Our Ref: J-2938 W 03 JC
12th November 2010

Claire FitzGibbon
Land Management and Conservation Adviser
Cornwall, Devon and Isles of Scilly Team
Natural England
Pydar House
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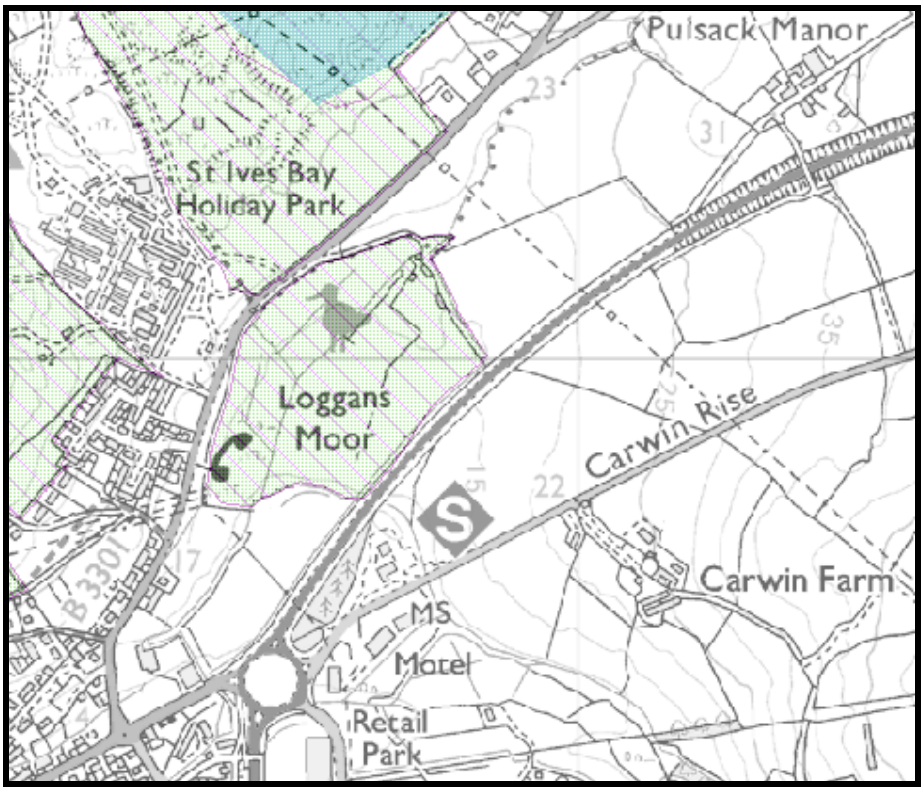
Dear Claire

Re: Development at Carwin Rise – Groundwater Levels at Loggans Moor SSSI

Further to our recent correspondence this letter seeks to investigate and address concerns over the affect of the development on groundwater levels at the Loggan's Moor SSSI. The plan below shows the location of the SSSI with the proposed development being located to the south east of Loggans Moor on the opposite side of the A30.



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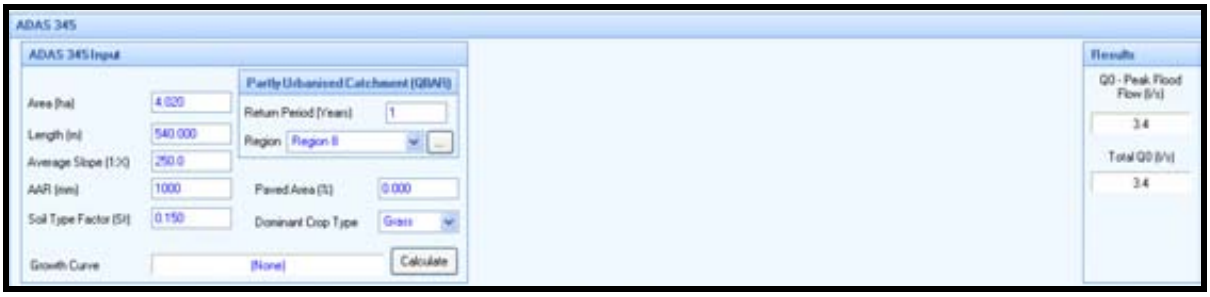
Your specific concerns were as follows *'Our concern centers round the fact that the water levels at the site will presumably be lowered by the introduction of drainage under the pitches and elsewhere, and whether that will affect ground water levels at the Loggans Moor SSSI. We assume that because the rainfall onto the large area of pitches will be partially intercepted by the drainage under them, groundwater re-charge may be significantly reduced, particularly since water drained from the site is unable to permeate back into the soil down the swale. If ground water levels in Loggans Moor are consistently higher than the adjacent rugby pitch, it seems logical that they will gradually dry out. What we are looking for is a comprehensive, clear explanation of why that is not the case. We are also not certain of the role that the intervening A30 road would play in all this'.*

In the first instance, it is worth considering the ground infiltration rates. Percolation rates on site were tested in line with CIRIA Report 156 and found to be slow. As such the contribution to groundwater levels through infiltration from the site would be less than a site with more favourable infiltration rates.

The site currently slopes at a relatively uniform gradient of around 1:40 down towards the Angarrack Stream. This constant fall ensures that rainwater falling on the site can freely runoff into the steam. With the development in place, the site will be terraced into flat areas of playing pitches. As such rainwater will no longer runoff freely and instead will be forced to infiltrate into the ground at a greater rate than the pre-developed site. Therefore the development will tend to increase ground water re-charge rates across the site.

The rate at which runoff will decrease, and hence groundwater re-charge increase, has been assessed using the ADAS 345 method.

Pre-Development Peak Runoff



Post-Development Peak Runoff

From the ADAS assessment it can be seen that the runoff rate from the site will reduce from a peak rate of 5.5 l/s to 3.4 l/s; this is a reduction of around 38%. Therefore it would be fair to make the assumption that the amount of water entering the ground would increase by around 38%. Clearly then, as a result of terracing the development site the rate of groundwater re-charge would significantly increase.

The overall site area is some 4.02 Ha. Of this area around 0.52Ha is to be developed as the club house building and car park. This equates to around 12.5% of the total site area.

The 2 pitches have a total area of 1.82 Ha. It is anticipated that the pitch drainage will intercept around 50% of the water falling on the pitch, due to the spacing of drainage trenches. As such the equivalent drained area of the pitch is 0.91 Ha. The represents around 22.5% of the total site area.

Therefore the area of the site routed to the drainage system is 35% of the overall site area. The water routed to the drainage system will not have the opportunity to contribute to groundwater re-charge, other than by infiltration in a short section of swale. Therefore the development of this area will reduce groundwater re-charge.

Taking the above information into consideration, it is clear that terracing the development will increase groundwater recharge, whilst the introduction of impermeable areas will reduce it. On balance it would appear that the resultant change in groundwater recharge rates would be minimal.

In addition it is worth remembering that this site has poor percolation. As such the site does not significantly contribute to groundwater levels in the area.

Your concerns included the following statement *'If ground water levels in Loggans Moor are consistently higher than the adjacent rugby pitch, it seems logical that they will gradually dry out.'*. To assess this it is worth considering the ground levels at the SSSI and on the proposed development site.

The proposed development is set at around 20m AOD, with the lower pitch at 18.95 the upper at 20.75m and the car park being located from 20.5 to 21.35m AOD. Loggans Moor SSSI is set between 10 and 15m AOD.

Clearly then the SSSI is set typically around 7.5m lower than the proposed development site. Given this it is clear that the groundwater level at the SSSI could never be higher than those on the development site.

The A30 provides a clear boundary between the development and the SSSI. The A30 will have been built on an engineered road-base/sub-base. Any soft material would have been excavated out and replaced to provide a suitably strong and well compacted material. This process is likely to have created a relatively impermeable barrier between the SSSI and development site.

As such it is likely that the presence of the A30 would act as a further safeguard and discontinuity between groundwater on site and in the SSSI.

Groundwater levels in the SSSI are likely to be largely controlled by the inflow from contributing watercourses, including the Angarrack Stream. The SUDS system devised for the site has been specifically designed to maintain similar flow rates into the steam as in the pre-development situation. As such it is anticipated that this will ensure groundwater levels are unaffected.

In summary, terracing of the site will promote groundwater re-charge. However the introduction of a formal drainage system over 35% of the site would reduce groundwater re-charge. On balance the affect on groundwater is likely to be neutral. In addition given the low percolation rates measured on site the level of groundwater contribution from the site is small in any case.

I hope the information and narrative above serve to address your concerns, however if you have any questions please do not hesitate to contact me.

Yours sincerely
For and on behalf of H2Ok Systems Ltd

Jan Clark
Head of Water and Civil Engineering

Enc. [enclosures]

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