

TECHNICAL NOTE ON DRAINAGE STRATEGY

LINGLONGS ROAD, WHALEY BRIDGE

The site is an existing grassed field, sloping steeply towards an ordinary unnamed watercourse that runs within the site. This watercourse in turn drains into the River Goyt, to the west of the site.

The site does NOT drain in any way to the nearby Toddbrook Reservoir. Toddbrook Reservoir discharges to the River Goyt, but only in significant storm events, and is downstream of the development site.

The site is in the Environment Agency's lowest category of flood zone – Flood Zone 1 (there is no Flood Zone 0), and is therefore at low risk of flooding.

UK wide standards set out by DEFRA requires that all new developments discharge surface water at a rate no greater than it was pre-development. To achieve this the peak run off rate is controlled via a flow control device and oversized surface water storage pipes under the highways.

The pre-development surface water discharge rate is termed "Greenfield Run-off Rate", and is calculated using an industry standard method based upon the development area.

The GWP response dated 4th Sept 2019, claims that the "Greenfield Run-off Rate" has been incorrectly calculated by using the entire site area to arrive at the "Greenfield Run-off Rate", suggesting this will provide an over estimate of the "Greenfield Run-off Rate". GWP suggest that the rate should be calculated using the smaller developed area.

The applicant believes that GWPs response is incorrect and misleading. The applicant has used the correct areas and the correct industry standard method of calculating the "Greenfield Run-off Rate" which is evidenced below.

The following is an extract from the uksuds.com website:

"The Greenfield runoff rate which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage for a site, should be calculated for the whole development area (paved and pervious surfaces - houses, gardens, roads, and other open space) that is within the area served by the drainage network, whatever size of the site and type of drainage system"

[HR Wallingford <http://www.uksuds.com/FAQRetrieve.aspx?ID=54989>]

HR Wallingford, are the UK's leading specialist in Flood and Water Management, and contributing authors of the industry adopted standard publication 'Ciria C753 The SUDS Manual', which is the national governments adopted standard for design and implementation of SUDS.

The site area is 6.2Ha (as stated in the FRA Para 2.1) this includes large areas of POS and Trees. The large areas of POS and Trees have been excluded from the Greenfield Run-off calculations as they are not *"within the area served by the drainage network"*.

The developed area used for calculating Greenfield Run-off Rates is 4.42ha (see page 85 of the FRA). This includes *"houses, gardens, roads, and other [small pieces of] open space"*.

Greenfield run off rates have been calculated in the site specific Flood Risk Assessment (para 2.4 and evidenced on pg85 of the FRA), and have been summarised in Table 1.

Proposed post development discharge rates have been calculated and modelled using industry standard software and modelling methods. Final discharge rates are summarized in Table 1.

Storm Frequency	Pre-development Greenfield Run-off Rate. (Litres/second)	Proposed post-development Discharge Rate. (Litres/second)	Difference % post development.
1 in 1 year	24.8 L/s	24.1L/s	-2.8%
Qbar (aprx 1in 2.3 Year)	28.6 L/s	25.8L/s	-9.8%
1 in 30 year	48.4L/s	32.2L/s	-33.5%
1 in 100 year	59.4L/s	36.1L/s	-39.2%
1 in 100 year + 40% climate change		48.4L/s	-18.5% (when compared to 1in100 no climate change)

Table 1.

A 1 in 100 year storm is a severe rainfall event, that has the probability of occurring only once in 100 years. This can also be considered as having 1% probability of occurring in any year.

Industry standard practice requires that the post development discharge rate for the 1 in 100 year + 40% climate change storm, is equal to or less than the predevelopment 1 in 100 year storm event without climate change, thus producing a betterment.

As can be seen from the above Table1, a significant reduction in discharge rate for all events has been provided, thus providing a reduction in flow discharging to the River Goyt, and a betterment for Whaley Bridge.

Given the above evidence, it can be shown that GWP's comments of 4th Sept 2019 regarding incorrect calculation of "Greenfield Run-off Rate" and increased flood risk are incorrect and can be discounted.

The LLFA are an independent regulator within Derbyshire County Council. It is their role to comment on planning applications and drainage proposals. The LLFA are satisfied that Barratt have approached the Greenfield Run-off Rate in the correct method.

In reality, the above calculations are likely to be a conservative approach for the following reasons:

1. Current practice uses formulae for calculating greenfield runoff which do not have any gradient terms in them. This results in lower greenfield flow rates than probably take place in practice in most circumstances. For the developer this implies unnecessary cost, while for the Planners and Environmental Regulator it provides a margin of safety for controlling downstream flooding. [HR Wallingford UKSUDS.com]
2. Since the pre-development site is a steep site, the pre development greenfield run off rates could be greater than calculated, as mentioned above, implying the design is a conservative design.
3. The design assumes a 100% impermeable area for all Roof, driveways, and highways. In reality only roofs and highways are positively drained. Driveways are positively drained only where the surface water is likely to cause run off to properties. The majority of driveways are allowed to run off to adjacent landscaped areas. This assumption is known to be an over estimate as some run off will not reach the drainage systems and could infiltrate to ground or adjacent landscaped areas.
4. An additional 10% increase in impermeable areas has been included into the modelling to allow for "Urban Creep". That is the increase in drained areas caused by potential future building of house extensions, driveway widening, and other increases in drained areas.

Given the above, the LLFA and Barratt consider that the design is a robust one that has been designed in accordance recognised national government standards for new developments and SUDS, and allows numerous factors of safety for any future increase in flows, as well as betterment for the River Goyt.