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Dear Ms Goodson

**PROPOSED RESIDENTIAL/EMPLOYMENT DEVELOPMENT
CHURCH GRESLEY SWADLINCOTE**

Thank you for your email dated 20 July 2012.

Fluvial Flood Risk

The Environment Agency's Flood Zone Map outlines are based on a generalised river modelling and mapping method carried out nationally, to provide only an indication of flood risk. The Flood Zone outlines are the result of the above macro modelling techniques, and whilst they are generally accurate on a large scale, they are not provided for land where the catchment of the watercourse falls below 3km².

For the above reasons the Flood Map (flood zone outlines) is therefore deemed not sufficiently accurate to resolve the details of possible flooding for individual properties or sites. To provide site specific flood risk information, or in catchment areas smaller than the 3km² cut-off, a more precise local assessment of flood risk is required.

Because the Flood Zones outlines are not definitive and do not include all minor watercourse flood plains, they should not be assumed to be correct where a minor watercourse (ditch, brook, drain, dyke, etc...) is shown with no flood zones outlines, within or adjacent to a site.

The OS map shows an Ordinary Watercourse running from North-East to South-West bisecting the site, in addition another Ordinary Watercourse runs along the South-Western boundary of the site. The catchment areas along with any inflows to these watercourses should be established along with any flood risk these may pose to the site, as detailed below.

Suitable Hydraulic calculations (IOH124) or modelling will be required to confirm actual Flood Zone/Flood plain outlines at the site, including but not exclusive of channel capacity, 20 year, 100 year, 100 year plus 20% (for climate change) and 1000 year (5%, 1%, 1% plus 20% increase in flow, and 0.1%) flood event levels.

When established a comparison of the watercourse, hydraulic and topographic information for the above flood levels will confirm the flood risk, and extent and depth of

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flooding and Flood Zone classification at the site.

The topographic survey must be to GPS Ordnance Datum (Adjusted to Ordnance Survey GPS, where traditional surveying methods are used). Any other topographic level information provided must also be corrected to OS GPS.

Appropriate plans and cross-section(s) of the site must be provided extending from the site, through the watercourse and beyond (where necessary), detailing the site layout and levels and the predicted flood levels, with the above flood event outlines marked on the plan/s as contour lines.

The proposed development will need to be able to satisfy the following statements:

- No Raising of ground levels, or storage of materials (including soil) within the 100 year (1%) flood plain.
- No new buildings (including sheds, cycle storage or garages), structures (including gates, walls and fences) or raised ground levels within 8 metres of the top of any bank of any river/watercourse, inside or along the boundary of the site, unless otherwise agreed in writing.
- The permanent retention of a continuous unobstructed area is an essential requirement for the preservation of the water course corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement.
- The watercourses should be retained within a habitat corridor minimum 4m either side of the top of the bank of the watercourse.
- We recommend finished floor levels are set a minimum of 600mm above the 100 year plus 20% (for climate change) (1% plus 20% increase in flow) flood event level.

Surface water run-off limitation

The Environment Agency is charged with contributing towards the achievement of sustainable development. Sustainable Drainage Systems (SuDS) have a major role in this in this regard.

NPPF states that 'Surface water arising from a development site should, as far as practical, be managed in a sustainable manner to mimic the surface water flows arising from the site'.

SuDS techniques aim to control surface water run-off as close to it's origin as possible, often mimicking the natural processes which exist for undeveloped land, including recharge of groundwater. The objective is to minimise impact on Quantity, Quality and Amenity of the receiving water body. Common techniques include source controls, porous pavements, infiltration trenches and basins, attenuation filter drains, swales and filter strips, retention basins, ponds and constructed wetlands.

Infiltration drainage is the preferred method of surface water run-off disposal, however if it is demonstrated that ground conditions are not suitable for this then the Agency would prefer on site attenuation to be in the form of one or more large open water ponds.

The Agency therefore recommends that if ground conditions are suitable, then the applicant should consider SuDS alternatives in preference to the more traditional methods. This should evolve out of following the SUDs Management Train Hierarchy (CIRIA document C697 - SUDs Manual) in association with CIRIA Document C687 - Planning for SUDs making it happen.

All on site surface water between the allowable run-off rate* and 100 year plus 30% for residential, 20% for industrial (for climate change) rainfall event above will need to be attenuated.

Where allowable discharge rates* are not confirmed, the FRA should include a estimate of the worst case attenuation requirements based on the allowable Greenfield run-off rate, identify appropriate location/s for this within the site (based on site specific topographic survey).

*The allowable discharge rate will be set by: -

1. The Environment Agency, where surface water discharges to a watercourse (river, brook, ditch)

Run off rates should be restricted to 5l/s/ha for all rainfall return periods up to the 100 year plus 30% for residential, 20% for commercial (for climate change) rainfall event, unless it can be justified otherwise (ie due to the steepness of the catchment).

However, in the case of Brownfield sites we would look for a substantial reduction in run-off in accordance with NPPF.

Developers should design the maximum possible reduction in run-off towards the Greenfield run-off rate within the design of the redeveloped site, where possible by using the above SuDS methods, or if not possible by using on site underground attenuation tanks. These systems should be located within the open space within the proposed development layout.

2. The sewerage undertaker where surface water is discharged to a public sewerage system. However any FRA undertaken must include a copy of the written confirmation of the allowable surface water discharge to STW's public sewerage system, within the appendices of the FRA.

Drainage design

The proposed on site surface water drainage system should be designed to the Sewers for Adoption, 30 year standard or similar, which is acceptable in principal. However, we require additional details to confirm that surface water system will operate without flooding during the 30 year rainfall event, and not flood or leave the proposed site during the 100 year and 100 year plus 30% for residential, 20% for commercial (for climate change) rainfall events.

For site over 1ha in size, we will need to see the plan and calculations in support of the on site surface water drainage system (ie, microdrainage output for the 30 year, 100 year and 100 year plus 30% for residential, 20% for commercial (for climate change) rainfall events, including pipeline schedules, network information, summary results and where flood risk or flooding occurs the detailed output for the worst case duration for each return period affected), provided as part of the FRA/SW drainage strategy (for Full or Res Matters) and at discharge of conditions. To demonstrate that no flooding occurs to the proposed development or surrounding area from the above rainfall events.

If the system surcharges we would wish to see a detailed plan (location of any surcharging should be identified) and calculations for any surface flooding, including overland flood flow routes, expected depths, duration and confirmation that this would not cause flooding to nearby properties. Any excess surface water should be routed

away from any proposed or existing properties.

In addition we would like to see any calculations (ie, microdrainage output for the 30 year, 100 year and 100 year plus 30% for residential, 20% for commercial (for climate change) rainfall events) in support of any on site surface water attenuation system including sizing and any flow control eg hydrobrake, details and design.

The surface water drainage scheme will need to include:

- Surface water drainage system/s to be designed in accordance with either the National SUDs Standards, or CIRIA C697 and C687, whichever are in force when the detailed design of the surface water drainage system is undertaken.
- Limiting the discharge rate and storing the surface water run-off generated by all rainfall events up to the 100 year plus 30% (for climate change) critical rain storm so that it will not exceed the run-off from the undeveloped site and not increase the risk of flooding off-site.
- Provision of surface water run-off attenuation storage to accommodate the difference between the allowable discharge rate/s and all rainfall events up to the 100 year plus 20% (for climate change) critical rain storm.
- Detailed design (plans, cross, long sections and calculations) in support of any surface water drainage scheme, including details on any attenuation system, and the outfall arrangements.
- Details of how the scheme shall be maintained and managed after completion.

Please do not hesitate to contact us should you have any queries.

Yours sincerely

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