Eastwood & Partners
CONSULTING ENGINEERS

PRELIMINARY FLOOD RISK & DRAINAGE APPRAISAL

BARNSLEY WEST

FOR

STRATA

36284-002 **October 2013**

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INTRODUCTION

The report is written on the assumption that 125 ha of land to the south of Barugh Green Road (hereafter referred to as the "site") is to be developed principally for commercial and residential use.

The site is centred on Ordnance Survey grid reference SE 317 073 and is bounded by the M1, Barugh Green Road and the urban development edge of Barugh Green, Higham, Gawber and Pogmoor.

The site comprises sloping arable and grassed farmland and steep-sided wooded valleys.

The principal watercourses crossing the site are the streams through Red Brook Plantation and Craven Wood through the central part of the site. There are drainage ditches within the south-eastern part of the site and along the north-eastern site boundary with Barugh Green Road. The nearest main river is the River Dearne, 1 km to the north.

DOCUMENTS CONSULTED

The following documents have been reviewed in the preparation of this report

Barnsley MBC Housing Site Selection Methodology Long List (undated)
Barnsley MBC Preliminary Flood Risk Assessment (July 2011)
Barnsley MBC Strategic Flood Risk Assessment – Level 1 (Sept 2012)
Barnsley MBC Strategic Housing Land Availability Assessment (March 2009)
Environment Agency Don Catchment Flood Management Plan (Sept 2010)
Environment Agency flood maps - website (August 2013)
Interim Code of Practice for Sustainable Drainage Systems (July 2004)
National Planning Policy Framework & Technical Guidance (March 2012)
National Standards for Sustainable Drainage Systems - Consultation document (Dec 2011)

Additional sources of information

Ordnance Survey contour maps
Site walkover
Local knowledge (Flood risks assessments prepared by Eastwood & Partners for past developments in the area)

CONSULTATIONS

The following statutory bodies have been consulted in the preparation of this report

Yorkshire Water

Informal consultation

- Darton treatment works will need to be upgraded. This will be funded by YW.
- The 1.2km length of trunk sewer to the treatment works will need to be replaced or a new sewer laid alongside. This will be a developer cost.
- There is currently sufficient capacity within the system for an initial development phase (say 200 houses or equivalent).

Barnsley MBC

Initial telephone conversation with Highways drainage engineer

- BMBC will be Lead Local Flood Authority and will be looking for SUDS and treatment trains for water quality
- Suggest the use of greywater harvesting and green roofs for the commercial areas.
- Suggest swale along main spine road
- Some flooding downstream of the site associated with culvert but no details given
- BMBC to provide a formal response including surface water discharge rates in due course.

Danvm Drainage Commissioners

Informal consultation

- Outfall consent may be required if the discharge point falls within the Drainage District. The Drainage Board should be contacted when detailed proposals are available.

METHODOLOGY

This appraisal has been prepared in accordance with the National Planning Policy Framework (March 2012) and considers flood risk on the site and considers possible drainage strategies. The appraisal is intended to highlight any constraints flood risk and drainage might have on development and how they may be mitigated.

Drainage strategy has been developed in line with National Standards for Sustainable Drainage Systems, December 2011. This is currently a consultation document. The National Standards set out what to design and construct in order to obtain approval from the SuDS Approving Body. Barnsley MBC are preparing their own guidance on SuDS as a future SuDS Approving Body and this may differ from future national guidance. Barnsley MBC should be consulted on SuDS policy as the drainage design progresses.

For initial estimates of surface water storage volumes we have assumed a maximum discharge rate of 2.5 l/s/ha. This is in excess of the greenfield runoff rate calculated using the FEH statistical method but is a necessarily conservative figure for initial drainage design. The final surface water discharge rate is to be agreed with the statutory bodies.

FLOOD RISK

The site is in EA flood zone 1. The development use is appropriate to the site and it is expected that the Sequential Test can be successfully demonstrated.

There are a number of watercourses and land drains crossing the site. These converge to the culverted watercourse under Redbrook Road and to the culverted watercourse under Barugh Green Road. The watercourses flow to the north and north-west to the River Dearne.

There has been localised highway flooding associated with these watercourses. This has occurred downstream of the site.

Details of the flooding are to be investigated.

Impacts of development

The highway flooding does not affect the site but indicates there may be limited capacity in the watercourses/culverts downstream of the site. This is not a flood risk to the site but is a potential flood risk to downstream development. Thus, culvert capacity may be a determining factor in the rate at which surface water can discharge from the site and this is discussed in more detail under the surface water drainage section of this report.

Proposed mitigation

None anticipated.

SURFACE WATER DRAINAGE

Existing surface water disposal is to Redbrook watercourse and to the culverted watercourse under Barugh Green Road. Redbrook watercourse is culverted under Redbrook Road and Zenith Business Park. Minimum culvert size is 900mm dia at gradient 1 in 70. The route of the Barugh Green Road watercourse beyond Claycliffe Road is not known. There are Yorkshire Water surface water sewers and a combined sewer overflow discharging to these watercourses.

Soakaways are unlikely to be viable on the site due to the presence of clayey, opencast backfill across much of the site.

There are no public surface water sewers in the vicinity which may accept flow from the site.

The proposed drainage strategy is to mimic the site areas and flows discharging to the two watercourses.

Impacts of development

We have requested advice on likely permitted discharge rates from Barnsley MBC. Significant flow attenuation is likely to be required. If the receiving culverts are under capacity, the flow restriction might be considerably more onerous than the standard greenfield rate.

There are no issues associated with surface water drainage expected to prevent development of the site. Surface water attenuation storage may be a significant cost is terms of plan area required for above-ground SuDS in each development area. Attenuation storage may be reduced if surface water discharge rates can be increased and there may be cost benefits in renewing/upgrading sections of culverted watercourse to increase capacity.

Barnsley MBC, as the future SuDS Approving Body, may require source control and treatment trains for surface water disposal.

Proposed mitigation

Details of the culvert capacity are to be determined. A CCTV drainage survey of downstream culverted watercourses will need to be undertaken.

Further discussion of permitted runoff rates will need to be had with Barnsley MBC. Assume, at present, approximately 12% of each development area/phase will need to be set aside for surface water storage.

The proposed drainage strategy for the employment areas will be for surface water conveyance and attenuation storage principally in swales.

For the eastern and southern-most residential areas surface water attenuation storage will be principally in basins located in green spaces.

There is currently insufficient space shown on the masterplan for full above-ground attenuation for the main residential area to the north and west of the site. It is suggested that this is reviewed in due course. There may be opportunity for below-ground storage but this will be limited by the shallow invert level of the receiving watercourse.

The valleys around the woodland are steep sided and are not suitable locations for swales or basins.

SuDS source control and treatment trains may include grey-water recycling, permeable paving, green roofs and swales adjacent to the spine road. These are to be discussed with Barnsley MBC.

FOUL DRAINAGE

There is currently no capacity in the foul sewerage system to accommodate flows from the whole site.

There is a 150/225 mm public foul sewer in Wharfedale Road which may accept foul effluent from the eastern residential area.

There is are 175/225 mm public foul sewers in Hermit Lane and Higham Common Road which may accept foul effluent from the first phase of residential development in the south-west of the site.

Impacts of development

The eastern residential area of the site will not drain by gravity to the public sewer and pumping will be required. Space will be required within the layout for a pumping station.

The first phase of residential development in the south-west of the site will not drain by gravity to the public sewer and pumping will be required. Space will be required within the layout for a pumping station. There may be capacity within the trunk sewer and treatment works for an initial phase of around 200 houses.

There are no issues associated with foul drainage expected to prevent development of the site. There will be costs associated with a new foul trunk sewer, on-site pumping stations and rising mains.

Proposed mitigation

It is intended that there will be a main foul sewer running along the length of the proposed spine road and that all of the site, with the exception of the eastern residential area, will drain by gravity to this sewer. This sewer will discharge by gravity to a new/upgraded foul trunk sewer in Barugh Green Road.

The 1.2 km length of trunk sewer from Barugh Green Road to the treatment works will need to be replaced or a new sewer laid alongside. A feasibility study of existing capacity and proposed routes will need to be commissioned from Yorkshire Water and discussion will be needed with Yorkshire Water regarding development timescales and works programming. Darton treatment works will need to be upgraded. Again, discussion will be needed with Yorkshire Water regarding development timescales and works programming.

CONCLUSIONS

There are no issues associated with flood risk or drainage on the site which would be expected to prevent development of the site.

There are potential issues with flood risk downstream of the site relating to culvert capacity. This is an existing condition which should not be exacerbated by the development of the site.

The surface water drainage strategy is to mimic existing flows to the watercourses on the site. These watercourses are culverted for part of their length downstream of the site. Thus, the capacity of the culverts may determine the rate of surface water discharge from the site. If permitted discharge rates are very low the costs associated with attenuation storage on the site may be such that it may be more cost effective to renew sections of the culverts. Attenuation storage on the site is in basins and swales.

Foul discharge is principally by gravity to a new trunk sewer between Barugh Green Road and Darton treatment works. One temporary and one permanent on-site pumping station are required. The treatment works will need to be upgraded to serve the whole development.