

Construction of 99 Dwellings with Associated Landscaping and Engineering Works

Application Reference HPK/2023/0192

Non-Technical Note on Drainage Strategy and Flood Risk

Our Ref: H8797-BAH-XX-XX-RP-DR-300564-P02

The site is an existing grass field, sloping steeply towards the adjacent former land fill site and an ordinary watercourse known as Nun Brook.

In accordance with national planning policy, a Flood Risk Assessment (FRA) has been carried out.

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 probability of flooding.

Ground investigations and infiltration testing carried out have demonstrated that infiltration or soakaway drainage is not a suitable option. The scheme therefore discharges surface water to Nun Brook.

The site drains via a separate system of Surface Water and Foul sewers.

Surface Water Drainage

Surface water drains through a network of gravity sewers located under the highways. The surface water discharges through a swale/attenuation basin, and flow control before discharging to Nun Brook.

UK wide standards set out by DEFRA requires that all new developments discharge surface water at a peak run-off rate no greater than it was pre-development. To achieve this, the peak run off rate is controlled via a flow control device and surface water attenuation basin located within the adjacent former landfill site.

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.

Greenfield run off rates have been calculated in the site-specific Flood Risk Assessment (Table 5.5, pg19 of the FRA), and have been summarised in Table 1 below.

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

Storm Frequency	Pre-development Greenfield Run-off Rate. (Litres/second)	Proposed Post-development Modelled Discharge Rate. (Litres/second)	% Difference in Pre-development versus Post-development discharge rates
1 in 1 year	37.5 L/s	24.9 L/s	-34 %
Qbar (approx 1in 2.3 Year)	45.2 L/s	-	-
1 in 30 year	88.6 L/s	38.7 L/s	-56 %
1 in 100 year	116.2 L/s	41.4 L/s	-64 %
1 in 100 year + 40% climate change	162.6 L/s	45.1 L/s	-72%

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 event + 40% climate change, is equal to or less than the predevelopment 1 in 2.3 year storm event (known as Qbar).

As can be seen from the above Table1, a significant reduction in discharge rate has been provided for all events above Qbar, thus providing a reduction in flow discharging to Nun Brook, which in turn provides a small reduction in downstream flooding in the wider Buxton Area.

The Nun Brook culvert acts as a flow control to Nun Brook, restricting the flow downstream of the culvert, and thus reducing flooding to the wider Buxton Area. Due to the levels/topography of the site, the existing pre-development surface water run-off has been assessed as discharging DOWNSTREAM of the existing Nun Brook culvert. The new drainage strategy will now capture and divert the post development surface water run-off and discharge UPSTREAM of the existing Nun Brook culvert, thus adding an additional layer of flow control and providing a further reduction in downstream flooding to the wider Buxton Area.

The swale and attenuation basin arrangement provide natural treatment of surface water flows, to help remove suspended solids and contamination, prior to discharge to Nun Brook.

Foul Drainage

Foul drains through a network of gravity sewers located under the highways to a new pump station located in the northwest corner of the site. The pump station is required to drain the lowest part of the site to the existing adopted foul sewers.

Maintenance

All on site foul and surface water sewers will be put forward for adoption by an adopting water authority.

A resident appointed management company will be appointed to manage and maintain the public open spaces, the attenuation basin area, and the culvert within it, under regulatory rights and responsibility of riparian ownership.

Further Benefits of the Scheme

Introduction of the attenuation basin improves the Biodiversity of the landfill area, which is currently blighted by large amounts of rubbish and waste at the surface arising from the landfill. Introduction of a wetland area within the site boundary provides improved biodiversity metric.

The attenuation basin lies in an area of former contaminated landfill. Introduction of the basin reduces the depth of the landfill and thus has the potential to reduce the impact of contamination migrating downwards and finding its way into the watercourse and water table. Furthermore, the basin will be lined with an impermeable clay layer which will reduce the migration of contaminated surface water through the ground into the culvert, and provide a break layer between the contaminated landfill and the habitats present at the surface.

The scheme involves the construction of a new pre-cast concrete headwall at the inlet to the existing Nun Brook Culvert, where currently there is none. The headwall will assist in preventing blockage to the culvert and reducing the risk of future blockage.

Given the above, 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 Nun Brook and the wider Buxton area.

END