates that the water in the Issues is most likely to be surface water and not groundwater.

The natural gradient of the site and the location of the SUDS ponds (Monson, Appendix A) suggests that surface runoff from the higher northern part of the site will potentially drain south and east potentially bypassing the northern part of the SSSI before infiltrating to groundwater.
The Issues sourcing the northern tributaries rise at ~110mAOD and 120mAOD, however the proposed SUDS ponds are located further south and much lower at 70mAOD. There would be quite a lot of pumping required to return this water to the current stream sources where it is required for the ecology in the northern part of the site.

5.4 Low Flows
The proposed SUDS include the option to pump water from the attenuation ponds into the SSSI at low flows. It would be helpful to see this supported by calculations on the volume of water likely to be available following an extended dry period. It is also vital that this water has been resident within the attenuation ponds for long enough to ensure any contamination has been completely attenuated.

5.5 Mitigation Measures
The construction of a borehole to supply water to the SSSI at low flows is an interesting idea and would certainly need licensing by the Environment Agency. Given current abstraction licensing it is possible that the borehole would be licensed with a Hands-Off Flow condition which could stop abstraction during dry periods. We would require further information on the detail of this to ensure that the borehole would not cause any environmental damage. We note that the EA have been consulted separately on this issue as to the likelihood of a borehole being successfully installed and licensed.

The installation of reed beds at the edge of the existing eastern housing development is an excellent idea and would help safeguard the SSSI from diffuse urban pollution. Regardless of whether the Breadsell Lane development goes ahead the relevant bodies should start discussions.

**6. Further Investigations**

The water management strategy states that it is unreasonable for NE to object to the proposal solely on the basis of a lack of current hydrological and hydrogeological information. The strategy has then tried to set out how the use of SUDS will not change the current natural water environment. It is not possible to state with any level of certainty the full extent and impact of the hydrological changes which will result from the water management strategy without having a better understanding of the current hydrological regime. However it is possible to state that there will be significant changes and this will have the potential to impact the SSSI.

The Rigare report notes that the site hydrology is complex and more work is required to characterise the hydrology to a sufficient degree. It then goes on to set out detailed works which include monitoring surface water processes and water quality. Since then the size of the site has reduced and the extent and cost of this work would also be reduced.

**7. Recreational Pressure**

The other potential impact from a development in this location is damage to the interest features of the SSSI from recreational pressure. We would have particular concerns regarding potential impact from trampling and pollution from recreational pressure on the ghyll streams. No further information has been received regarding investigations into this issue or potential mitigation measures.

**7. Conclusion**

The proposed SUDS have the potential to protect the SSSI from pollution. However the surface water strategy has failed to understand the complex hydrology of the site. This failure has resulted in the proposed system failing to protect and mirror the natural environment. By properly studying and characterising the site, and then using this data to fully inform the strategy, it should be possible to produce a strategy which does not change the current hydrological and hydrogeological regime.

Before it would be possible for Natural England to remove the objection to the development at least 3 years of monitoring will be required in order to develop a detailed hydrological understanding. This monitoring data will also provide a baseline against which future change can be assessed.

Due to the very close proximity of the proposed development to the SSSI, as well as existing pollution from the eastern development it is vital that the site hydrology is both understood and not significantly changed by the development. We believe this can only be done based on further monitoring work.

We would also require an assessment of the potential impacts from recreational pressure and how these could be avoided or mitigated.

We would be happy to comment further should the need arise but in the meantime if you have any queries, please do not hesitate to contact me.

Yours sincerely

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