

CALA HOMES (SOUTH) LTD

**THE POTENTIAL IMPACT OF THE
DEVELOPMENT ON GROUNDWATER
AND THE RIVER ITCHEN**

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SECTION 1

EXISTING SITUATION

1 EXISTING SITUATION

1.1 The site is currently agricultural (arable) land and this has been the case for some time. It covers an area of 84ha and is situated within the catchment of the River Itchen, which has a total catchment area of 360km² upstream of Highbridge Gauging Station (located approximately 10km south of Winchester). The site is 1km from the nearest point of the river.

1.2 Water mainly enters the site via incident (direct) rainfall but following very high rainfall also as runoff from the up-gradient catchment. All runoff is intermittent as there are no permanent surface watercourses across the site.

Infiltration

1.3 Depending upon the stage of crop growth, the soil moisture deficit and weather conditions at the time, water entering the site will either be evaporated, transpired from plants, infiltrate through the soil or result in surface runoff. The chalk soil is generally very well drained and so under most circumstances there will be little or no run off and infiltration on site will occur largely at the point of rainfall. Runoff originating on site will only occur when there is no soil moisture deficit (i.e. when the soil is at "field capacity") or when the rainfall intensity is greater than the rate of water infiltration to the soil. In this case overland flow will occur. This water, along with any water flowing onto the site from up-gradient, will accumulate in any hollows but principally in valley bottoms, and will subsequently evaporate and infiltrate, or, as in the case of the northern catchment, it may flow across the site boundary.

1.4 Under exceptionally heavy rainfall conditions ponding of water occurs in the middle of the southern part of the site (along a fence-line). At these times some of this water is runoff from the Andover Road although under normal conditions run off from the Andover Road is contained in a swale east of the Andover Road where it subsequently infiltrates. Only during very heavy rainfall does water overflow this swale and flow into the site. The absence of a culvert beneath the railway line at the lowest part of the southern site indicates that all runoff either infiltrates or evaporates within the site boundary.

1.5 Runoff in the north of the site, including runoff from the up-gradient catchment (including the John Moore Barracks), flows across the Barton Farm site eastwards along a normally dry valley. The presence of a culvert beneath the railway line to take surface water indicates that not all of this runoff infiltrates or evaporates within the site boundary.

Water Quality

1.6 Being agricultural land the site has in the past had organic fertilisers added to the soil, as well as other chemicals such as pesticides and herbicides. Inorganic fertiliser is annually added with nitrogen (ammonium nitrate) added every year and NPK (nitrogen-phosphorous-potassium) typically added every other year.

1.7 The application of any organic or inorganic fertiliser to the soil should be a controlled process balancing the needs of the crop. However, excess nutrients sometimes reach the groundwater and surface water, particularly following heavy rainfall. Excess nutrients in natural watercourses can result in high rates of weed and algal growth and, in the worst case, eutrophication (and algal blooms).

SECTION 2

POST DEVELOPMENT SITUATION

2 POST DEVELOPMENT SITUATION

2.1 The proposed site development includes the relocation of the Andover Road, to run through the site, as well as the development of 2000 new houses and other commercial and employment premises over an area of 84ha. The majority of the site between the railway line and the Andover Road will be disturbed. The proposed development consists of the following categories (and % areas):

- i Buildings (20%);
- ii Roads and other paved areas (impermeable) (26%);
- iii Parking areas (permeable) (14%); and
- iv Green space (40%).

2.2 The site drainage has been designed using sustainable urban drainage systems (SUDS). The key aspects of the design in this respect are that:

- i Building (roof) drainage will be directed to soakaways on each individual plot;
- ii Road and paved surface runoff will be directed to lined phyto-treatment ponds and then to infiltration ponds; and
- iii Parking areas will be permeable.

2.3 The philosophy of the drainage design is to attenuate water on site, allow for treatment (where applicable) and permit infiltration to the groundwater.

2.4 Rainfall runoff from the up-gradient catchment will be unaffected by the development and the drainage-infiltration system will include a capacity for this.

Infiltration

2.5 After development, the characteristics of runoff and infiltration will be different to that given the current land use. It is likely that the volume and rate of infiltration and recharge to groundwater will be greater following development than in the current situation.

2.6 The 20% of site rainfall falling on buildings will be directed into infiltration trenches located on individual plots. The trenches will bypass the soil zone and therefore water will reach the unsaturated chalk sooner than at present. Given that the flow will be concentrated into trenches (rather than spread over the area of the buildings as is presently the case) then the rate of infiltration through the unsaturated zone is also likely to be quicker in these areas following development.

2.7 The 26% of site rainfall falling on roads and paved areas will be directed to swales and common infiltration beds (via lined treatment ponds). Swales and infiltration beds will be vegetated and therefore the soil zone will still play an active role in the attenuation of infiltration. However, due to the concentration of flow and consequent ponding, the rate and the volume of infiltration will be greater than under current conditions. The gravity transport of the runoff along hard surfaces and in pipes will also move the point of infiltration marginally closer to the River Itchen. It would be

expected therefore that the infiltrating groundwater would reach the river slightly sooner than it would do currently, although it is considered, given the 1km distance to the river and the small proportion of the site area to the total catchment that any change would be imperceptible.

- 2.8 Areas of grass and of permeable hard surface (in total accounting for 54% of the site) are likely to retain much of the character of infiltration and runoff as under current conditions.

Water Quality

- 2.9 The application of fertilisers, to playing fields and gardens, will be over a very much reduced area compared to that which is currently normal practiced. Hence, the total quantity of excess nutrients that could potentially reach the groundwater and ultimately the River Itchen is likely to be reduced after development. The same is very likely to be true for pesticides and herbicides.
- 2.10 The proposed development includes the realignment of the Andover Road from its current location along the site boundary to a new alignment through the site. As a consequence of this the road drainage will be directed through the lined treatment ponds prior to discharge to the infiltration ponds. This is an improvement on the current situation where road run off entering the site infiltrates the chalk without treatment.
- 2.11 The construction of modern sewerage systems (sewers and wet-wells) must be compliant with a high construction standard, set out in British Standard BS EN 752:2008. Leakage from sewers is therefore not anticipated. Discharge of treated sewage effluent will be undertaken according to a discharge consent held by Southern Water and therefore the impact of that discharge is not assessed here.
- 2.12 The use of household chemicals is not anticipated to have an impact on the groundwater and thereby the River Itchen. Most chemicals used in the home do not have a mobile residue. Those that do, bleach for example, are normally discharged to foul sewer and end up at the sewage treatment works. Random disposal of small volumes of other waste such as fuel and oils to the ground cannot be easily predicted or controlled. However the volume that may be disposed in this way is unlikely to give rise to groundwater contamination. The design of household soakaways for roof runoff should exclude surface grates or other means that potentially provide an easy disposal pathway for liquid household waste.

SECTION 3

SUMMARY

3 SUMMARY

3.1 The development will result in:

- i Small increases in the infiltration characteristics of the site, which are unlikely to be perceptible in the River Itchen;
- ii Likely slight reduction in nutrients to groundwater and the River Itchen; and
- iii Slight reduction in risk to groundwater from highway spillages due to the improved outfall arrangements;

3.2 The greatest potential risk to groundwater from the development appears to be from a leaking foul sewer system which represents a potential source of nitrogen to the groundwater. However, compliance with current sewer design criteria would minimise this risk.