

Appendix 2

NJB/30864

January 2014

Revision 0

City of Bradford MDC – Application No. 10/04551/MAF
Barratt Homes Yorkshire West
Site at Derry Hill, Menston

Discharge of Planning Conditions
Condition 15 - Surface Water Drainage

The condition states:

15. *Development shall not begin until a surface water drainage scheme for water passing through the site, based on sustainable drainage principles has been submitted to and approved in writing by the local planning authority. This must include details of how the surface water run off rate of 8.2 litres/second/ha will be maintained for up to and including the 1 in 100 year(plus climate change) rainfall event.*

Reason: To prevent flooding by ensuring the satisfactory storage/disposal of surface water from the site.

Interpretation

It is noted that the Condition as written refers both to “a *surface water drainage scheme for water passing through the site*” and a “*surface water run off rate of 8.2 litres/second/ha*”.

The reason provided refers only to the “*disposal of surface water from the site*”.

For the avoidance of confusion the flows referred to and terminology used are interpreted as follows.

- a. Water passing through the site means run-off from the wider catchment off site, conveyed both via. the watercourse running south to north through the site and by overland flow.
- b. The surface water run-off rate of 8.2 litres/second/hectare relates to flows generated on the site to be conveyed by the proposed buried drainage system, to be adopted by Yorkshire Water as public sewers. The figure of 8.2 litres/second/hectare is established in

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the approved Flood Risk Assessment for the scheme, referred to in Condition 14, and represents the existing rate of natural run-off from the land for a 1 in 1 year return period.

Proposed On-Site Drainage Systems – Management Of Flows Originating On the Site

The site will be drained by a system of underground pipes to be adopted and maintained by Yorkshire Water as public sewers. The drainage proposals have been submitted to Yorkshire Water for Technical Approval and will be adopted under a formal S104 Agreement under the Water Industry Act.

The drainage network will keep foul discharges separate from surface water, the foul system being connected to the existing foul sewers in Derry Hill, and the surface water system connected to the culverted watercourse in Dirks Garth Road all as described in the approved Flood Risk Assessment for the scheme.

Surface water flows will be restricted using a flow control device located in the final manhole, such that only a maximum of 8.2 litres/sec/ha is allowed to leave the site. The flow control device will be a Hydro-Brake Optimum® Flow Control unit (ref: SHE-0261-42.50-2050) designed for a maximum flow rate of 42.5l/sec (8.2l/sec/ha) against an operating head of 2.05m. The mean flow from the unit over its operating depth range (zero to 2.05m) will be 36.55l/sec (7l/sec/ha on average).

Excess storm water will back up into a below ground storm water storage tank sized to accommodate up to and including a 1 in 100 year plus climate change storm event. The volume of the tank is approximately 1,160m³. For all storm events, water will drain back out of the system over a period of hours at the same controlled flow rate.

Copies of drawings showing the proposed on-site drainage scheme are appended.

Land drainage pipes on site will drain to the existing watercourse running through the site. Inevitably, as a consequence of the proposed positive on-site drainage system, any overland or land drainage flows from the site itself will be greatly reduced in comparison with the existing situation.

Management of Water Passing Through The Site

Background

Firstly, it is to be noted that it is not the responsibility of the developer to resolve any existing flooding issues, but it is required that the situation is made no worse as a consequence of the scheme, and the approved Flood Risk Assessment (FRA) prepared in connection with the proposed development is based on this premise.

Reference has been made during the planning process to existing overland flows originating from land to the south of the site, which run through the site via the existing watercourse, and consequential flooding from time to time on properties to the north of the site. Two particular matters that have been raised are:

1. The act of developing either side of the watercourse, it is said, may act to channel flows towards the northern boundary. In this context JBA Consulting, acting on behalf of the Menston Action Group (MAG), have prepared a TUFLOW analysis which indicates an existing overland flow route across the field for water escaping from the watercourse in an extreme event.
2. It is suggested that the proposed “swales” along the southern boundary will increase flow to the watercourse increasing flood risk downstream.

These matters are dealt with as follows:

Overland Flows

The principles may be summarised as follows:

- It is a normal requirement within a “functional floodplain” to provide compensatory storage for any existing flood storage lost as a consequence of developing a site. The Derry Hill, Menston site does not fall within a “functional floodplain” and this requirement therefore does not apply in the conventional sense. However, if it is shown that the loss of temporary storage on land could materially affect the flood risk elsewhere, it is reasonable to apply the same principle.
- The JBA TUFLOW map for a 100 year event (copy appended – 30864/Fig1A) is taken as the starting point, which indicates that there are locations where the watercourse can overtop its eastern bank and flow overland in a northerly direction towards the bottom of the site.

- The MAG Fig 3 photograph (copy appended – 30864/Fig3A) shows an area of ponding at the bottom of the hill, overtopping through the adjacent dry stone wall to the path/gardens beyond, at the location of the electricity sub-station.
- Assessment of the existing flood storage volume available at this location, using a contour plan and computer software (copy appended– 30864/Fig2A), indicates a volume of 36m³. It is not pertinent that a larger volume may escape from the watercourse and/or flood adjacent properties. It is only the volume temporarily stored on the development site that is relevant.
- In order to utilise the available capacity and to avoid worsening the existing situation, it is necessary to retain spill levels along the eastern bank of the watercourse, provide sufficient flow capacity to the storage area and retain the same or greater storage capacity on the land.
- Analysis of the area between the new road running east to west across the site and the northern boundary, shows that after construction of the below ground tank for the on-site system, there will be approximately 68m³ of “field” storage capacity available at the same location.
- Any flow escaping from the watercourse will be channelled to the field storage area by creating a shallow flow "channel" (at existing ground level) between the watercourse and the proposed path running parallel, a pipe system and culvert to convey the flow downstream. The culvert will cross the new site road at the bottom to outfall at the proposed detention basin.
- The idea in simplistic terms is to mimic as far as possible to existing situation identified by JBA and the proposals are shown in the Appendix.

Swales

Shallow ditches (swales) are to be provided along the southern boundary. These will intercept excess overland flow and provide some temporary storage.

The swales will discharge in two directions, roughly split 40:60 in the direction of the main central watercourse and the ditch alongside Moor Lane, this being the natural split due to the lie of the land.

The swales are to be constructed along contour lines and will therefore be more or less level so as to enable them to hold water. The outfalls to the watercourses will be restricted by providing small pipework with limited capacity (100mm diameter).

Proposed dimensions and capacities for the swales (reference drawings 30864/075 and 076) are:

a. Swales 1 and 2 – Eastern sector, draining to the main central watercourse

Catchment width	80m
Effective swale length	60 m
Storage capacity	210 m ³
Outlet drain capacity	20 l/sec

b. Swales 3 and 4 – Western sector, draining to Moor Lane

Catchment width	130m
Effective swale length	105 m
Storage capacity	367 m ³
Outlet drain capacity	18 l/sec

Notwithstanding that the whole area drains ultimately to the watercourse at present, our assessment is that the sub-catchment areas for Swales 1-2 and Swales 3-4 are 1.75ha and 1.95ha respectively. Analysis shows that:

- The 1.75ha sub-catchment for Swales 1-2 would normally yield a peak run-off of 14l/sec for a 1 year return period and 42l/sec for a 100 year return period, and that the total volumes discharged for a 6 hour duration would be 170m³ and 500m³ respectively. The restricted discharge rate proposed, which would be on average about 15l/sec (20l/sec peak) would discharge 320m³ over the same duration, with up to 200m³ stored in the swales.
- Similarly, the 1.95ha catchment for Swales 3-4 would yield an estimated peak run-off of 16l/sec and 47l/sec for 1 and 100 year return periods respectively, the volumes for a 6 hour duration would be 190m³ and 560m³, and the storage requirement in the swales would be 230m³.

It is appreciated that the residents association may feel that the flow/volume figures are underestimated, but the consequence of this would be that the swales would perhaps overtop at an earlier stage or during storm events of a shorter return period. The rate of flow passed forward from the outfall pipe to the watercourse however would not increase and, notwithstanding the additional attenuation provided by the swales, there would be no worsening of the existing situation.

Summary

1. Flows generated on the site as a consequence of the new development will be managed within the adoptable drainage system. The discharge rate will be limited to a maximum 8.2l/sec per hectare as required by the Condition 15, with below ground storage sufficient for a 1 in 100 year storm event plus allowance for climate change.
2. Overland flows from the wider catchment to the south of the site are unaffected by the development, but the addition of swales along the site boundary will assist with attenuation without increasing flood risk.
3. Excess storm water over spilling the eastern bank of the watercourse will be channelled to the open area to the north of the road where the ground will be shaped to ensure provision of a “field” storage volume greater than existing, mimicking the existing situation as far as possible.

A handwritten signature in black ink, reading 'N. Baines', is written over a horizontal line.

N Baines
Director - Eastwood and Partners