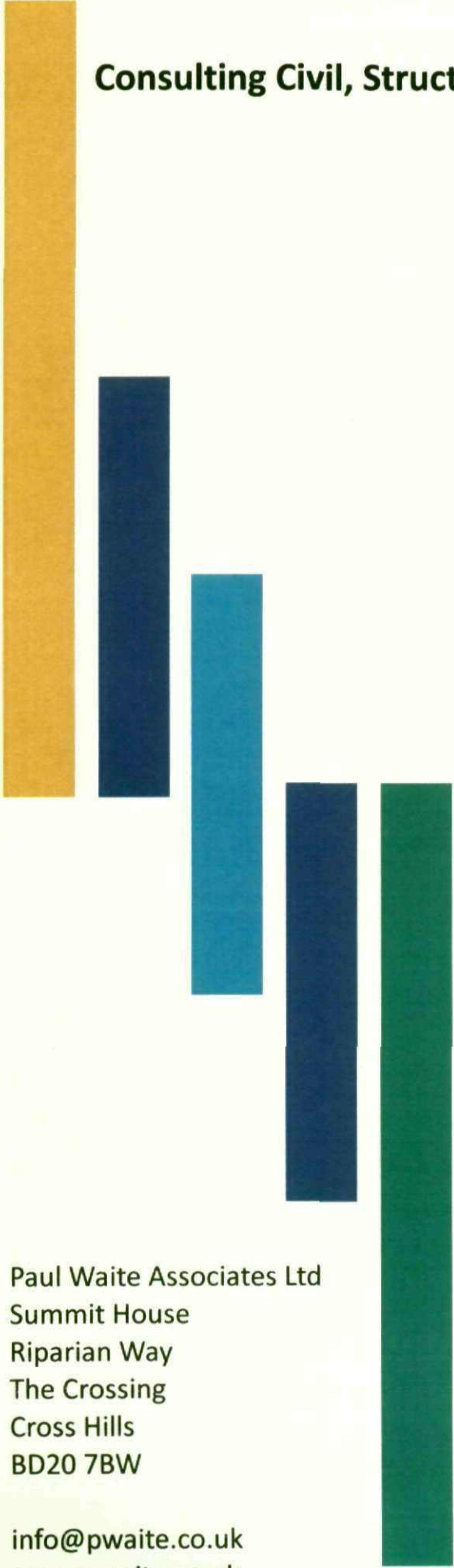




Consulting Civil, Structural & Geo-Environmental Engineers

Flood Risk & Drainage Impact Assessment

Site Address:
Redevelopment of the
Former Dunford
Hazlehead Centre,
Whams Road,
Penistone

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Project Ref: 10108/i/01
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Summary Report Status Details

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Paul Waite Associates were instructed by Halliday Clark Architects on behalf of their Client, R&M Swaine Limited to provide a Drainage Impact Assessment to support redevelopment of the former Dunford Hazlehead Centre at Whams Road, Penistone.

Clients Details

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Executive Summary

Paul Waite Associates has been commissioned to undertake a Flood Risk and Drainage Impact Assessment in accordance with PPS25 to support a planning application involving redevelopment of the former Dunford Hazlehead Centre located at Penistone near Barnsley.

The development site is 1.05 Hectares in size and lies within Flood Zone 1 of the Environment Agency's Flood Map.

The primary sources of flooding have been identified from an increase in surface water runoff following development; along with an increase in wastewater flows resulting from the brewing process.

Yorkshire Water has indicated that there are no public sewers within the immediate vicinity of the site.

It has been suggested that both foul and surface water flows from the existing site are directed to a cesspit located within the south east corner of the site. However, from the topographical survey of the site, the arrangement of inspection chambers within the site and around the location of the existing cesspit suggests that this may not be the case.

An existing highway drain has been identified within the footpath of Whams Road and as such, all or some of the surface water drainage from the site may be connected into this existing drainage network.

In addition it is thought that there may be an overflow arrangement attached to the cesspit which enables foul flows to be pumped northward along Whams Road, towards a Yorkshire Water operated foul pumping station. The pumping station is situated off Lee Lane immediately to the north of the development site.

As such it is highly recommended that an on-site investigation of the existing drainage system is carried out in order to confirm the locations of foul and surface water outfalls from the existing site.

The impermeable area within the existing site is estimated as 0.17 Hectares, which equates to 16% of the total site area. Following development this will be increased to 32% or 0.333 Hectares, and so result in an increase in surface water runoff.

In order to minimise surface water flows and volumes leaving the site it is proposed that a range of SUDS techniques such as green roof technology; rainwater harvesting/grey water re-use and permeable paving are utilised within the drainage strategy for the proposed brewery development.

It is recommended that infiltration testing is undertaken as part of the site investigation works in order to ascertain the suitability of soakaways within the drainage strategy.

In the event that infiltration methods are found to be suitable, it is highlighted that the site overlies a minor aquifer. As such, the Environment Agency may require surface water runoff from the car park and service yard areas to be treated via a petrol/oil interceptor prior to discharge to the surrounding subsoil.

In contrast, should infiltration techniques be unsuitable, surface water runoff will need to be restricted prior to leaving the development site.

Calculations based on the Modified Rational Method; estimate that the existing peak surface water runoff during the 1 in 2 year rainfall event is 11l/s. As the site is considered to be brownfield development, a 30% reduction must be applied in order to accommodate climate change over the lifetime of the development. As such, any surface water flow which needs to leave the proposed development will need to be restricted to a maximum flow rate of 7.7l/s.

It is proposed that the increased wastewater flows created by the brewing process are directed to an on-site wastewater treatment facility. Following treatment, flows may be directed via gravity to discharge into Sledbrook Dike, situated approximately 250 metres to the east of the site. It is noted that discharge rates will need to be agreed; along with a permit to discharge commercial effluent to a watercourse will need to be gained from the Environment Agency.

It is also highlighted that the route of this proposed outfall through the adjacent field will need to be undertaken via an easement agreement with the land owner.

1.0 Introduction

Paul Waite Associates has been commissioned to undertake a Flood Risk and Drainage Impact Assessment in accordance with PPS25 to support a planning application involving redevelopment of the former Dunford Hazlehead Centre located at Penistone near Barnsley.

The proposed redevelopment covers an area of 1.05 Hectares, is industrial in nature and involves provision of the following:

- New office facility
- Brewery
- Shop
- Private car store

The development is situated within Flood Zone 1 of the Environment Agency Flood Map (version 2.8.2), being the zone with risk of less than 1 in 1,000 year (<0.1% AEP) for river flooding or tidal/coastal flooding.

Two primary sources of flood risk to the proposed development site have been identified.

The first source is considered to be from an increase in surface water runoff from the development, due to increased areas of roof and hardstanding.

The second source is considered to result from the brewing process. Brewing often generates significant volumes of wastewater which includes both waste product and cleaning water. While this effluent is unlikely to contain toxic material, the high organic content may produce a pollution risk if discharged into the public sewer system or watercourse in an untreated state. It is therefore considered that wastewater from the development will need to be treated on-site prior to discharge. As a consequence, the Brewery will require a permit from the Environment Agency which will set limits on water quality discharged from facilities such as waste water treatment plants.

It is noted that other flood mechanisms have been considered within this assessment.

The existing development has historically been used as a school and provides an almost rectangular shaped plot comprising buildings of stone and brick construction. The existing buildings are situated largely within the north east corner of the site, with the remaining area currently undeveloped.

It is usual for the Environment Agency to raise an objection to development applications within the functional floodplain or Zone 2 or 3 of the flood map until the question of flood risk has been properly evaluated. The Agency will also object to developments where the total site area is in excess of 1 hectare until suitable consideration has been given to surface water runoff.

2.0 Approach to the Flood Risk Assessment

2.1 Approach

A topographical survey of the site was carried out by CSL Surveys in January 2010. It is understood that the survey has been calibrated to Ordnance Datum, and the resulting site levels have been used within this report.

The requirements for flood risk assessments are generally as set out in Annex E of PPS25. The detail and complexity of the study required should be appropriate to the scale and potential impact of the development. For the purposes of this study, the following have been considered:-

- Available information on historical flooding in the area.
- Site level information.
- Details of structures, which may influence hydraulics of the watercourse and consideration of the effect of blockage of structures.
- Estimates of design levels, equivalent to a 200-year (coastal/tidal) and a 100-year (fluvial) return period flood event.
- Allowances for increased flows resulting from the effects of climate change.
- Allowances for sea level rise resulting from the effects of climate change.
- Assess the existing runoff characteristics and the potential impact the proposed development will have on the runoff.

Further guidance is also provided in the CIRIA Research Project 624 "Development and Flood Risk: Guidance for the Construction Industry".

2.2 Application of the Sequential and Exceptions Test

The risk based sequential test should be applied at all stages of planning. Its aim is to steer new development to areas at the lowest probability of flooding, within zone 1. The flood zones are the starting point for the sequential approach.

The development is situated within Flood Zone 1 of the Environment Agency Flood Map (version 2.8.2), being the zone with risk of less than 1 in 1,000 year (<0.1% AEP) for river flooding or tidal/coastal flooding.

The proposed development comprises a residential development. As such Table D2 of Annex D within PPS25 indicates that the residential portion of the development is classified as 'less vulnerable'.

Utilising the Flood Risk Vulnerability Table as shown overleaf, it is considered that the proposed development is suitable for the site.

Table 1: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b	Exception Test required	✓	✗	✗	✗

✓ Development is appropriate

✗ Development should not be permitted

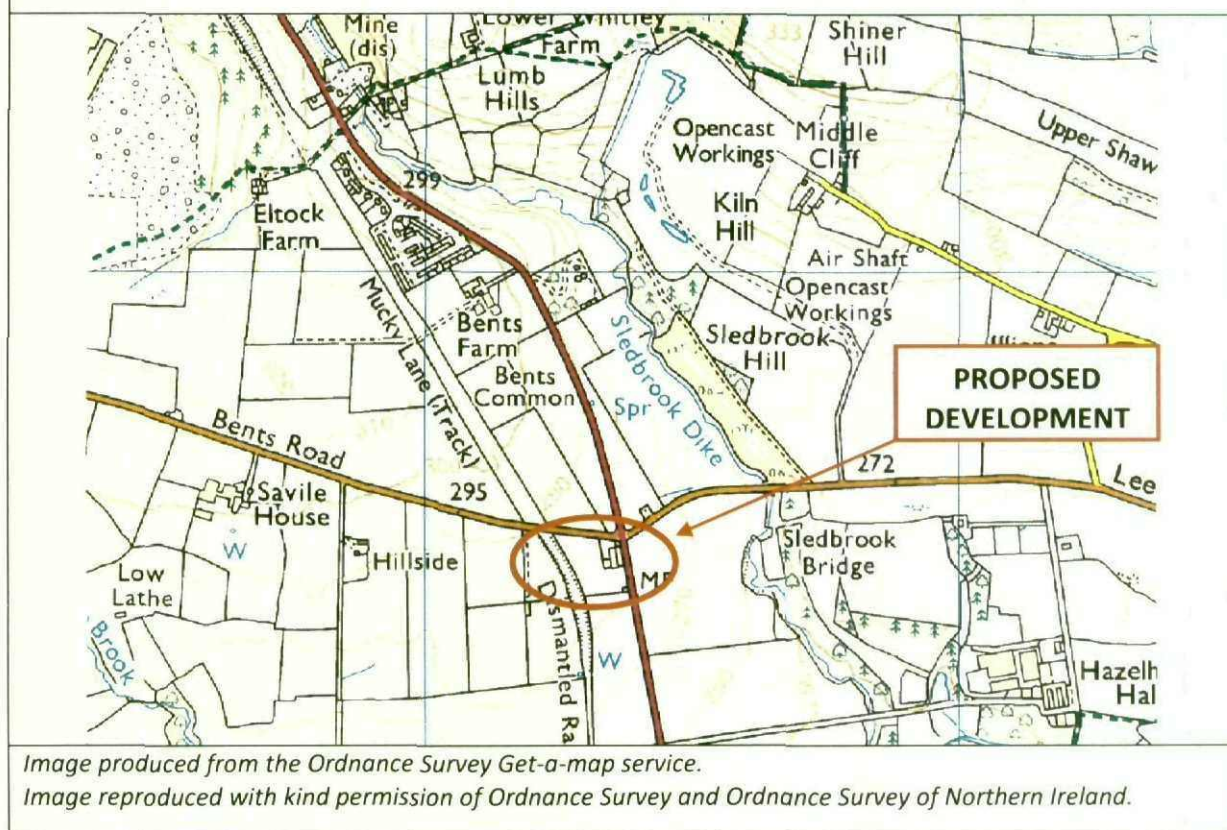
3.0 Site Details

3.1 Location

The site is centred on ordnance survey grid reference SE 193 034.

An Ordnance Survey plan, indicating the location of the development is presented below.

Figure 1: Location Plan – Former Dunford Hazlehead Centre, Penistone



3.2 Current/Formal Use

The site currently comprises a development formerly known as the Dunford Hazlehead Centre. There is an existing building located within the north east corner of the development site, which accommodated the former school; activity centre and more recently residential property. The remaining area within the site is largely undeveloped.

The original school was constructed in 1901. In 1985 the site underwent a change of use from educational to activity centre specialising in outdoor pursuits, with an associated training centre; and in 2002 the centre was closed and the buildings were used for residential purposes.

Figure 2: Existing Building Viewed South East



Image produced from Google Earth

Figure 3: Existing Building Viewed South West



Image produced from Google Earth

3.3 Proposals

Proposals for the site involve the provision of industrial development in the form of a brewery, with associated offices; a shop and a subterranean private storage area.

Demolition of the flat roofed buildings within the site is proposed, with retention of the original school building, which was constructed in 1901. The existing school building will form a new office facility.

It is also proposed to provide a nature walk and picnic area within a large proportion of the west side of the site.

The proposed layout produced by Halliday Clark Architects is provided in Appendix B of this report.

3.4 Boundaries

The proposed development is located at the junction of Whams Road with Bents Road at Penistone near Barnsley.

The site is situated within an area comprising predominantly of open farmland and agricultural development and is located approximately 5 kilometres to the west of central Penistone, with the village of Crow Edge situated approximately 700 metres to the north west of the site.

There are numerous open cast mine workings shown to the north of the site and existing industrial development in the form of Hepworth Drainage Products is also located to the north west of the site.

A dismantled Railway Track known as Mucky Lane forms the west boundary of the site.

The proposed development is accessed directly off Bents Road.

3.5 Topography

From the topographical survey, ground levels within the existing development area fall generally in a south westerly direction.

The highest ground level within the site is identified as 287.97mAOD and is located at the north west corner of the site. The lowest point within the site lies at a level of 278.18mAOD and is conversely situated at the south east corner of the site.

The Ordnance Survey maps of the area generally indicate that ground levels fall eastwards towards Sledbrook Dike, which lies approximately 250 metres to the east of the development area.

3.6 Drainage

3.6.1 Public Sewer System

Details from Yorkshire Water indicate that the nearest public sewer system is located within a small residential development comprising Middlecliffe Drive, situated approximately 700 metres to the north of the development.

The sewer system in this area is separate, with surface water discharging into an open channel to the north east of the A616 Manchester Road, which ultimately flows into Sledbrook Dike.

Foul flows from this residential area discharge via gravity to a combined sewer overflow chamber located within land to the north east of Middlecliffe Drive. Foul flows are generally directed southwards, with excess flows allowed to spill directly into Sledbrook Drive.

It is understood that foul flows continue southwards towards a Yorkshire Water operated pumping station situated on the north side off Lee Lane approximately 100 metres to the north east of the proposed development.

Yorkshire Water advises that foul water from the proposed development should discharge into the existing 150mm diameter foul sewer which crosses the A616 Manchester Road, approximately 700 metres from the development.

Ground levels in the vicinity of the existing foul sewer are approximately 298.7mAOD, with the lowest ground level at the development site being 278.18mAOD. As such, discharge of foul water to the public sewer via gravity will not be possible and should such a connection be required, a foul pumping station will be necessary to facilitate the connection into the public sewer. In such a case, Yorkshire Water will restrict discharge from the foul pumping station to a maximum of 6 l/s.

Yorkshire Water also advises that there are no public sewers available within the vicinity of the proposed development to accept surface water flows from the proposed development.

The sewer record plans and associated correspondence provided by Yorkshire Water are presented within Appendix C of this report.

3.6.2 On-Site Drainage

The site comprises existing development in the form of an old school building, and the topographic survey indicates that it is positively drained via rainwater pipes and gullies.

An investigation of the on-site drainage has not been undertaken at this time and it has been suggested that both foul and surface water flows from the existing site are directed to a cesspit located within the south east corner of the development area.

However, the configuration of inspection chambers within the developed part of the existing site infers that some surface water flow from the existing site may be conveyed to a highway drain situated within the footpath of Whams Road.

In addition, the location of inspection chambers at the cesspit suggests that the pipework within this area is more complex than initially understood. It is believed that there is an existing overflow arrangement, connected to a foul pumping station which allows excess flow to be directed to the public sewer system situated to the north of the development.

Therefore it is recommended that prior to the detailed design stage of the project, a full investigation of the existing on-site drainage is undertaken in order to determine all existing foul and surface water outfall locations.

It is considered that both foul and surface water flows from the site will be significantly increased as a result of the development.

The proposed development will create an increase in impermeable area within the site boundary; thereby causing an increase in surface water runoff from the development.

Additionally due to the nature of the proposed development, it is considered inevitable that there will also be an increase in wastewater generated by the site, as a result of the engineering processes involved in the brewery industry.

Therefore, consideration of changes to surface water runoff; wastewater discharges; requirement of surface water attenuation; incorporation of sustainable drainage techniques; and wastewater treatment facilities within the proposed drainage strategy has been investigated further within this report.

3.7 History of Flooding

A search on the British Hydrological Society Chronology of British Hydrological Events website (<http://www.dundee.ac.uk/geography/cbhe>) found a single record relating to flooding within the area of Penistone. This flooding occurred in 1767 and appeared to affect the surrounding agricultural land. No records relating to flooding within the immediate vicinity of the proposed development at Whams Road was highlighted.

Undertaking an internet based search for flooding indicated that Penistone was affected by the floods of 2007, however no further information relating to historical flooding within the vicinity of the proposed development was found.

4.0 Flooding

Mechanisms

Table 2: Sources of Flooding

Source/Pathway	Significant?	Comment/Reason
Fluvial	No	Town Brook; Sledbrook Dike; and the River Don.
Tidal/Coastal	No	
Canal	No	
Pluvial (urban drainage)	Yes	Existing site is positively drained. Following development the impermeable area within the site will be increased and wastewater discharge will also be increased.
Groundwater	No	Site is situated over a minor aquifer.
Overland flow	No	Elevated ground at Sledbrook Brow.
Blockage	No	See Infrastructure failure
Infrastructure failure	No	Full cesspit, failure of the existing pumping station
Rainfall Ponding	No	

4.1 Town Brook; Sledbrook Dike and the River Don

4.1.1 Town Brook

Town Brook is a small tributary of the River Don. The watercourse begins at Tinker Hill, and flows eastwards towards the village of Carlecotes, where it changes direction to flow southwards through existing farmland towards the River Don. The watercourse is situated approximately 1 kilometre from the proposed development. The confluence of Town Brook with the River Don lies at Soughley.

Topography of the area indicates that the watercourse exhibits a fairly steep gradient and as such, should overtopping of the natural banks occur, flooding is likely to remain within a narrow corridor along the route of the brook, as it flows southwards towards the River Don.

As such it is considered that Town Brook presents a low risk of flooding to the development.

4.1.2 Sledbrook Dike

This watercourse is another small tributary of the River Don. The stream springs near a disused mine workings at Crow Edge, and flows southwards to meet the River Don near to Hazlehead Hall.

From the Ordnance Survey Map for the area, the banks of Sledbrook Dike in line with the development lie at a level approximating 260.0mAOD. The lowest point within the site is at a level of 277.91mAOD, and as such, the development is elevated in excess of 17 metres above Sledbrook Dike.

During extreme flood conditions within the watercourse is unlikely that water levels will be able to reach the development and it is therefore concluded that Sledbrook Dike presents a low flood risk.

4.1.3 The River Don

The River Don is classified as 'Main River' and rises in the Pennines. The watercourse flows for 112 kilometres eastwards, through the Don Valley, via Penistone; Sheffield; Rotherham; Mexborough; Conisbrough; Doncaster and Stainforth.

The River Don originally joined the Trent, but following re-engineering works by Dutch Engineer, Sir Cornelius Vermuyden, now joins the River Ouse at Goole in the East Riding of Yorkshire.

The proposed development is situated approximately 3 kilometres to the north of the River Don, and is elevated in excess of 20 metres above the natural banks of the river.

The site is therefore considered to lie outside of the known floodplain area for the River Don. As such, the watercourse is considered to present a low flood risk to the proposed development.

4.2 Increased Runoff Resulting from the Development

4.2.1 Existing Site

The existing site has a total area of 1.05Ha and evidence of a positive drainage system within the site is available via the topographical survey provided.

The survey indicates the arrangement of existing yard gullies and inspection chambers within the developed portion of the existing site. A copy of this survey is available within Appendix A of the report.

It has been suggested that there is a combined drainage system serving the development which directs both foul and surface water flows to a cesspit situated within the south east corner of the site.

Consequently, owing to the scale of the existing development, during high intensity rainfall events, should this assumption be found to be accurate, it is likely that the existing cesspit will become overwhelmed causing localised foul flooding.

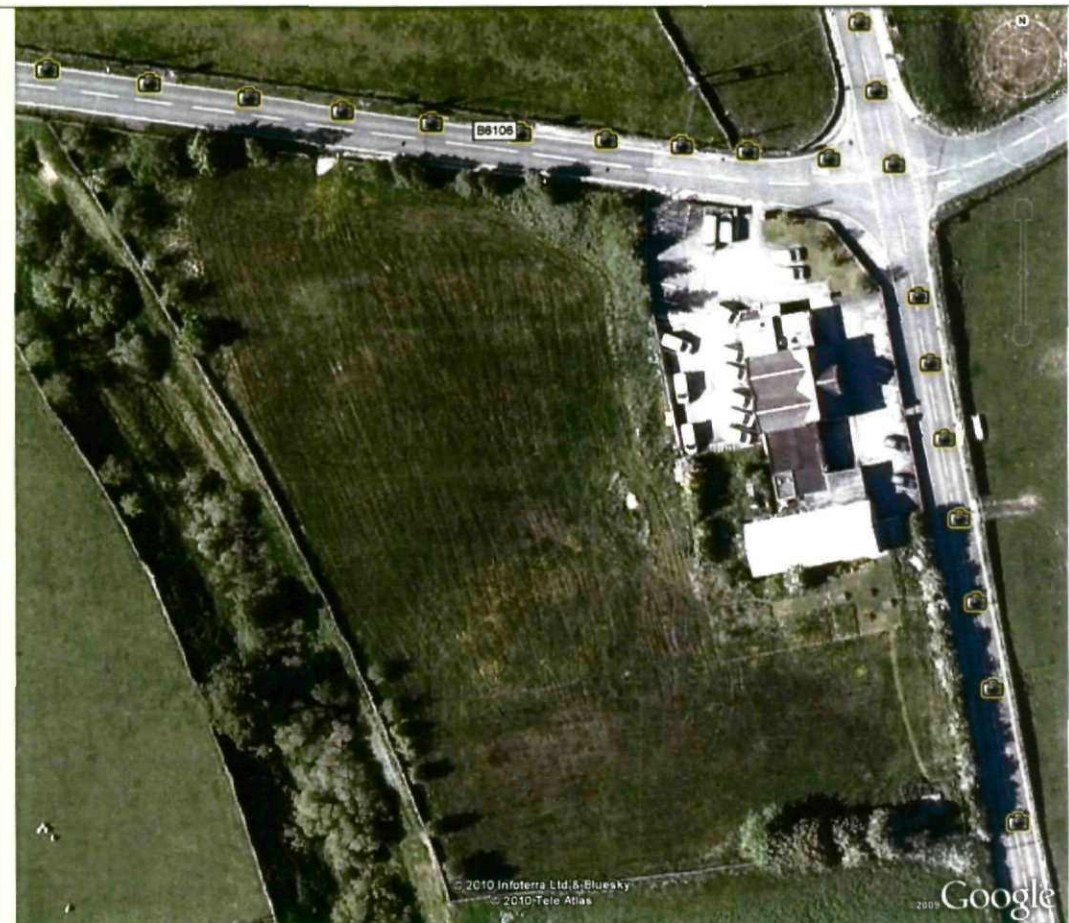
As such, it is believed that the existing on-site drainage is more complex than originally believed and therefore it is highly recommended that a full investigation of the drainage network is undertaken in order to determine all existing foul and surface water outfall locations.

For example, an existing highway drain has been identified within the footpath of Whams Road in the vicinity of the existing site. As such, it is possible that some of the surface water runoff from the site is directed to this existing highway drain directed towards this drainage network.

In addition the arrangement shown in the topographical survey of the drainage system at the cesspit suggests that there may be a foul pumping station present, which could be used transfer excess flows to the public foul sewer system located to the north of the site.

Due to the location of manholes and inspection chambers within the west verge of Whams Road, it is considered that there is an existing highway drain located within the vicinity of the site. As such it is possible that surface water flows from the site are directed into this existing highway drain.

Figure 4: Aerial Photograph of the Existing Site.



Photograph obtained from Google Maps.

Estimation of Existing Surface Water Runoff

From the topographic survey, it is estimated that roof and hard paved areas cover 0.17 Hectares, hence 16% of the total site area.

In accordance with PPS25, surface water runoff from the proposed development which is to be discharged to a local sewer network or nearby watercourse should be restricted to the existing 1 in 2 year peak runoff rate incorporating a 30% reduction to accommodate climate change over the lifetime of the proposed development.

However should ground conditions within the development prove to be suitable to accommodate disposal of surface water runoff via infiltration methods, then this restriction is not applicable.

As such, the proposed 1 in 2 year runoff should be maintained within the drainage system and the 1 in 30 year event should not be allowed to flood the surface; hence the water must remain within the pipes, manholes, and storage systems.

The 1 in 100 year plus climate change event is usually allowed to flood the surface but flood water will not be permitted to enter any of the buildings within the site. In addition, the 1 in 100 year plus climate change flood must be limited to the development boundary and must not be allowed to migrate to adjacent properties.

Using the Wallingford Procedure, Modified Rational Method, peak flows during the 1 in 2 year design storm have been calculated overleaf.

$$Q_p = C_i A$$

Where, Q_p = Peak discharge (l/s)

C = Dimensionless coefficient

i = Rainfall intensity (mm/hr)

A = Contributing catchment area = 0.17 Ha.

Determination of C : $C = 2.78 \times C_v \times C_r$

C_v = Volumetric runoff = 0.75

C_r = Dimensionless routing coefficient = 1.30

Therefore $C = \underline{2.71}$

Calculation of Rainfall Intensity:

$M5-60$ (from figure A1) = 19.90

r (from figure A2) = 0.30

$M5-D = Z1 \times M5-60$

For calculation purposes design storm duration of 30 minutes has been used.

$Z1$ (from figure A3b) = 0.75

Therefore $M5-30 = 0.75 \times 19.9 = \underline{14.93}$

$MT-D = Z2 \times M5-30$

For calculation purposes a 1 in 2 year return period has been utilised.

$Z2$ (from table A1) = 0.80

Therefore $M2-30 = 0.8 \times 14.93 = \underline{11.94}$

Point rainfall intensity $i = MT-D / D = 11.94 / (30/60) = 23.88 \text{ mm/hr}$, say 24 mm/hr

As such, the peak 1 in 2 year surface water runoff from the existing site:

$Q_p = 2.71 \times 24 \times 0.17 = 11.1 \text{ l/s}$, say 11 l/s

In conclusion surface water flow from the existing development is estimated to be 11 l/s. Incorporating a 30% reduction in surface water flow from the brownfield development, surface water discharge from the proposed development should be restricted to a maximum of 7.7 l/s.

Following development there will be an increase in the area of roof, car park and service yard facilities, which will contribute to an increase in surface water runoff from the development.

As such, solutions for dealing with this increased surface water runoff have been investigated further below in Sections 4.2.2 and in more detail within Section 5.6 of this report.

4.2.2 Proposed Site

Halliday Clark has provided a copy of the current development layout, which is presented in Appendix B of this report. The layout indicates that the impermeable area within the site following development will increase to approximately 44% of the total site area, hence 0.46 Hectares.

Due to this increased contributing area, it is considered that there will be a subsequent increase in surface water runoff. Therefore, the impact of this has been considered in greater detail within this report and an investigation of various methods to minimise surface water runoff within the site has been carried out. Such methods include:

- Gravel surfacing to car park areas to reduce permeability.
- Rainwater harvesting and grey water re-use to the brewery, shop and office buildings.
- Green roof technology applied to the subterranean storage area.
- The use of soakaways to dispose of surface water runoff, subject to ground conditions.

4.3 Wastewater Flows

Proposals for redevelopment of the site involve construction of a brewery.

The brewing process often generates significant volumes of wastewater which includes both waste product and cleaning water. While this effluent is unlikely to contain toxic material, the high organic content may produce a pollution risk if discharged directly into the public sewer system or watercourse in an untreated state.

Details obtained from R & M Swaine Limited indicate that the following volumes of wastewater are expected to be generated by the brewing process alone.

- 1500 litres/day
- 6000-7500 litres/week

In addition there will be domestic foul flows generated from the development.

It is considered that the volume of wastewater generated by the proposed development will be such that the existing cesspit is inadequately sized to cope with the increased flows.

Therefore it is recommended that all wastewater flows from the proposed development are treated using a package wastewater treatment plant prior to discharge from the site.

Following treatment the resultant flows may be discharged into a sewer or drain system; used to recharge groundwater via infiltration if ground conditions permit; or discharged directly to the nearest watercourse. Alternatively, the treated water may be used for the following:

- Water reclamation and / or reuse
- Vehicle washing and other "non-potable" applications
- Boiler/cooling tower feed water

Should discharge of treated flows to the nearby watercourse present the most favourable option, then the occupant will need to acquire a permit to discharge from the Environment Agency. This permit sets the required limits on water quality discharged from the proposed waste water treatment plant.

4.4 Groundwater

A site specific ground investigation has not been completed at this stage and therefore the presence and depth of groundwater within the development is currently unknown.

The Ordnance Survey map of the local area indicates the presence of wells within the surrounding area. The hydrogeological characteristics concur with this and indicate that the area is underlain by a minor aquifer, as illustrated in Figure 5 overleaf.

Groundwater flooding occurs as a result of water rising up from the underlying rocks or springs, and tends to occur after long periods of sustained high rainfall.

This means that more water will dissipate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. Therefore in low-lying areas groundwater is usually at found at shallower depths.

However, during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

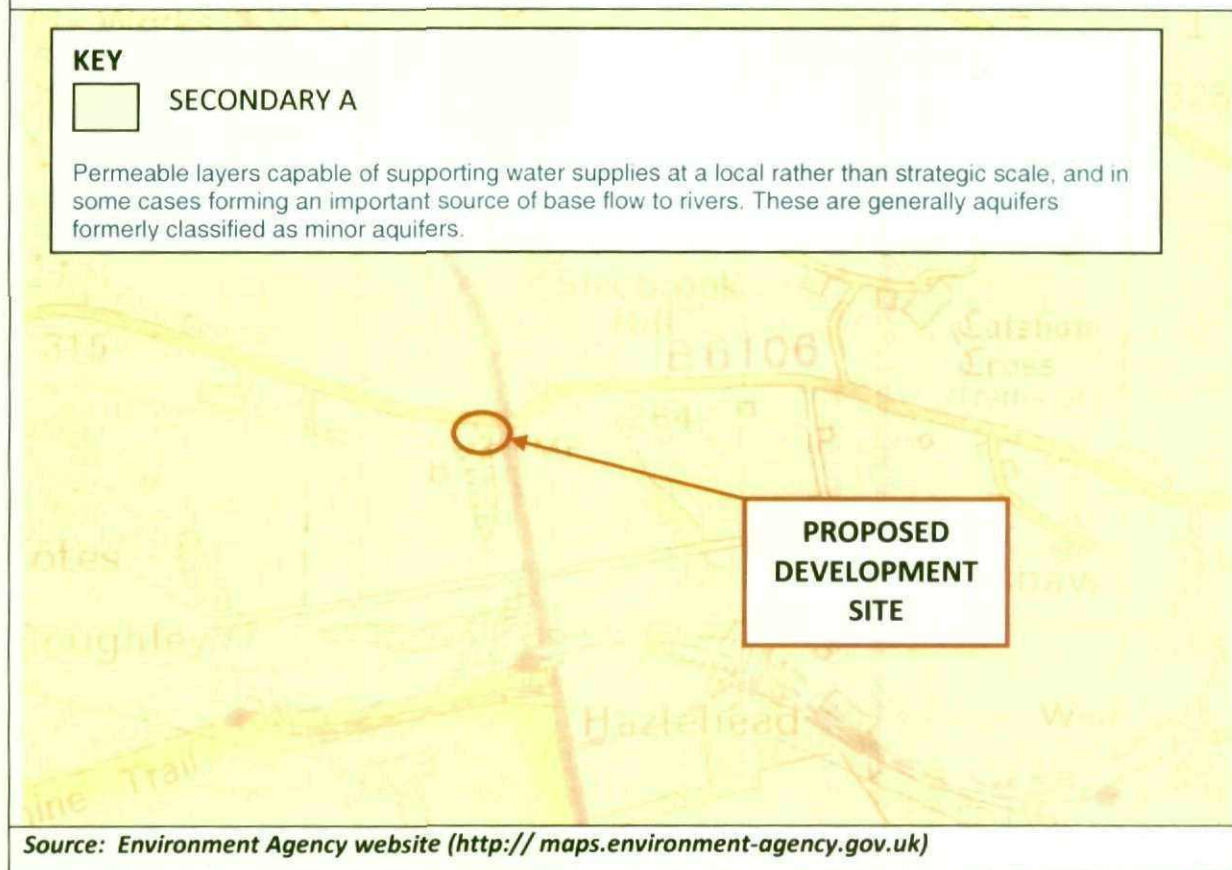
Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks or aquifers. These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.

Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

Due to the location and elevation of the proposed development within the Don Valley it is considered unlikely that groundwater flooding will present a flood risk to the proposed development. However, it is highly recommended that a site specific ground investigation is undertaken to confirm this.

In addition, Figure 7 indicates that the area surrounding the development comprises ground conditions exhibiting mixed permeability. As such, a detailed ground/site investigation will be able to confirm the possibility of incorporating infiltration methods into the proposed drainage strategy for the development.

If infiltration rates are found to be suitable for disposal of surface water from the site, it is highlighted that the Environment Agency may first require treatment of runoff via a petrol/oil interceptor in order to prevent pollution of the underlying aquifer.

Figure 5: Identification of Groundwater and Aquifers

4.5 Overland Flow

From Ordnance Survey Plans for the area surrounding the proposed development, a natural high point is situated at Sledbrook Brow. This area is elevated to a level of 332.00mAOD and is located approximately 2 kilometres to the north west of the proposed development.

Owing to topography of the area, it is likely that any water accumulating at this high point will be directed downhill via Sledbrook Dike.

As highlighted in Section 4.1.2 of this report the site is elevated significantly above the watercourse and as such, it is considered that overland flow presents a low flood risk to the proposed development.

5.0 Material Consideration In Respect of PPS25

5.1 Climatic Change

Annex A of PPS25 suggests that winters will become wetter over the whole of the UK, by as much as 20% by the year 2050. In making an assessment of the impact of climatic change, flooding from rivers and land will give a peak flow allowance of up to 20% increase in rainfall for a given return period by 2050 and 30% by 2110. These considerations will provide an appropriate precautionary assessment for climatic change impact on flood flows and rainfall intensities.

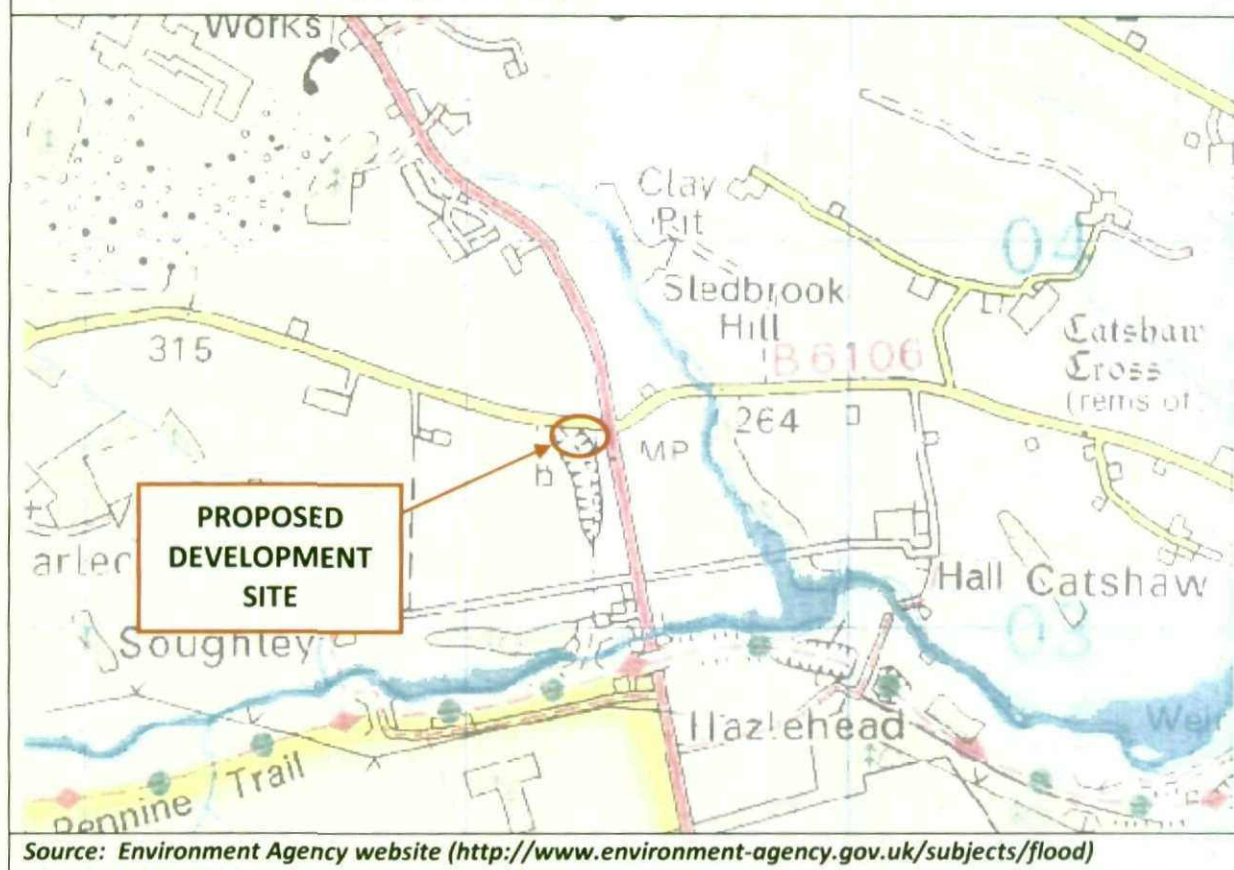
The areas surrounding the site comprise existing development and therefore in terms of climatic change, only rainfall falling within the site will be considered.

The latest identified figures in Annex B of PPS25 identifies that increases in rainfall of around 30% are anticipated for developments extending beyond the year 2050. It will be necessary, therefore, to make allowance for this increased rainfall in any positive drainage system assumed on the site.

5.2 Environment Agency Flood Maps

The Environment Agency flood zone map indicates that the site lies within Flood Zone 1, of the Environment Agency Flood Map (version 2.8.2), being the zone with risk of less than 1 in 1,000 year (<0.1% AEP) for river flooding or tidal/coastal flooding.

An extract of the Environment Agency flood map at the development site is provided in Figure 6 overleaf.

Figure 6: Environment Agency Flood Map

5.3 Proposed Finished Floor Levels

The proposed development located at the junction of Whams Road with Bents Road. The site at Penistone is situated within Flood Zone 1 of the Environment Agency Map and as such it is considered that land raising will not be required as a direct result of flood risk.

The floor level of the existing building is set to 280.44mAOD and as such setting the ground floor level within the proposed building to this value is recommended.

Due to the possibility of localised flooding caused by heavy rainfall, it is also recommended that the internal ground floor level is elevated a minimum of 150mm above the adjacent external finished ground levels.

5.4 Emergency Access and Egress during Times of Flood

It is a requirement under Planning Policy Statement PPS25 that occupants should be able to gain access or egress to any building during times of flood, without being trapped by flood conditions.

The development is shown to lie completely within Flood Zone 1. As such, it is considered that safe access and egress from the site will be possible at all times.

5.5 Surface Water

It is a requirement of any new development to ensure that surface water run-off from any has a negligible consequence on downstream areas as a result of sewer capacity; discharge to watercourse; or groundwater recharge via infiltration methods.

It is proposed that the drainage strategy for the development will incorporate a number of different methods in order to reduce the volume of surface water leaving the site. The suitability of such methods are investigated further in Section 5.6 below.

5.6 Sustainable Urban Drainage

The impermeable area within the site will be increased following development. There will therefore be an increase in surface water runoff from the site when it is developed. The existing site is partially developed and is drained via a positive system to either a cesspit located within the south east corner of the site, or towards an existing highway drain located in the footpath of Whams Road.

Surface water outflow from the existing development during the peak 1 in 2 year rainfall event is estimated to be 11 l/s. Following development, any surface water leaving the site should be restricted to 7.7l/s i.e. existing surface water runoff incorporating a 30% reduction to accommodate climate change over the lifetime of the development.

It is proposed that the volume of surface water runoff produced by the proposed development will be reduced through the implementation of sustainable urban drainage techniques, prior to discharge from the site either by infiltration methods, if ground conditions are found to be suitable; to the local sewer network; or to the nearby watercourse known as Sledbrook Dike.

It is usual for the Environment Agency to request that adequate pollution control is incorporated into the drainage system in order to prevent deterioration of the quality of the water environment.

It is normal practice to ensure that the 1 in 30 year event is maintained within the drainage system and the 1 in 100 year is permitted to flood the surface as long as there is no flooding to buildings and the flood volume is contained within the site boundary in specific areas proposed for this purpose.

The following section provides an indication of the possible SUDS techniques which could be employed on the site to balance flows within the proposed development. SUDS techniques are also able to provide treatment to the runoff to remove a proportion of the pollution and protect the quality of the downstream watercourses. Following guidance from CIRIA Report C522 the following levels of treatment will be provided:

- Roofs – 1 level
- Driveways – 1 level
- Roads and communal parking areas – 2 levels.

The level of treatment indicates the number of SUDS techniques that will be used to treat pollution. For example if two levels are required the runoff may enter a filter drain that leads to a basin or pond before outfall.

It is recommended that the use of source control techniques is employed within the drainage strategy for this development. In practice there will be little outflow from these techniques for a 1 in 2 year storm as most of the rainfall will be held within the system and will disperse via evapotranspiration. Further detail of the potential to use SUDS within this site is provided within Table 3. The precise combination of methods used will be dependent upon the site constraints identified at the final design stage.

With regards to the potential for infiltration methods to dispose of surface water from the development, the following information has been taken from hydrogeological and drift data for the catchment area containing the development site obtained from the Centre for Ecology and Hydrology website.

The information obtained indicates that the development is located within an area exhibiting ground conditions with a mixed permeability. A map illustrating the geological features of the area surrounding the proposed development is provided within Figure 7 overleaf.

As such, it is highly recommended that a site specific ground investigation is carried out in order to determine if this method of surface water disposal is suitable for the proposed development.

Figure 7: Hydrogeological and Drift Deposits Map

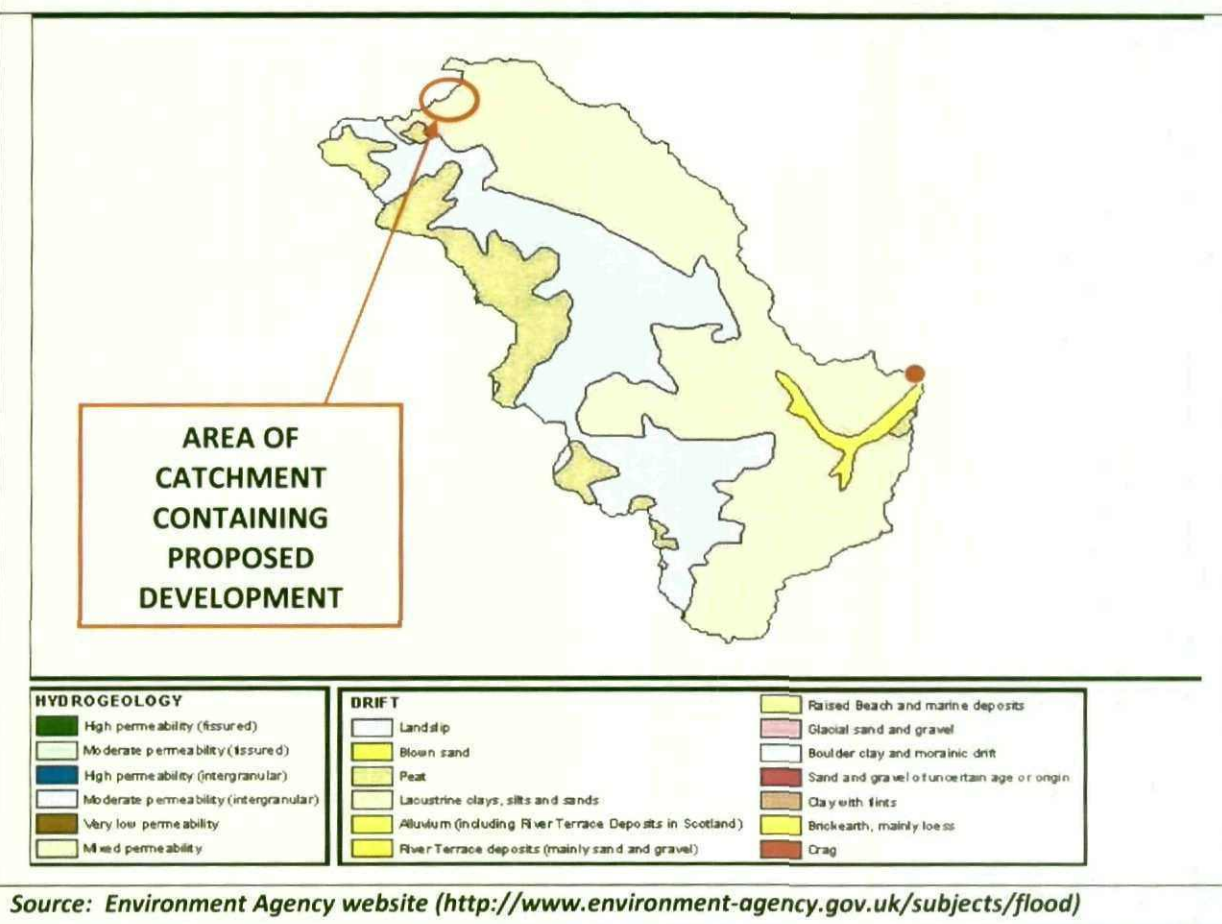


Table 3: SUDS Techniques and Suitability of Use

Method	Description	Potential for use at site
Filter drains	Drainage trench filled with gravel and provided with a pipe	Possible use to be established following infiltration testing.
Swales	Shallow grass ditch	May be utilised around the development boundary to prevent surface water migrating from the site.
Permeable surfaces	Pavement surfaces that allow water to pass through into underlying storage in sub base e.g. permeable concrete block paving or porous asphalt	May be considered suitable for use within the car park and hard paved areas in order to remove the need for on-line attenuation.
Ponds and basins	Open areas that are used to store and treat rainwater. Ponds are permanent bodies of water and basins are generally dry and occasionally store water	Open area of proposed development is situated within the north west part of the site, where ground levels would not necessarily suit the implementation of such a SUDS solution.
Green roofs	Roof system that is vegetated with plants (note sedum plants rather than grass so no mowing is required)	Proposed for the subterranean storage area, however usage may be extended to other roof areas within the development.
Infiltration devices	Methods that allow rainwater to soak into the ground, e.g. soakaways	Possible use to be established following infiltration testing.
Storage tanks	Underground tanks that temporarily store water in the drainage system	These will be used as a last resort on this site if dictated by site constraints.

6.0 Proposed Drainage Strategy

It is believed that surface water flows from the existing site are discharged either to a cesspit located within the south east corner of the site or offsite towards an existing highway drain located within the footpath of Wham's Road.

Foul flows from the existing site are directed towards the cesspit.

In order to accommodate increased surface water runoff and wastewater from the development, it is proposed that a number of solutions are incorporated into the drainage strategy for the development.

6.1 Surface Water

In order to minimise any increase in surface water volumes leaving the proposed development, resulting from an increase in roof and hardstanding area, it is proposed that the following solutions are implemented.

- Rainwater Harvesting
- Green Roof Technology
- Permeable and Semi-Permeable Paving Solutions

It is proposed that rainwater harvesting is implemented to collect storm water from the proposed roof areas of the director's offices, brewery and shop buildings. The storm water is collected via rainwater pipes and conveyed via gravity to the harvesting tank unit, where it can be re-used within the brewery and office buildings for non-potable applications such as toilet flushing, irrigation, and cooling.

In addition, it is proposed that green roof technology is employed for the subterranean storage building. Green roofing systems slow the movement of surface water runoff, allowing drainage systems more time to process flows. Sedum plants also filter pollutants and heavy metals out of rainwater, adding an additional ecological benefit which will act to supplement the proposed nature walk within the new development.

It is proposed that the car park spaces within the new development will be paved using gravel surfacing. This type of surfacing will act to reduce surface water runoff from the parking areas, as the irregular surface acts to slow down flow, allowing some infiltration of flow into the surrounding ground.

The remaining areas within the car park and service yard areas are to be paved with block paving and as such where gradients allow and ground conditions are found to be suitable, permeable block pavers are utilised in order to enable infiltration through to the underlying subsoil.

However following completion of the site investigation works, should infiltration rates be unsuitable, shallow attenuation may be provided to store surface water prior to discharge from the site.

Figure 8: Typical Commercial Rainwater Harvesting System

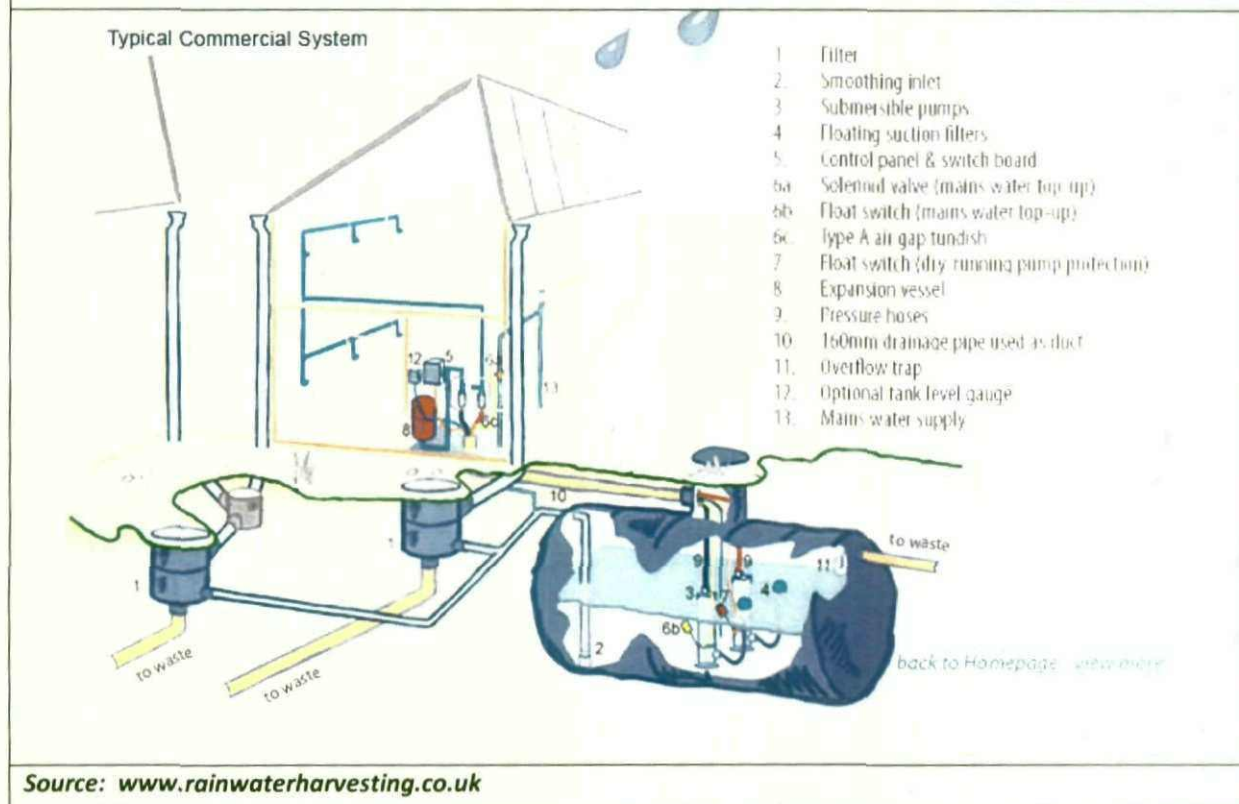
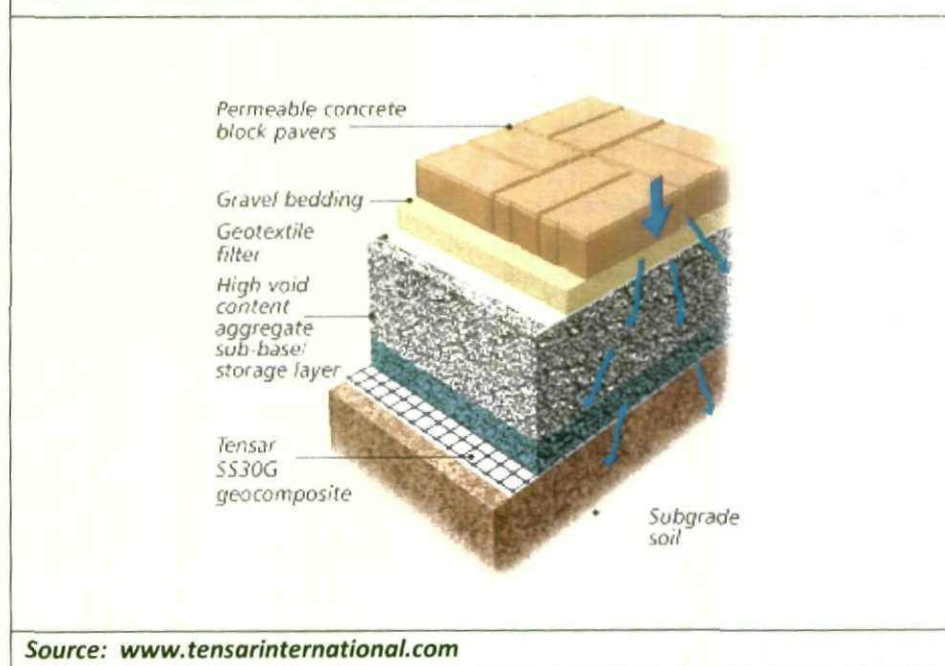


Figure 9: Typical Permeable Paving Solution



6.2 Commercial Wastewater and Domestic Foul Flows

Following development the discharge of wastewater from the development will be significantly increased and it is probable that the existing cesspit is inadequately sized to cope with the additional flows.

It is therefore proposed that a wastewater treatment solution such as Aquabio Ltd's AMBR Process or similar.

This process provides an aerobic wastewater treatment solution, which combines jet aeration with membrane bioreactor technology, and has previously been used successfully in the brewing industry.

The process provides high quality wastewater treatment with low surplus sludge production. Following treatment the resultant flows, subject to Environment Agency approval may be discharged to Sledbrook Dike.

It is proposed that resultant flows from the treatment process; along with excess surface water from the rainwater harvesting process is discharged from a location in the south east part of the development, across Whams Road towards Sledbrook Dike, situated approximately 250 metres to the east of the proposed development.

Figure 10: Typical Wastewater Treatment Facility



Source: www.aquabio.co.uk

7.0 Conclusions and Recommendations

- 7.1 The proposed development at Whams Road in Penistone is located within Flood Zone 1 of the Environment Agency's Flood Map.
- 7.2 The primary sources of flood risk to the development are from an increase in surface water runoff, and increased wastewater flows resulting from the brewing process.
- 7.3 It is believed that foul and surface water runoff from the existing development discharge to a cesspit located within the south east corner of the site. However, it is recommended that a full investigation of the existing on-site drainage is undertaken to establish both foul and surface water outfalls from the site.
- 7.4 Following development it is proposed that a range of SUDS techniques such as green roof technology; rainwater harvesting and permeable paving are utilised in order to reduce the volume of surface water runoff attributed to the site.
- 7.5 It is recommended that a site investigation is carried out in order to ascertain the suitability of infiltration methods for inclusion within the drainage strategy for the development.
- 7.6 It is proposed that the increased wastewater flows created by the brewing process are directed to an on-site wastewater treatment facility. Following treatment, flows may be directed via gravity to discharge into Sledbrook Dike, situated approximately 250 metres to the east of the site.

APPENDIX A

EXISTING LAYOUT

APPENDIX B

PROPOSED REDEVELOPMENT

PLANS

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- TIM 117 0.256 OutOfDate

NOTES

PROPOSED LANDSCAPING SHOWN
INDICATIVE ONLY AND SUBJECT TO A
DETAILED PROPOSAL WITH AGREEMENT
WITH THE LOCAL AUTHORITY

PLANNING ISSUE

REDEVELOPMENT OF
FORMER DUNFORD HAZLEHEAD CENTRE
WHARFS ROAD, PENNISTONE
SOUTH YORKSHIRE, S36 4JU
FOR
R&M SWAINE LTD

PROPOSED SITE PLAN

Date	FEB 10
Scale	1:250 @ A1
Drawn	RJM
Checked	

HALLIDAY CLARK

Dwg No. 323.08.(01)05	Rev. B
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APPENDIX C

YORKSHIRE WATER CORRESPONDENCE

& SEWER RECORDS

INCOMING E-MAIL MESSAGE

From: Kashif.Khan@yorkshirewater.co.uk
Subject: Fw: Whams Road/ Bents Road, Penistone - Pre-Planning Sewerage Enquiry

To: Donna Metcalf;
Attachments: khank_rad30AFD.PDF;
Reply Ref.:
Sent: Fri. 25 Jun 2010 at 15:51
Filed:
Received: Mon. 28 Jun 2010 at 08:16

Message:

Donna,

please see below and attachment. Original plus sewer map will follow in today's post.

Regards,

Kashif.,

(See attached file: khank_rad30AFD.PDF)

----- Forwarded by Kashif Khan/Waste Water/YWS/Yorkshire Water on 25/06/2010 15:50 -----

	Yorkshire Water
	Developer Services Team
	Western House
	Halifax Road
Paul Waite Associates	PO Box 500
Summit House	Bradford
Riparian Way	BD6 2SZ
The Crossings	
Cross Hill	Tel: 0845 120 8482
Keighley	Fax: (01274) 372 834
BD20 7BW	
	Email:
For the attention of Donna Metcalf	Planning.Sewerage@yorkshirewater.co.uk

For telephone enquiries ring:

Your Ref: Kashif Khan on (0845)120 8482
Our Ref: L004215
25th June 2010

Dear Madam,

Whams Road/ Bents Road, Penistone - Pre-Planning Sewerage Enquiry

Thank you for your enquiry received 10th June 2010. Our charge of £60.00

(plus VAT) will be added to your account with us, reference PWA070. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map. This indicates the recorded position of the public sewers. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site:

The site is remote from the public sewer network.

Development of the site should take place with separate systems for foul and surface water drainage. The separate system should extend to the public sewer.

Foul water should discharge to the 150 mm diameter public foul sewer recorded crossing the A616 Manchester Road, at a point approximately 710 metres from the site.

From the information supplied, it is not possible to determine if the whole site will drain by gravity to the public sewer network. If the site, or part of it, will not drain by gravity, then it is likely that a sewage pumping station will be required to facilitate connection to the public sewer network. If sewage pumping is required foul water discharge must not exceed 6 (six) litres per second.

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SUDS), for example the use of soakaways and/or permeable hardstanding etc., may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SUDS in this instance from the appropriate authorities.

Where appropriate, soakaways, swales and infiltration trenches (SUDS) may be adopted as part of the public sewer network. For general conditions for the adoption of SUDS please see the attached sheet. Further information may be seen in the DEFRA publication 'Interim Code of Practice for Sustainable Drainage Systems' (ISBN 0-86017-904-4). If the developer is considering adoption of SUDS they should contact our Developer Services Team on 0845 120 84 82.

There are no public sewers available in the vicinity to accept any surface water discharge from this site. Therefore, I would advise you to contact the Environment Agency/local Land Drainage Authority with a view to establishing a suitable watercourse (if any nearby) for discharge.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Off-site sewerage may be required which may be provided by the developer and considered for adoption under Section 104 of the Water Industry Act 1991. Please telephone 0845 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991

for which an application must be made in writing. For further information, please telephone 0845 120 84 82.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Developer Services Team (telephone 0845 120 84 82) for further information.

The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. Land drainage will not be allowed into a public sewer. Highway drainage, however, may be accepted under certain circumstances; for instance, if SUDS are not a viable option and there is no highway drain available and if capacity is available within the public sewer network. In this event, a formal agreement for highway drainage discharge to public sewer, under Services under Section 115 Water Industry Act 1991, will be required.

No land drainage to be connected/discharged to public sewer.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0845 120 84 82.

Yorkshire Water's Industrial Waste Manager must be consulted in respect of any proposed trade effluent discharge to the public sewer.

All the above comments are based upon the information and records available at the present time. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours faithfully

Developer Services Team

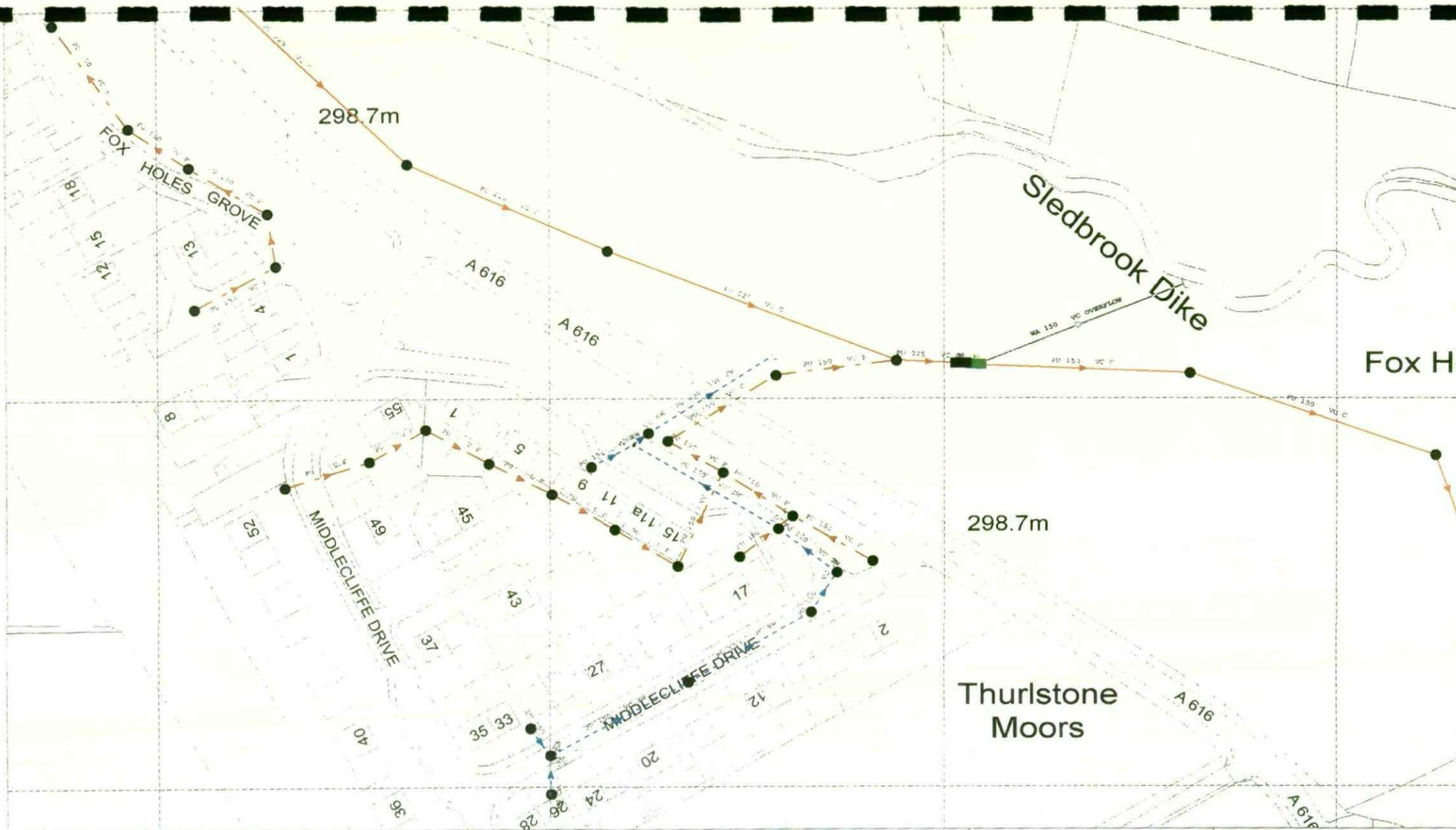
Find out how our new character Numptee is causing all sorts of problems by putting the wrong things down his toilet and drains - check out his videos and look at what you can do to help keep your drains running free.

Visit <http://www.yorkshirewater.com/binit>

The information in this e-mail is confidential and may also be

legally privileged. The contents are intended for recipient only
and are subject to the legal notice available at
<http://www.keldagroup.com/email.htm> Yorkshire Water Services
Limited Registered Office Western House Halifax Road Bradford BD6
2SZ Registered in England and Wales No 2366682

Notes:



418851 : 403970	Map Name : SE1803NE	Title	Partial Key		This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connection
 YorkshireWater	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name K KHAN Contact Tel	Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS		
	(Only) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2004 All rights reserved Ordnance Survey Licence number 100019559				
		Date Req	25/06/2010, 15:50:02	Date Gen	25/06/2010, 15:50:05
		Source :	Sewer Network Enquiry		

APPENDIX D

PRELIMINARY DRAINAGE STRATEGY

to be returned to Medley Case Limited on request.

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NOTES

PROPOSED LANDSCAPING SHOWN
INDICATIVE ONLY AND SUBJECT TO A
DETAILED PROPOSAL WITH AGREEMENT
WITH THE LOCAL AUTHORITY

NOTE: MAX SW
QUOTA RATE
FROM DEVELOPMENT
= 7.7415.

ROUTE OF OUTFALL
TO BE UNDERTAKEN
BY AGREEMENT
WITH
THE LAND OWNER

PLANNING ISSUE

**REDEVELOPMENT OF
FORMER DUNFORD HAZLEHEAD CENTRE
WHAMS ROAD, PENNISTONE
SOUTH YORKSHIRE, S36 4HJ**

FOR
R&M SWAIN LTD

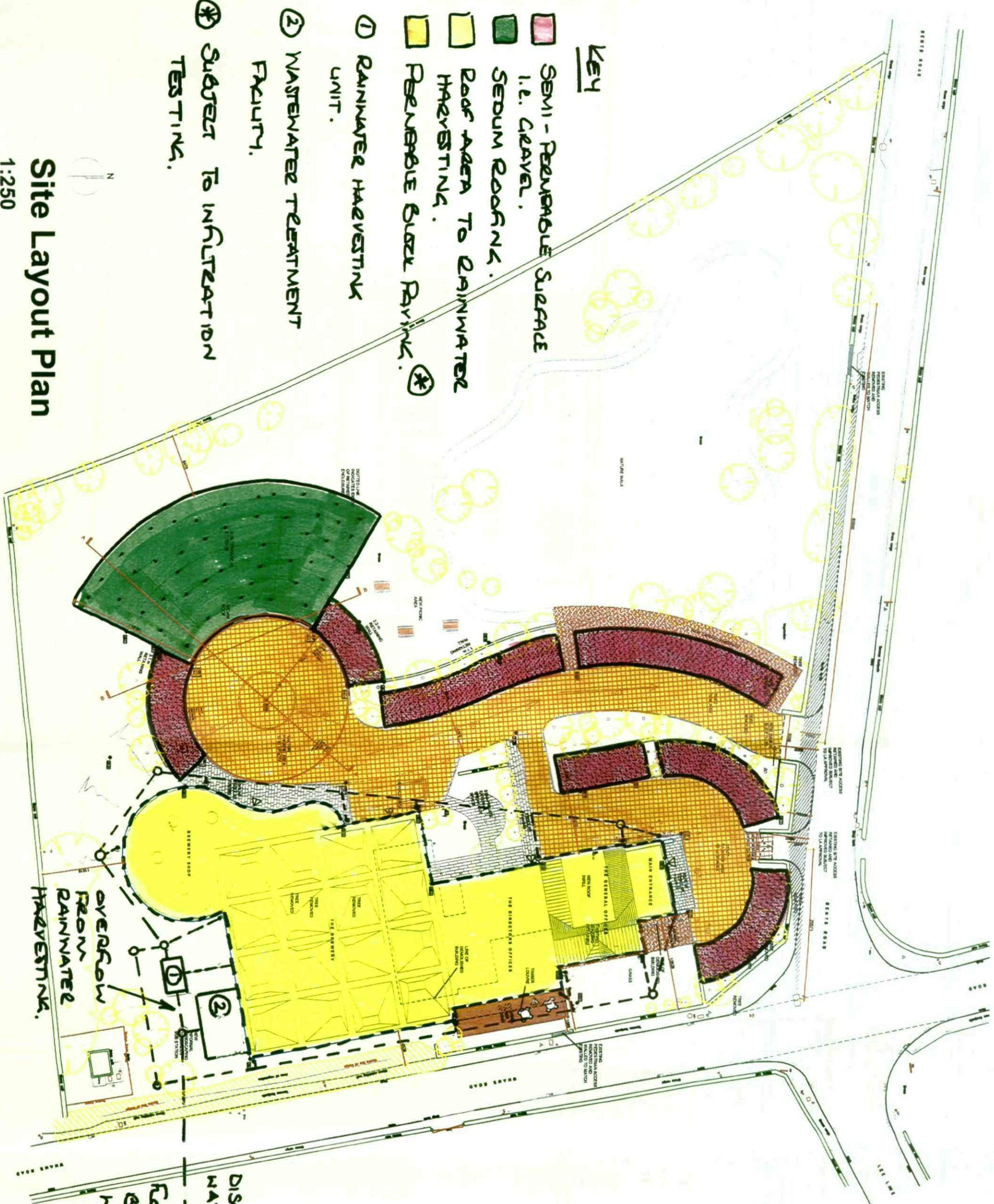
PROPOSED SITE PLAN

Date	FEB 10
Scale	1:250 @ A1
Drawn	RJW
	Checked

HALLIDAY CLARK

Dwg No 323.08.10105

Rev. E



Site Layout Plan

1:250

-  SEMI-PERMEABLE SURFACE
I.E. GRAVEL.
-  SEDUM ROOFING.
-  ROOF AREA TO RAINWATER
HARVESTING.
-  PERMEABLE BUZZ PAVING. (*)
- ① RAINWATER HARVESTING
UNIT.
- ② WASTEWATER TREATMENT
PLANT.
- (*) SUBJECT TO INFILTRATION
TESTING.

DISCHARGE TO
WATERCOURSE

FLOW RATE TO
BE AGREED
WITH THE
E.A.