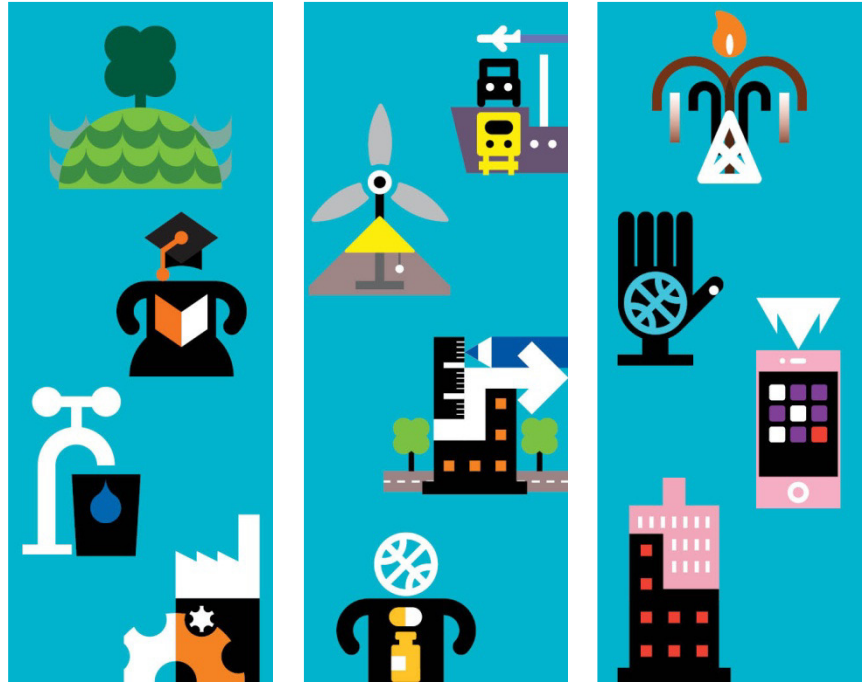




Better Barnsley

Drainage Strategy

June 2016

Barnsley Metropolitan Borough Council

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Drainage Strategy

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Gateway Plaza
PO Box 634
Barnsley
S70 9GG

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1 Introduction

1.1 Purpose of the Report

Mott MacDonald have been appointed by NPS to undertake preliminary Stage 3 Structural and Civil Engineering design for the redevelopment of the Barnsley “Met Centre” located in the Barnsley town centre.

This report summarises the preliminary foul and surface water strategies in respect to the development of a multi-storey mixed retail and leisure development which partly re-uses existing buildings and is part new construction over what was the “Met Centre”.

1.2 Proposed Development

A site plan of the proposed development is included in Appendix A.

At this stage key elements of the development have been scoped out including the locations of:-

- Two stories of open plan market stalls
- Food halls
- Retail units
- Back of house areas
- Customer and staff toilet and welfare facilities
- External boulevards and public open spaces
- The May Day Green Development (linked to the Met Centre site but will be undertaken separately)
-

The site slopes generally downwards from west to east with ground levels varying from 96.7m to 93m OD. However, the floor slabs for the development will remain level at approx. 96.7m OD support on concrete columns and beams above the basement and under-croft.

2 Site Description

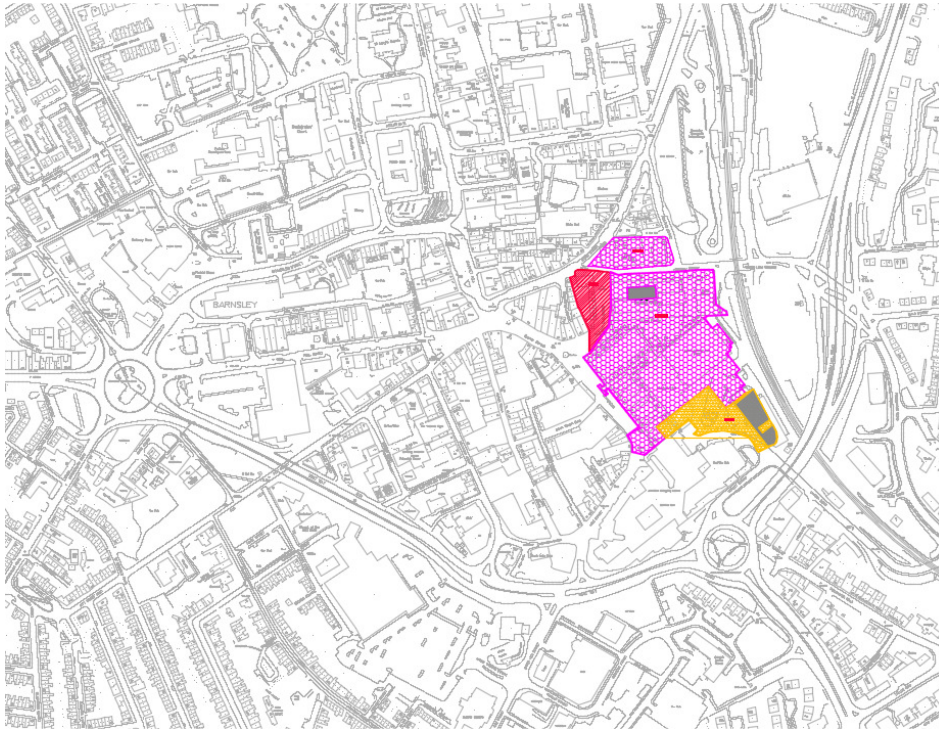
2.1 Existing Site

The site covers approximately 3 ha and comprises the former Council offices off Kendray Street, the old Market Hall building to the rear and the associated multi-story carpark and May Day Green. The Met' Centre site is currently occupied by concrete frame buildings which are largely in use. The former central office site has been demolished to floor slab level and the "Tech Building on the opposite side of Kendray Street is vacant but for a single tenant. This will leave the existing basement and under-croft area intact for use as part of the future development. The May Day Green building is still standing and occupied by shops and businesses.

Queen Street and Cheapside provide street level access on the western side of the site. The eastern boundary is formed by the railway line into the town and the low level service road access which leads to the basement and under-croft.

The site is completely developed with hard pavements and buildings and does not include any areas of soft landscaping.

Figure 2.1: SITE LOCATION PLAN



Source: Mott MacDonald Drainage Plan

2.2 Existing Drainage

2.2.1 Main Rivers

A culverted water course (Sough Dyke) is shown on the services survey plan which has been compiled using GPR as running eastwards down Kendray Street before turning southwards and crossing under the north east corner of the site.

All of the surface water and roof drainage from the Met Centre and former central offices site is discharged to Sough Dyke culvert via a manhole on the south east perimeter of the site.

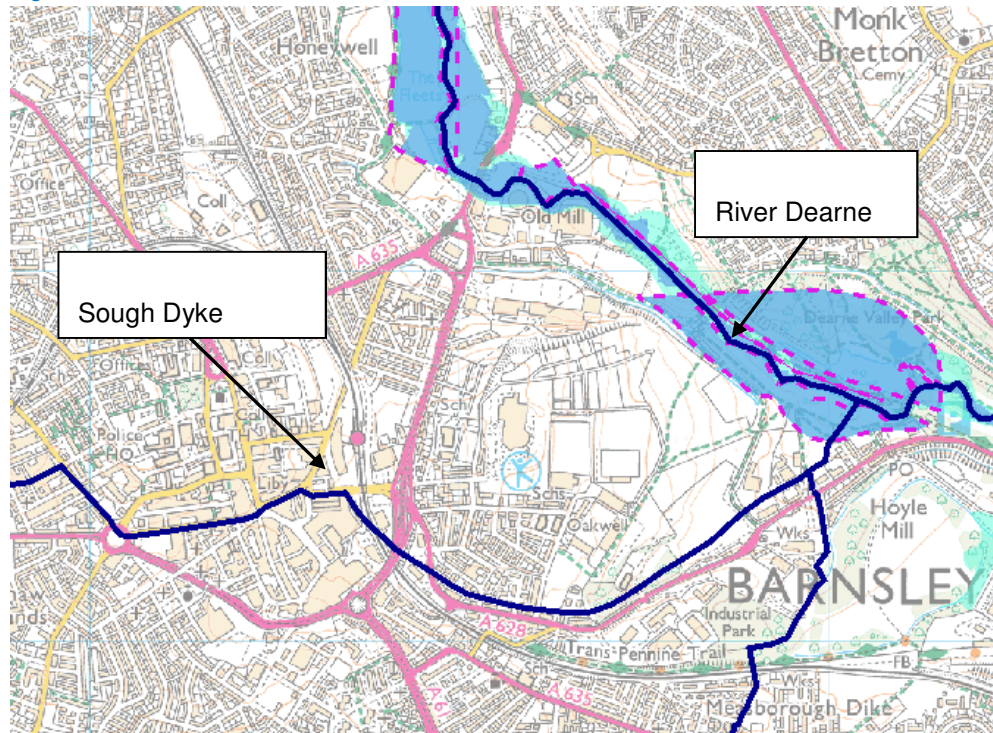
Roof drainage from the May Day Green building (1450m²) is collected at several points with the majority of the roof area (1355m²) connecting into the Sough Dyke culvert. The remaining 95m² of roof is connected to the Yorkshire Water combined drainage system in Burlington Arcade.

The Environment Agency (EA) Flood Maps also show that the River Dearne is located approximately 1.1 km to the east of the site.

2.2.2 Ordinary and Manmade Watercourses

There are no ordinary water courses within the site.

Figure 2.2: Location of Main Rivers



Source: EA Flood Mapping

2.2.3 Sewers

Yorkshire Water Sewers

Yorkshire water have provided their sewer plans for this location, which indicate Surface Water and Combined sewers running in Cheapside, May Day Green and Kendray Street

Private Drains

CCTV and GPR surveys have been undertaken on the site, which show a limited extent of the existing foul and surface water drainage connections on the site. It is assumed that much of the existing drainage is collected at slab level and then routed along pipes slung from the underside of the slab. These then connect to pipes situated under the base slab of the under-croft. The survey located a combined drain exiting the under-croft area on the east side of the site.

An extract from the Yorkshire Water Sewer Record Plan is included in Appendix B.

An extract from the site services survey plan is included in Appendix C.

2.3 Ground Water

2.3.1 Groundwater Source Protection Zone

Groundwater Source Protection Zones (GWSPZ) show the level of risk of contamination from any activities that might cause pollution to licensed water abstractions in the area. It is considered that the closer the activity is to a GWSPZ, then the greater the risk.

A review of the EA's GWSPZ maps for the development site location shows that the site is not located within a GWSPZ.

2.4 Flood Risk

A Flood Risk Assessment (FRA) for Barnsley Town Centre has been prepared by YWG. There is no proposal to undertake a separate FRA for this site. In summary the YWG document highlighted the risk of flooding from the culverted water course, Sough Dyke, which is known to surcharge to surface during intense rainfall events.

3 Drainage Strategy

3.1 Surface Water

As stated previously the existing site is fully developed and there are limited opportunities to infiltrate surface water as a method of disposal. Surface water from the existing site is collected from roofs and pavements and discharged directly to Sough Dyke culvert and Yorkshire Water sewers. The new development will see the buildings and pavements remodelled utilising the existing suspended concrete floor slabs and building footprints.

It is proposed to install new surface water drainage to collect surface water from the roofs and pavements comprising a network of pipes slung and fixed to the underside of the suspended floor slab. This system will connect to new in-line attenuation tanks that will be constructed in an area of the existing basement that has been set aside for this purpose. The attenuation tanks will discharge to the existing surface water pipes which run under the basement floor and connect to Sough Dyke as shown on the Surface Water Drainage Strategy plan in Appendix D.

The Lloyd Davies assessment has been used to calculate the current run-off from the site. The site has been split into three distinct areas.

Area 1 – May Day Green 2,500m²

Area 2 – Met Centre Redevelopment 21,200m²

Area 3 – Southern development area 4,450m²

3.1.1 Area 1 – May Day Green

May Day Green is the first part of the site to be developed. It has been provisionally agreed that this area will use a free discharge for surface water which will effectively be equal to the current run-off rates as the whole of the site was previously roof / paved area and this will be retained by the planned development.

3.1.2 Area 2 – Met Centre Redevelopment

The redevelopment of the Met Centre Market will turn what was previously a building and multi-story car park with 100% impermeable area into a mixed retail and entertainment space with external paved areas thus will remain 100% impermeable. The surface water system will collect run-off from the roofs and paved areas within the site area and convey the flows to new attenuation tanks in the basement. A flow control will limit the peak discharge to 215 l/s such that the total peak discharges for Areas 1 & 2 area equivalent to the existing combined peak run-off reduced by 30%. Preliminary storage calculations have been undertaken which suggest that an attenuation capacity in the order of 560 m³ will be required to control the surface water discharge at 30% less than is currently experienced.

The externally paved areas may provide potential to install permeable paving which would capture and store rain water in the sub-base before draining into the central attenuation tanks in the basement area.

3.1.3 Area 3 – Southern Development Area

The southern development area has been set aside for future development and the plans for this are far less developed. It is not therefore possible to identify the impermeable areas within the catchment and likely run-off rates and storage requirements. Surface water from this area will be attenuated locally to achieve the required 30% reduction in peak run-off.

3.2 Foul Water

The foul drainage will be collected via a separate systems. The previous buildings on the Met' Centre site were served by foul drainage pipes located under the basement floor slab and these remain in place. The large office complex and market hall site were of a similar or greater scale to the planned developments on the site. Survey plans of the existing pipe network show pipe diameters from 150mm to 300mm. A provisional calculation of foul flows based on estimated DUs in accordance with BS EN 12056-2:2000 indicates that this will be sufficient to service the proposed developments on the site.

Foul water from the Met Centre will be collected internally to service the Food Courts, Toilet and welfare facilities and washing basins and floor gully in the market halls. The connection points will need to be reconfigured to suit the new layout. The foul pipes will be fixed / slung from the underside of the suspended floor slab to connect to existing sewer entry points.

Foul water from kitchens and food preparation areas will be directed through fat and grease trap units before discharge to the public sewer network.

The existing foul water drainage from the site connects to a 150mm DIA combined public sewer which cuts across the eastern side of the site before running under the railway line.

The foul drainage for the May Day Green building utilise the existing connections.

3.3 Rainwater Harvesting

There are no proposals to include rain water harvesting within the development. However consideration will be given to utilising the rainwater held within the attenuation tanks for water features that may be installed within the public realm space to be developed adjacent to Kendray Street.

3.4 SUDS Drainage

The application of the 'SuDS Manual' CIRIA report C753 for new developments requires that the runoff from sites is not only restricted to meet the Greenfield runoff characteristics but also that SuDS systems are utilised to improve the quality of the runoff prior to outfall to watercourses.

The manual and EA guidance applies a sustainability hierarchy to the various types of SuDS systems, this is summarised in the following table;

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	√	√	√
↑	Basins and ponds	√	√	√
	- Constructed wetlands			
	- Balancing ponds			
	- Detention basins			
↓	- Retention ponds			
	Filter strips and swales	√	√	√
	Infiltration devices	√	√	√
	- soakaways			
Least Sustainable	- infiltration trenches and basins			
	Permeable surfaces and filter drains	√	√	
	- gravelled areas			
	- solid paving blocks			
	- porous paviers			
	Tanked systems	√		
	- over-sized pipes/tanks			
	- Cellular Storage			

Living or green roofs which can provide improvements to water quality as well as attenuation benefits may be possible to construct on the new buildings to the periphery of the site, however the main element of the development is within the existing market hall where the existing structure will be retained. The application of green roofs in the context of the proposed development is therefore limited and unlikely to provide significant benefits.

The use of basins and ponds can also address water quality as well as providing attenuation. In addition the features can be presented to provide wildlife habitats and public amenity. However the development is located entirely over a suspended concrete floor slab and such water features are not practical to construct.

The externally pave areas may provide potential to install permeable paving which would capture and store rain water in the sub-base before draining into the central attenuation tanks in the basement area. This will require careful coordination between external paving levels and the intern floor levels of adjacent shops

and premises. The use of permeable paving and sub-base materials will improve the quality of surface water discharged to Sough Dyke culvert.

Other SUDs solutions include the provision of storage to attenuate and control discharges and help protect the downstream catchments. The inclusion of 560m³ of attenuation storage will fulfil this function to allow the peak discharge rate from the site to be reduced by 30%.

3.5 Future Maintenance Responsibilities

It is proposed that the future maintenance of the drainage system will be undertaken by the developer or an appointed facilities management contractor.

3.6 Other Discharge Options

The location of the site does not allow for further options to discharge the surface water. Infiltration is not practical as the site is located on top of an existing suspended concrete slab. Large scale infiltration would require significant modification to the existing basement and breaking out large areas of concrete slab and foundations.

4 Conclusions

This report has identified the following:-

- The existing site is a mix of retained market hall buildings and demolished carpark and office buildings which are proposed for development as mixed retail and entertainment facilities. The existing site is 100% impermeable area.
- New surface water connections into the Sough Dyke culvert in Kendray street will be required for both the main Met' Centre development and for the May Day Green development.
- There is limited opportunity to incorporate SUDs features into the proposed development given that it will be founded on a suspended concrete floor slab. Attenuation storage will be installed to achieve the required 30% reduction in peak discharge rate from the site.
- Surface water will discharge to the Sough Dyke culvert which crosses under the north and east side of the site.
- The foul water drainage system will utilise much of the existing below ground pipework as practical. An initial assessment of foul flows from the proposed development suggests that the existing pipes provide sufficient capacity.
- The foul flows from the proposed developments are likely to be less than those historically discharged from the site.

Appendices

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Appendix A. Site Plan, Drainage Strategy

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Appendix B. Yorkshire Water Sewer Record Plan

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Appendix C. Site Utility Survey

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