

Flood Risk & Drainage Assessment



Pipestone

**Proposed Residential Development,
Wakefield Road,
Mapplewell,
Barnsley**

Flood Risk and Foul Drainage Assessment

December 2017

Flood Risk & Drainage Assessment



Report Control

REPORT Flood Risk & Drainage Assessment

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Primary Author	Francisco de Borja Aguilar	Initialled: FA
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Contributor	Initialled:
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Review By	Tom Beavis	Initialled: T.B
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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

Pipestone has commissioned WYG Engineering Ltd to undertake a Flood Risk and Drainage Assessment (FRDA) in respect of the proposed residential development in Wakefield Road, Mapplewell. This report has been prepared to accompany the outline planning application for the development as set out below.

It should be noted that in developing the surface water and foul drainage strategies for this development due consideration has been made in respect of the separate detailed planning application for a new retail unit which is to be submitted for the site immediately to the south of the proposed residential development.

This report (Version Rev A) has been updated to incorporate the revised off site surface water drainage proposals and the recent investigations into the existing foul drainage connection to the Yorkshire Water public sewer system.

1.2 PROPOSED DEVELOPMENT

The proposed development is to consist of up to 82 dwellings and associated landscape and infrastructure.

The application site is brownfield as it was occupied by an industrial unit that has now been demolished.

The proposed development is classified as 'More Vulnerable' in accordance with Table 2 of the PPG - Flood Risk & Coastal Change (PPG).

A copy of the Indicative Masterplan is contained in Appendix A.

1.3 REQUIREMENT FOR SURFACE WATER DRAINAGE ASSESSMENT

According to flood risk mapping provided by the EA, the site is located within Flood Zone 1: i.e. land assessed as having an annual probability of river flooding lower than 1 in 1000 (<0.1% Annual Exceedance Probability (AEP). However, as the site area exceeds 1 Ha, in accordance with the Planning Practice Guidelines (Flood Risk & Coastal Change) ¹, a Flood Risk Assessment is required to support the outline planning application.

1.4 SCOPE OF THE SURFACE WATER DRAINAGE ASSESSMENT

The FRDA will be undertaken in accordance with the guidelines of the Environment Agency Flood Risk Assessment Guidance in FZ 1 <https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zone-1-andcritical-drainage-areas>

¹ NPPF Section 103 note 20



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In line with the NPPG and the EA requirements, the FRA will review the existing fluvial and coastal flood risk and also consider all other potential sources of flood risk, such as pluvial flooding, sewers, overland flow routes, groundwater flooding, reservoir flooding, and ordinary watercourses.

The FRA will assess the existing flood risk to the site from rivers and the sea and propose appropriate mitigation measures; and establish a management regime for surface water runoff from the site such that flood risk to adjoining areas is not exacerbated. If not managed properly, surface water runoff from the site could potentially lead to increases in flood risk to other areas or the development itself.

As the planning application is an outline application then a high – level surface water drainage strategy will be included in which potential measures for draining surface water will be discussed, and this will have a specific focus on implementing Sustainable Drainage Systems (SUDs) strategies.

1.5 FOUL DRAINAGE ASSESSMENT

The Foul Drainage Assessment will review the existing foul water drainage systems within and adjacent to the development site and identify the peak flows from the proposed development. The assessment will also identify points of connection to the public sewer system. A pre – development enquiry was lodged to Yorkshire Water to confirm the suitability of the proposals.

1.6 LIMITATIONS OF THIS REPORT

This report has been prepared by WYG Engineering on behalf of Pipestone with the scope of the report as described in Section 1.2 above and the particular instructions and requirements. It is not intended for and should not be relied on by any third party and no responsibility is undertaken to any third party.

WYG Engineering accepts no duty or responsibility (including in negligence) to any party other than Pipestone and disclaims all liability of any nature whatsoever to any such party in respect of this report.

This report cannot be reproduced without WYG's written consent.

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2 SITE DESCRIPTION

2.1 EXISTING SITE

The application site covers an area of 3.65 ha and is currently brownfield, as it is located on a site previously occupied by an industrial unit. The site is adjacent to Wakefield Road in Mapplewell, and the nearest postcode is S75 6FZ and the site's grid reference is SE 33971 09973.

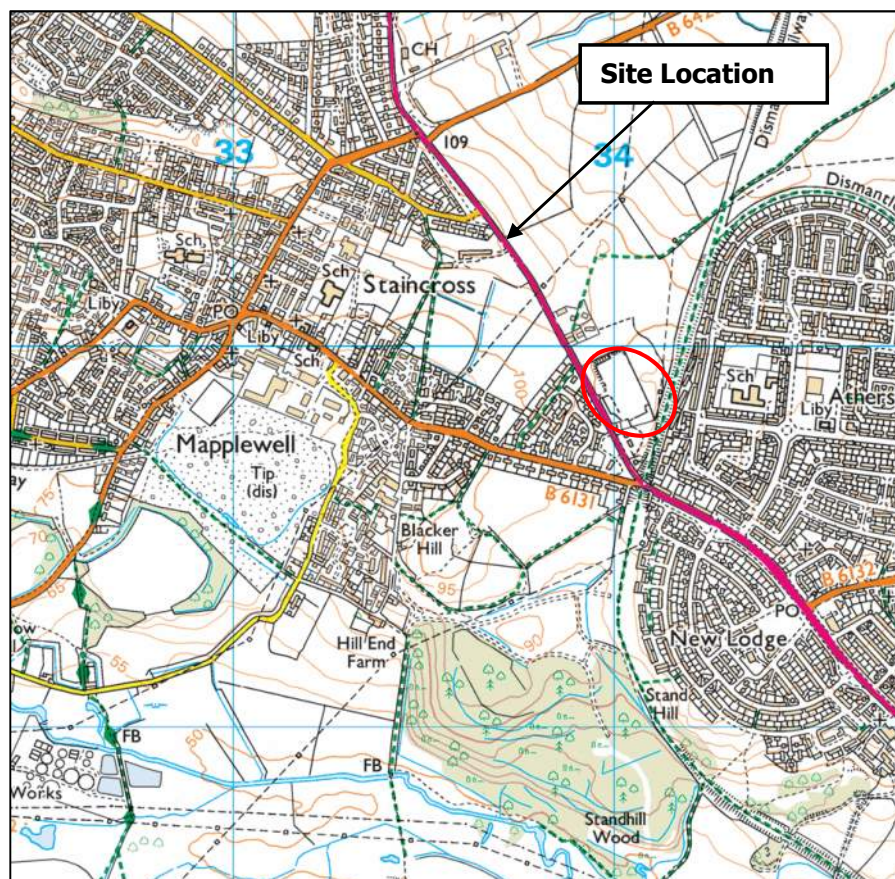


Figure 1 – Site Location¹

The site is bounded by agricultural land to the north, by a disused railway to the east, by a commercial area to the south and residential dwellings to the west and north west.

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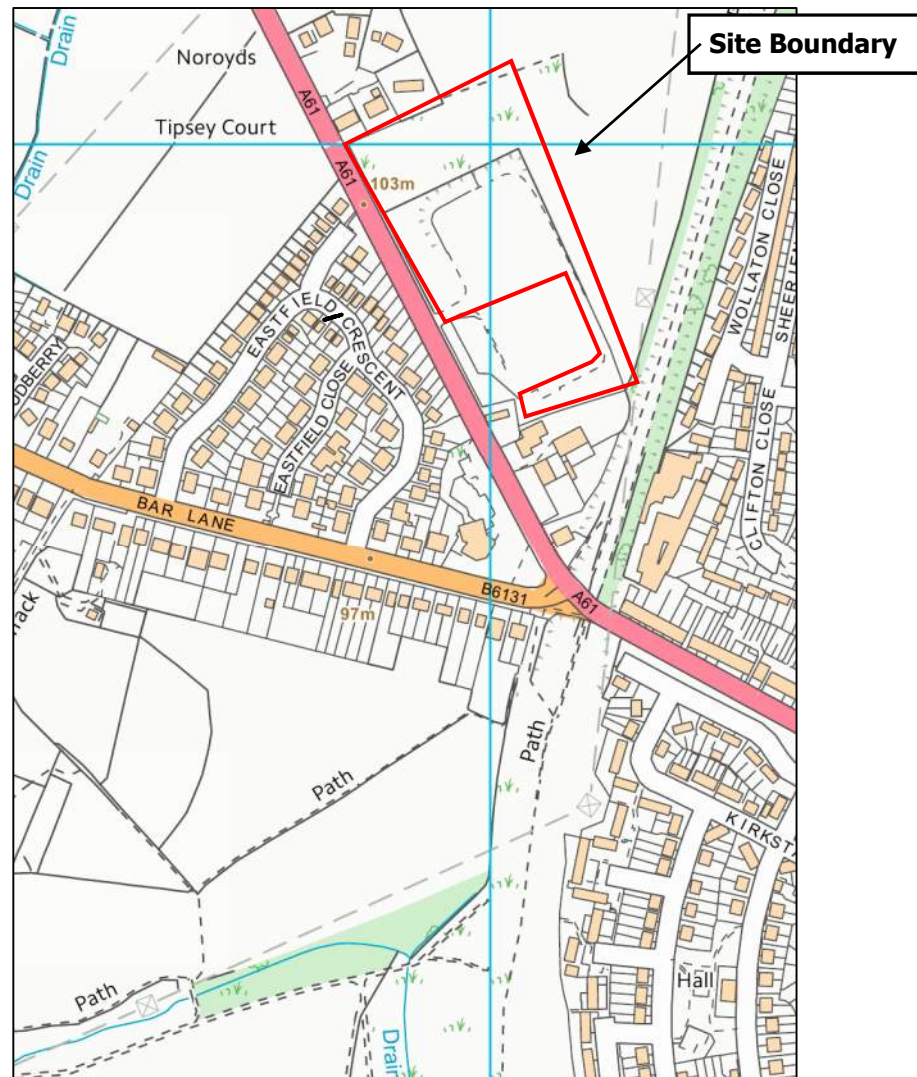


Figure 2 – Site Plan

A topographical survey of the site was undertaken in July 2015 and identified that the site falls from north west to south east. The highest levels within the site are found at the north western corner of the site, where the highest level is 104.30m AOD. The lowest levels are located at the eastern part of the site, and the lowest level is 94.23m AOD.

A copy of the plan showing the survey of the site is contained within Appendix B.

2.2 EXISTING DRAINAGE

2.2.1 Main Rivers

The nearest main river to the application site (as listed on the EA Flood Map for Planning) is the River Dearne, which flows 1.2km to the south west of the site.



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2.2.2 Ordinary and Manmade Watercourses

There are no ordinary watercourses within the site boundary.

2.2.3 Sewers

Yorkshire Water Sewers

Inspection of the Yorkshire Water (YW) sewer records identified a 225mm diameter public foul sewer which drains south parallel with Wakefield Road within the rear gardens of the existing residential properties fronting onto Eastfield Crescent. This sewer discharges into a combined sewer at the junction between Wakefield Road and Bar Lane.

A copy of the sewer records received from YW is contained in Appendix C.

Barnsley Council

The YW sewer records identified a 225mm diameter highway draining south within the western verge of Wakefield Road. However, Barnsley MBC Highways section have confirmed that at present there are known capacity and flooding issues associated with this sewer.

Private Sewers

The utility survey of the site identified a number of manholes within the site. However, these are in a poor condition and mostly blocked.

A potential existing connection from the south west corner of the site discharging to the Yorkshire Water combined sewer has been identified and some initial survey work undertaken.

During January and February 2018 further survey and cleaning works were undertaken and these confirmed that the existing 150mm diameter foul sewer does discharge into the 225mm diameter Yorkshire Water sewer located to the west of Wakefield Road.

A copy of the utility survey is included in Appendix B.

Recent discussions have confirmed that the former factory site actually discharged surface water via a separate outfall onto the old railway line from where it is understood that the run off soaked away into the old track ballast. As the railway line and ballast has now been removed and the railway line partially filled in, this results in an element of ground water and surface run off from the application site still draining onto the old railway line.

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This discharge results in the area of the former railway line to the north of Wakefield Road bridge becoming flooded following any rainfall.



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3 FLOOD RISK

3.1 FLUVIAL FLOOD RISK

Fluvial flood risk is the risk arising from rivers and watercourses.

A floodplain is the area that would naturally be affected by flooding if a river rises above its banks or if coastal areas are exposed to coastal flood risk. In England, floodplains and land subject to coastal flood risk are divided into flood zones (FZ) for planning purposes. These areas show the extent of the natural floodplain area at risk of inundation if there were no flood defences or certain other manmade structures and channel improvements. They are divided as follows:

- Flood Zone 3 shows the land having a 1 in 100 or greater annual probability of river flooding.
- Flood Zone 2 shows the additional extent of an extreme flood from rivers. It is land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding;
- Flood Zone 1 is the area where flooding from rivers and the sea is very unlikely.

The EA Flood Map for Planning shows the site as being in Flood Zone 1 and therefore it is considered that it is at low risk of flooding from rivers.

3.2 SURFACE WATER FLOODING & OVERLAND FLOWS

Surface water flooding occurs where high rainfall events exceed the drainage capacity in an area (i.e. sewer system and/or watercourse), leading to flooding.

An extract of the Environment Agency's Updated Flood Map for Surface Water is shown below in Figure 3. It can be seen that the central area of the application site is at risk of flooding from surface water. The topographical survey indicates that the area shown as being at risk is at a lower level than the adjacent areas and therefore surface water will pond there when the capacity of the drainage system is exceeded. Additionally, the southern boundary is shown as being at risk.

However, it is expected that once the site is re – developed, the new site levels will remove this low lying area, and a suitable drainage system will be provided. Therefore, the risk will become low. Regarding the southern area of the site, as it is proposed to provide open space in the area, no mitigation measures against the existing risk are required.

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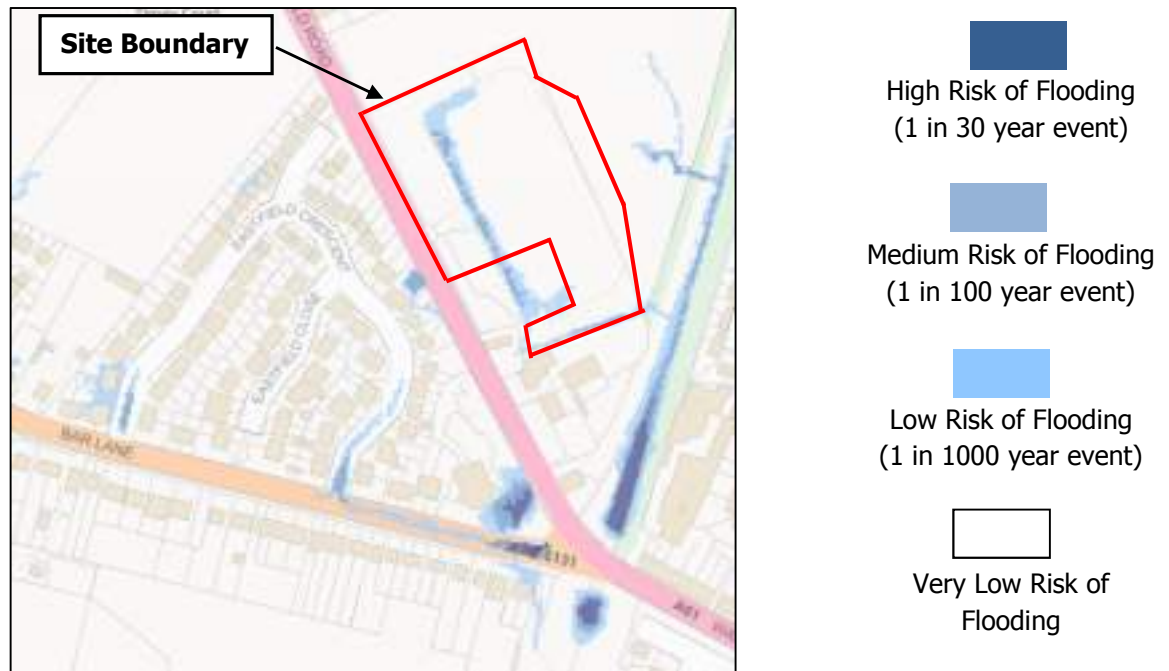


Figure 3 - Extract from the EA's Updated Flood Map for Surface Water (July 17)

3.3 SFRA REVIEW

A review of the Barnsley Metropolitan Borough Council SFRA dated 2010 was undertaken to inform this FRA. The following points were highlighted:

- Proposals over 1000 m² floor space or 0.4 hectares in Flood Zone 1 need to demonstrate how the proposed development will make a positive contribution to reducing or managing flood risk;
- All development proposals on Brownfield sites are required to reduce surface water run-off by at least 30%; and
- New development should incorporate SuDS;

3.4 BARNSELY MBC - LOCAL FLOOD RISK MANAGEMENT STRATEGY (LFRMS)

A review was undertaken of the Barnsley MBC Draft LFRMS dated 2014 and this did not identify any additional flood risk issues relevant to the proposed development site.

3.5 SEWER FLOODING

The SFRA does not include Mapplewell as one of the areas where sewer flooding has been recorded and therefore it is considered that the site is at low risk of flooding from sewers.



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3.6 GROUNDWATER FLOODING

The SFRA indicates that a number of areas within the council boundaries are at risk of flooding from groundwater, however the site is not within any of these areas. Therefore, it is concluded that the site is at low risk of flooding from groundwater.

3.7 RESERVOIR FLOODING

Although the probability of a catastrophic dam failure is considered to be extremely low, the consequence of such an event would be severe. A review of the EA online 'Risk of Flooding from Reservoirs' identified that the application site is not located within a zone at risk of reservoir flooding.

3.8 SUMMARY OF FLOOD RISK

3.8.1 Overview of Flood Risk

Based on the above it can be seen that the application site is considered to be at low risk of flooding from rivers, sewers, groundwater, and reservoir failure. A small low lying area within the central part of the site is shown as being at risk from surface water flooding, however the re-development of the site will remove the low lying area and therefore the risk will become low.

It will be essential to ensure that no increase in flooding occurs downstream of the site as a result of the development and this matter is discussed in more detail within Section 4.



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4 DEVELOPMENT PROPOSALS

4.1 PROPOSED DEVELOPMENT

The proposed development is to consist of up to 82 dwellings and associated landscaping and infrastructure.

The application site is currently brownfield as there used to be an industrial unit on site that has now been demolished.

The proposed development is classified as 'More Vulnerable' in accordance with Table 2 of the PPG - Flood Risk & Coastal Change (PPG).

A copy of the Indicative Masterplan is contained in Appendix A.

4.2 SEQUENTIAL & EXCEPTION TEST

One of the aims of the PPG is to steer development away from zones of high flood risk towards Flood Zone 1. According to Table 2 of the PPG (Flood Risk & Coastal Change), the development is classified as 'More Vulnerable', and given that the application site is located in Flood Zone 1, according to Table 3 of the PPG (Flood Risk & Coastal Change), the proposed development is acceptable and there is no need for the Sequential or Exception Tests.

4.3 LOCAL PLANNING POLICY

4.3.1 Barnsley MBC Local Plan

A review of the Core Strategy dated 2011 was undertaken. Additionally, Barnsley MBC is in the process of producing a new local plan that will be adopted in 2018. A review of the 2016 Draft Local Plan was also undertaken to inform this report. The Core Strategy includes policies CSP 3 and CSP 4, and the draft Local Plan includes policy CC 3 – Flood Risk which indicate that:

- New development will not be permitted if it is at an unacceptable risk of flooding or if it increases flood risk elsewhere;
- Development on brownfield sites should reduce runoff rates at least a 30%; and
- All major development will be expected to use SuDS unless it is demonstrated that they are not feasible.

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4.3.2 Barnsley LFRMS

A review was undertaken of the Barnsley MBC LFRMS dated 2014. The document provides a background in flood risk within the county and it sets out regional strategies to manage flood risk. One of the objectives that the council will seek as LLFA will be to promote appropriate development that includes SUDS.

4.4 DEVELOPMENT AND FLOOD RISK

4.4.1 Flood Risk to the Development

As discussed in Section 3.8.1, the site is considered to be at low risk of fluvial flooding, groundwater, sewer, overland flows, and reservoir failure. Additionally, in accordance with the requirements of the PPG and the NPPF, it is essential that the development of the site does not increase the risk of flooding off site.

4.4.2 Flood Risk Arising from the Development

The new development will result in the development of a brownfield site in flood risk terms. In line with the requirements of the Barnsley MBC stated in the SFRA, runoff rates from the proposed development must be a 30% lower than the existing runoff rates. However, this requirement has now been superseded by the introduction of the DEFRA Non-Technical Standards for Sustainable Drainage which requires post development run off to be reduced to pre development greenfield run off rates.

On site attenuation will therefore be required within the application site to ensure that the proposed surface water drainage system does not exacerbate flood risk outside of the extent of the proposed development for all storm events up to and including the 1 in 100 plus 30% allowance for climate change storm event.

4.5 ASSESSMENT OF PRE AND POST DEVELOPMENT AREAS

The application site covers an area of 3.65ha and is classified as a brownfield site. Table 3 below shows the pre and post development permeable and impermeable areas for the application site. It must be noted that areas shown as covered by gravel in the topographical survey have been considered impermeable.

In accordance with the requirements of the DEFRA Non-Technical Standards for Sustainable Drainage, the post development discharge rate is to be based on the existing pre development greenfield discharge rate and therefore no allowance will be made for the existing surface water run-off from the existing impermeable areas.

Table 1 – Pre and Post Development Areas for Application Site

Status	Impermeable Area (Ha)	Permeable Area (Ha)
Pre Development – Residential Site	1.1	2.57
Post Development	1.495	2.15



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The above proposed post development impermeable areas have been adopted in assessing the preliminary on site attenuation volumes.

4.5.1 Existing & Proposed Discharge Rates

Although the site is considered a brownfield site in flood risk terms and discharged the previous surface water run off to an off-site sewer system and anecdotal evidence infers that this was discharged to the old railway line to the east.

It should be noted that DEFRA Non-Technical Standards for Sustainable Drainage now require the post development discharge rate to be based on the existing pre-development greenfield discharge rate.

Taking into account the above requirements, an assessment of the pre development greenfield run off rate has been undertaken using the Micro Drainage ICP Suds toolkit and based on a post development impermeable area of 1.495 ha the Qbar greenfield discharge rate has been identified as being 4 l/s/ha, which when applied to the post development impermeable area of 1.495 ha equates to a post development allowable discharge rate of 6.0 l/s.

Appendix D includes the Micro Drainage Calculation of the greenfield run off rate.

4.6 PROPOSED MITIGATION

4.6.1 Flood Risk due to Surface Water Runoff from the Site

In order to ensure that surface water runoff from the site does not cause an increase in flood risk, the management of runoff has been considered via a sequential approach, in line with Building Regulations. The following options for the disposal of surface water runoff were considered, in order of preference²:

- i) A soakaway or some other infiltration system;
- ii) A watercourse;
- iii) A sewer.

4.5.1.1 Discharge to soakaway

The site investigation information for the site identified that the underlying ground consisted of silty and stiff clays and therefore infiltration is considered to be unfeasible to drain the surface water run-off from the development.

² Building Regulations H3(3), Rainwater drainage



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4.7.1.2 Discharge to Watercourse

The nearest watercourse is approximately 580m to the south of the site, south of the A61/abandoned railway bridge. The option of utilising this watercourse is considered further in Section 4.7.

4.6.1.3 Discharge to Sewer

The only sewers which could be utilised to drain the development are either the existing 225mm diameter highway drain or alternatively the existing Yorkshire Water 225mm diameter combined sewer, both of which are located to the west of Wakefield Road.

Barnsley Council as Highways Authority indicated that surface water runoff from the site cannot be accepted into the existing highway drain.

A consultation was issued to YW to seek their views in a discharge of surface water runoff from the proposed development to the combined sewer in Wakefield Rd and this confirmed that surface water could not be drained to the existing combined sewer.

A copy of the relevant correspondence with Barnsley MBC is included in Appendix E.

4.7 SURFACE WATER DRAINAGE STRATEGY

Following further investigation and discussions with Yorkshire Water and Barnsley Highways, it is now proposed to either enlarge and relay the existing highway drain or alternatively lay a new surface water sewer parallel to the existing highway drain with a new outfall being constructed to the existing watercourse to the south of the Wakefield Road railway bridge.

For either option it is proposed that the existing or new surface water sewer will be adopted by Yorkshire Water under a Section 104 agreement.

To serve the proposed residential development and the retail site and the to the south, it is proposed to construct a new surface water sewer connection into the south western part of the retail site. From this manhole the drainage will then split with one leg draining the retail site and another spur serving the future residential development to the north.

The residential site will be drained via a gravity surface water drainage system draining to the south eastern part of the site. From here the surface water will be attenuated by means of a concrete storage tank with the outflow controlled by a pumped system rated at 6 l/s and a new rising main laid within the site highways and discharging into the new connection laid within the north western part of the Lidl site.

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4.7.1 Required Attenuation Volumes

Table 3 below includes the required attenuation volume to be provided to make sure that there is no flooding within the site during any rainfall event up to and including the 1 in 100 year plus 30% climate change event and will be stored within the below ground cellular storage tanks located within the proposed car parking areas.

Within the site the attenuation is to be provided by means of either an open detention pond, below ground storage tanks or oversized sewers or a combination of all three with any detention pond or tanks being located within the green space located along the eastern boundary.

Table 3 – Estimated Attenuation Volumes

Impermeable Area including 10%urban creep (ha)	Option	Discharge Rate (l/s)	Required 1 in 30 year volume (m³)	Required 1 in 100 year + CC volume (m³)
1.65	Discharge to Sewer and then Watercourse	6.0	395	781

The proposed surface water drainage strategy is contained in Appendix F. Appendix G includes the supporting Micro Drainage quick storage estimates.

4.8 MINIMUM FINISHED FLOOR LEVELS & OVERLAND FLOOD ROUTE

In setting the final external levels for the development it is important to ensure that if flows in exceedance of the 1 in 100 years plus 30% allowance for climate change storm event occur or a failure of the site surface water drainage system occurs, that suitable overland flood routes are provided within the development to ensure no localised flooding of the buildings occurs within the development.

It is therefore proposed to direct overland surface water flows to the east of the application site, given that the site naturally drains in that direction. The site levels and layout will be set in order to maintain an overland surface water flood path through the development. Additionally, it is proposed that the finished floor levels of the new buildings are to be set 150mm above the average ground level, which will ensure that in the event of extensive overland flows, no flooding of the buildings will occur. Additionally, by installing a suitable surface water drainage system, this should deal with any potential surface water flooding issues on site.



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4.9 RESIDUAL FLOOD RISK

If the above mitigation measures are provided as part of the development, it is considered that the primary residual failure would be as a result of some type of failure of the site drainage system during the life of the development. Regular, ongoing maintenance will therefore be required to ensure that the capacity of the system is maintained as it has been designed.

In addition, as discussed above there remains a residual risk of a storm event that exceeds the capacity of the drainage system, as events beyond the 1 in 100 year plus 30% allowance for climate change storm event will not be catered for explicitly.

4.10 FUTURE MAINTENANCE RESPONSIBILITIES

It is anticipated that upon completion of the development the surface water sewers will be adopted under a Section 104 agreement with Yorkshire Water, responsibility for the maintenance of the new surface water drainage systems will eventually be with YW. In the event that the drainage systems remains private, a management company will be appointed to undertake the required maintenance responsibilities.

Maintenance and adoption of SUDs will be covered in Section 5.

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5 SUDS

5.1 SUDS AND DESIGN PRINCIPLES

It is proposed to incorporate a fully compliant SUDS strategy where economically viable³ in relation to the discharge of surface water drainage from the proposed development.

This section will also seek to identify some of the SUDS systems and techniques which are to be considered and reviewed as part of the proposed detailed surface water drainage design and subsequent planning application for the development site.

5.1.1 The SUDS Management Train

The overarching principles of a SUDS system are to minimise the impacts arising from the development on the quantity and quality of the development surface water run-off, whilst at the same time replicating the natural drainage from the site before development.

SUDS key objectives are to minimise the impacts from the development on the quantity and quality of run-off and to maximise amenity and biodiversity opportunities.

The accepted SUDS management train consists of three elements:

Source Control

- Water butts, green roofs, filter drains, pervious surfaces, swales, rain water harvesting

Site Control

- Swales, ponds, wetlands, infiltration devices

Regional Control

- Basins, ponds and wetlands
- Reservoirs

The following is an illustration of these principles and how they may be applied to a development via a SUDS Management Train.



³ Reasonable and “what is reasonably practical” is as set out within paragraphs 082,083,084 and 085 of the PPG (Flood Risk & Coastal Change) and compliance with the Technical Standards (i.e. DEFRA Non Statutory Technical Standards for Sustainable Drainage) will be regarded as not practical, if the cost of compliance exceeds the cost of compliance with Building Regulations (unless compliance is necessary where there is a risk of flooding requiring the development to be safe and to avoid flood risk elsewhere).

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Various methods are currently available for source, site and regional control. A review has been undertaken of how best the various systems and sub techniques could be incorporated into the proposed surface water management design and these are set out below:

Table 4 – Review of SuDS elements

Type of SUDS		Description	Applicability to the Site
Source Control	Water butts	Small storage tanks on each individual housing plot	This is appropriate for the site.
	Rain water harvesting	Recycling of water from roofs and impermeable areas.	This could be appropriate for the site.
	Green roofs	Vegetated roofs that reduce runoff and remove pollutants.	This is not appropriate for the site.
	Pervious surfaces	Surfaces that allow surface water inflow into underlying surfaces.	This could to be appropriate for the site.
	Rain Gardens	Shallow depressions with free draining soil and planted with vegetation that withstands occasional flooding	This could be appropriate for the site.
Site & Regional Control	Filter drains	Linear drains or trenches filled with granular material that allow infiltration to the surrounding ground.	This is not appropriate for the site.
	Swales	Vegetated channels to convey store and treat runoff.	This is likely to be appropriate for the site.
	Basins/ponds	Shallow areas of open space that temporarily hold water and collect silt.	This is likely to be appropriate for the site.
	Infiltration basin	Shallow depression that stores runoff before it infiltrates into the subsoil.	This is not appropriate for the site.
	Infiltration devices	Generally granular trenches or soakaways that store water and allow infiltration to the surrounding ground.	This is not appropriate for the site.

As the proposed SUDS strategy will only be seeking to utilise source and site wide methods, regional methods have not been considered.



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5.2 PROPOSED SURFACE WATER DRAINAGE PRINCIPLES

As discussed in Section 4, the surface water drainage strategy seeks to dispose of surface water through the use of either a detention basin or below ground tanks and either a connection off site to a watercourse or to an existing sewer.

Details of typical SUDS features that could be incorporated into the future detailed surface water drainage design are contained in Appendix G.

The individual elements of the surface water drainage systems potentially suitable for the site are discussed in more detail below:

Permeable Paving

Permeable Paving is a type of paving designed to allow run off to seep into its internal structure, and thus can provide an element of water attenuation and water quality benefits. Permeable paving can be designed to either discharge surface water to an on - site sewer system, with an impermeable surround to prevent infiltration of water into the ground, or can be designed to allow water to infiltrate into the ground via a permeable membrane. Permeable paving may be suitable for adopted and un adopted highways, car parking areas etc. and will provide water quality benefits.

Detention Basin

Detention ponds (also known as detention basins) are dry basins that attenuate storm water run-off by providing temporary storage and controlled release of detained runoff. They are normally vegetated depressions (i.e. grass) that remain mainly dry, except during and immediately after storm events. The detention pond may also incorporate a small permanent pool of water at the outlet to prevent re-suspension of sediment particles by high intensity storms and to provide enhanced water quality treatment for frequent storm events.

Lined detention ponds may be provided with a maximum depth of no more than 1.5m, and side slopes of approximately 1 in 3, and subject to the final design, may incorporate shallow ledges.

The ponds will be designed to incorporate a shallow dish section within the central part to allow low flows to drain to the outfall. At times of high rainfall the pond will fill up to provide the required attenuation and then drain down to maintain a grassed area for general amenity use.

The ponds can be designed to be infiltrative or non-infiltrative, depending on the ground permeability and susceptibility to pollution.



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In order to provide access for maintenance to the ponds inlet and outlet structures, vehicular access will be provided around the structure utilising a grass grid or similar pavement system.

Filter Drains

Filter trenches or drains are shallow trenches filled with gravel that provide attenuation, storage and filtration to surface water runoff. The filter material can be located directly on a trench or a structural concrete trench can be provided. Depending on the ground conditions, infiltration may take place from the filter drain. If infiltration is not feasible, a perforated pipe can be provided to convey surface water runoff to another SuDS feature or to the discharge point of the system.

Swales

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can create low flow velocities so much of the suspended particulate load in the surface water run-off settles out, thus providing effective pollutant removal. Additionally, assuming ground conditions permit, they can be designed to allow infiltration and could be incorporated across the site, space allowing. The swales would be shallow (i.e. 1m deep) depressions with a grass finish and where ground conditions permit an element of infiltration incorporated within stone basal layer.

Rainwater Harvesting and Water Butts

The use of rainwater butts and rainwater recycling could be promoted in residential areas in order to reduce runoff and to minimise water consumption.

5.3 WATER QUALITY

In accordance with the SuDS manual, the effectiveness removing pollutants varies depending on the SuDS element. Given the size of the proposed development, it is expected that a SuDS treatment train formed by two elements will provide the required treatment to surface water runoff, according to Table 26.2 of the SuDS Manual.

Reviewing the SUDS options, set out within Section 5.2, it can be demonstrated that at least three levels of treatment may be possible with these being provided by the following systems:

- a) Permeable Paving;
- b) Swales with Basal Stone Layer;
- c) Detention/Infiltration Ponds



Flood Risk & Drainage Assessment

It is recommended that any future detailed surface water drainage design for the development site should provide at least two levels of treatment in respect of water quality where possible. Although possible options have been stated above, alternative SUDS options may also be considered during the detailed design stage which achieves the same water quality objective.

Provided that the above two levels of treatment are provided then there should be no reduction in the overall water quality of the receiving aquifer, however consideration should also be made as to the overall water quality objectives of the existing watercourses in particular any downstream ecologically sensitive areas (e.g. SSSI) that may be affected by a change in the water quality regime.

5.4 FUTURE SUDS MAINTENANCE RESPONSIBILITIES

As stated previously it is anticipated that the main sewers within the application site will be adopted under a Section 104 agreement with Yorkshire Water and therefore the maintenance of these elements will be undertaken by Yorkshire Water.

In respect to the detention basins and any other SUDs elements provided within the application site, these will initially be undertaken by the Developer and subsequently a Management Company, will be set up and be funded by each house owner. This requirement will be incorporated into the deeds of each property so that as and when the houses are sold, the requirement to fund the Maintenance Company is transferred to the new owner. The maintenance of any SuDS within the individual plots will be undertaken by each home owner.

The Maintenance Company will establish a regular inspection and maintenance schedule, which will not only cover the surface water and flood measures, but will also include the maintenance of the landscaped areas

It is proposed that the full inspection and maintenance schedule will be provided, at a later date to discharge the relevant planning condition.

Table 5 below shows the maintenance requirements of each of the proposed SuDS elements for the scheme.

Flood Risk & Drainage Assessment



Table 5 - Maintenance tasks and frequency required

SuDS element	Maintenance Task	Recommended Frequency
Ponds/Basins	Remove litter and debris Cut grass & vegetation management Inspect inlets, outlets and structures Remove sediments from inlet and outlet Prune and trim trees Remove sediments from main basin Repair erosion and other damages Relevel surfaces	Monthly Monthly in Spring and Summer or as required Every 12 months Every 5 years As required
Permeable Pavements	Brushing and vacuuming Weed removal Rehabilitation of surface and upper substructure Remediation of depressions and cracked blocks Remediation of landscaping.	Every 12 months Every 12 months As required As required As required As required



Flood Risk & Drainage Assessment

6 FOUL DRAINAGE ASSESSMENT

6.1 EXISTING FOUL DRAINAGE

As stated within Section 2.2.3 there is a 225mm diameter sewer immediately to the west of Wakefield Road.

A copy of the sewer records received from YW is contained in Appendix C.

6.2 PROPOSED FOUL DRAINAGE STRATEGY

The application site is to consist of up to 82 residential units. Based on a peak flow of 0.0462 l/s per residential unit (refer to Sewers for Adoption 6th Edition), the peak foul flow has been assessed as being 3.8 l/s.

In relation to the proposed foul drainage solution to be adopted for this site, it is proposed that the foul drainage will drain by gravity to the south eastern corner where it will then be pumped up along the new highway network before discharging into the new spur to be constructed as part of the adjacent retail development to the south.

Yorkshire Water indicated in their response to the pre-development enquiry that the foul flows from the proposed development for both sites can be accepted into the existing 225mm diameter combined sewer located to the west of Wakefield Road and a copy of this approval is contained within Appendix H.

Further discussions are ongoing with Yorkshire Water as to the remedial works associated with utilising the existing connection, or alternatively constructing a short section of new foul sewer along Wakefield Road and connecting onto the Yorkshire Water sewer where it is not located within any private gardens.



Flood Risk & Drainage Assessment

7 CONSENTS REQUIRED

7.1 WATER INDUSTRY ACT 1991

7.1.1 Section 98

In the event that it is not possible to adopt the proposed surface water connection points as identified within Section 4, then an off site surface water connection could be provided by means of a sewer requisition to be submitted to Yorkshire Water under Section 98 application of the Water Industry Act 1991.

7.1.2 Section 106

Any new connection to the Yorkshire Water public sewer system will require a Section 106 application under the Water Industry Act 1991.

7.1.3 Section 104

The foul and surface water system within the proposed development is to be constructed to adoptable standards such that it can at a future date be adopted by YW. As such, the proposed foul and surface water sewers will be subject to an agreement under S104 of the Water Industry Act 1991.

7.2 OFF SITE SURFACE WATER SEWER

Where it is required to construct a new sewer through land owned by Barnsley MBC to the south of the Wakefield Road railway bridge, then approval will be required from the land owner (Barnsley MBC) to lay the sewer and also from the riparian owner of the receiving watercourse (Barnsley MBC) to facilitate the works.

This process is ongoing and subject to the results of the proposed CCTV drainage investigations as to the outfall and route of the existing Wakefield MBC highway drain.

8 CONCLUSIONS & RECOMMENDATIONS

8.1 CONCLUSIONS

This report has identified the following conclusions:

1. The foul and surface water drainage for the new residential development is to be developed in conjunction with the proposed detailed planning application for the adjacent retail development immediately to the south of the application site.
2. The development site is shown on the EA Statutory Flood Maps for Planning as being entirely within Flood Zone 1.
3. The proposed development is to consist of up to 82 new residential units together with associated infrastructure and landscaping on the 3.67 ha site.
4. The site is classified as brownfield as it was previously occupied by a now demolished industrial unit.
5. The existing & proposed developments are classified as 'More Vulnerable' according to Table 2 of the NPPG (Flood Risk & Coastal Change).
6. The existing site falls from north west to south east with a lower plateau where the former industrial unit was located being present within the southern part of the site.
7. The nearest main river to the application site (as listed on the EA Flood Map for Planning) is the River Dearne which flows 1.8km to the south west of the site.
8. The nearest watercourse is located approximately 580m to the south of the application site.
9. There are no historical records of any flooding within the application site.
10. The application site is considered to be at low risk of flooding from rivers, surface water, sewers, overland flows, groundwater, and reservoir failure.
11. The application site is underlain by silty stiff clays as identified by the site investigation study and deemed unsuitable to utilize infiltration techniques to drain the surface water run-off from the development.
12. The existing pre development greenfield Qbar discharge rate is estimated to be 6.0 l/s, and has been adopted in assessing the on site attenuation should a discharge to a watercourse be adopted.
13. Following further investigation and discussions with Yorkshire Water and Barnsley Highways, it is now proposed to either enlarge and relay the existing highway drain located to the west of Wakefield Road or alternatively lay a new surface water sewer parallel to the existing highway drain with a new outfall being constructed to the existing watercourse to the south of the Wakefield Road railway bridge.
14. For either option it is proposed that the existing or new surface water sewer will be adopted by Yorkshire Water under a Section 104 agreement.

Flood Risk & Drainage Assessment



15. To serve the retail site and the proposed residential development to the north, it is proposed to construct a new surface water sewer connection into the south western part of the site. From this manhole the drainage will then split with one leg draining the retail site and another spur serving the future residential development to the north.
16. The required attenuation storage will be provided by means of underground cellular storage tanks, over sized pipework or detention basins located within application site.
17. Based on a pumped solution with a maximum pumping rate of 6 l/s, the estimated 1 in 30-year storage volume has been calculated as being 385m³ and an additional exceedance volume of 1,139m³ being required, which will be provided by allowing the external car parking areas to flood with the site levels set to ensure that this exceedance volume is retained with the site boundary.
18. Based on a gravity discharge to the existing watercourse at a rate of 8.8 l/s the estimated 1 in 30 year storage volume has been calculated as being 986m³ and an additional exceedance volume of 396m³ being required, which will be provided by either a larger storage tank or where the final site levels permit allowing the external car parking areas to flood with the site levels set to ensure that this exceedance volume is retained with the site boundary.
19. It is proposed to provide SuDS elements such as swales, permeable pavements and detention basins to provide the required attenuation within the site.
20. Foul flows will drain to the Yorkshire Water sewer located to the west of Wakefield Road.
21. Yorkshire Water have accepted that the total foul flows from both the new retail store and the proposed residential development can be discharge d to the existing 225mm diameter combined sewer located to the west of Wakefield Road.

8.2 RECOMMENDATIONS

Based on the above, the following recommendations are made:

1. Finished Floor Levels of the new buildings are to be set at 150mm above the average ground level to ensure that in the event of exceedance events causing overland flows within the development, no flooding of the properties will occur.
2. The final site layout and drain age design shall seek to maximise the use of SUDs techniques as outlined within this assessment.
3. Further surveys and investigation is required to confirm the outfall location of the existing Barnsley MBC highway drain.
4. Following resolution of the above, a scheme shall be prepared for either upgrading and relaying the existing highway drain or laying a new off site surface water drainage sewer along Wakefield Road eventually discharging into the existing watercourse to the south of the Wakefield Road railway bridge.
5. On completion, a regular inspection & maintenance regime is to be provided for the proposed components of the drainage system.
6. Further discussions are required with Yorkshire Water as to the remedial works associated with utilising the existing connection, or alternatively constructing a short section of new foul sewer along

Flood Risk & Drainage Assessment



Wakefield Road and connecting onto the Yorkshire Water sewer where it is not located within any private gardens.



APPENDIX A

Indicative Masterplan

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DO NOT SCALE!
ALL DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE WORK COMMENCES

SUBJECT TO TITLE PLAN CHECK

SUBJECT TO HGV TRACKING CHECK

BASED ON LIDL PRESENTATION BROCHURE DATED 28.04.17

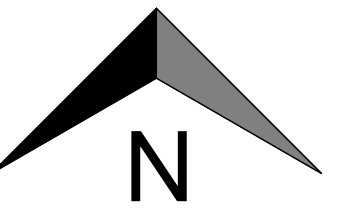
SUBJECT TO TOPOGRAPHICAL SURVEY

SUBJECT TO REVIEW OF LEVELS AND FALLS

SUBJECT TO CONFIRMATION OF CAR CHARGING POINT REQUIREMENT

SUBJECT TO LIGHTING PLAN

IN ACCORDANCE WITH SCON BBS 2017
(RECEIVED 27.04.2017)



Residual Hazard Register:
HGV Tracking
Pedestrian movements within car park.

Rev.	Date	Description	Drawn
------	------	-------------	-------

htcarchitects

York Place Studio
8 Britannia Street
Leeds
LS1 2DZ
T: (0113) 244 3457

W: www.htcarchitects.co.uk
E: info@htcarchitects.co.uk

client
Lidl UK GmbH



project
**New Store
Wakefield Road,
Mapplewell**

drawing title
Proposed Masterplan

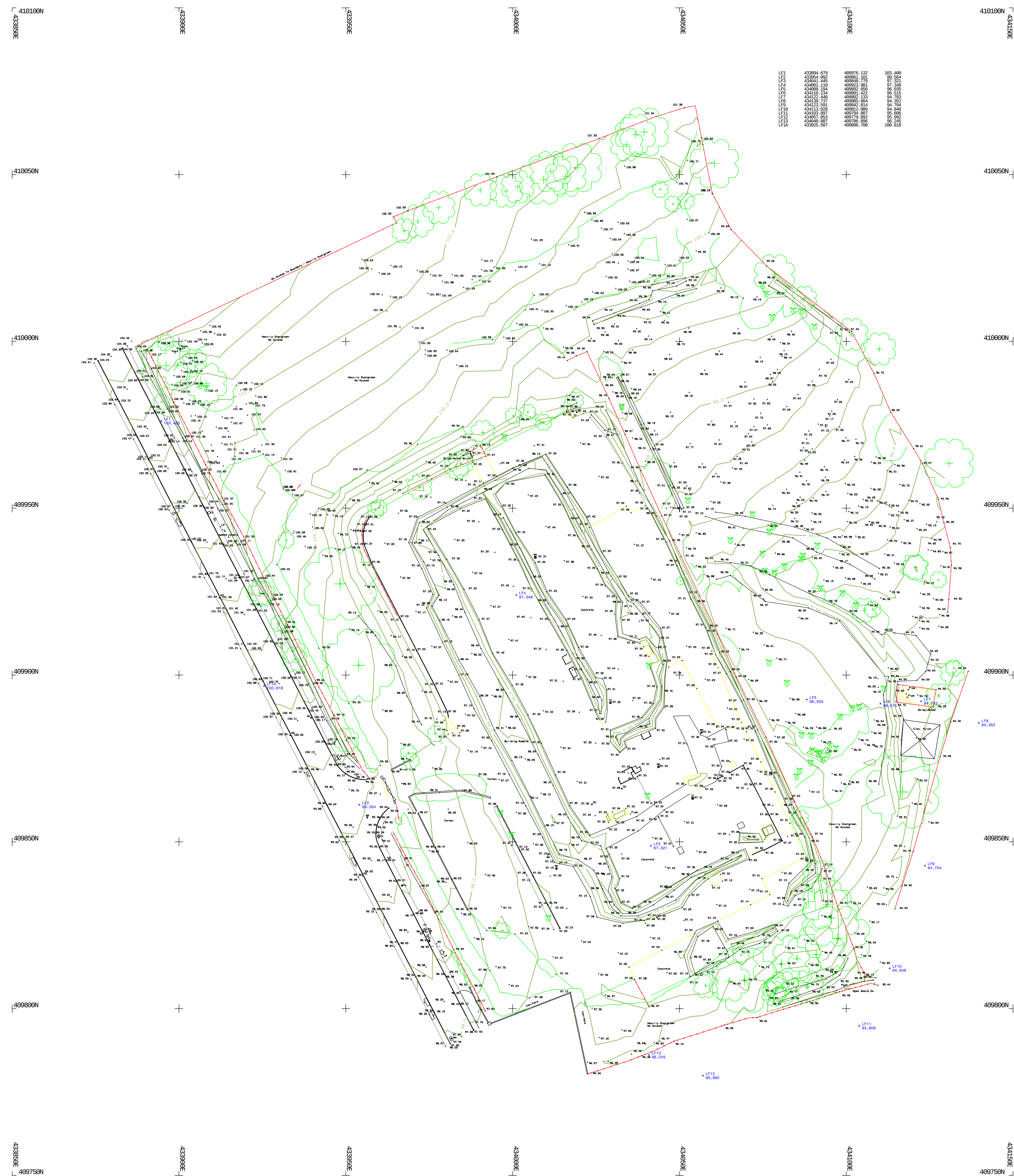
date	May 2017
status	Feasibility Issue
scale	1:500 @ A1
drawn	AB checked DW
job no.	1744 dwg no. 31 rev. -

Development Site Area (sq m)	45,249 sq m
Red Line Site Area (sq m)	9,098 sq m
Green Line Boundary Area (sq m)	2,316 sq m
Store Type Reference	Type 1300 Store
Sales Areas (sq m)	1325
Number of Aisles	5 Aisle
G/F GIA (sq m)	2125
Building footprint (ex canopy) (sq m)	2206
Building footprint (inc canopy) (sq m)	2403
Lidl Car Park Spaces	136



APPENDIX B

Topographic Survey and Utility Survey



Legend			
SE	SE LARSEN	EC	INJECTION CODE
SE	NO STEP	DL	INVEST LIVES
LP	SCHEMATA	LP	LAMP POST
EF	TELECOMM CODE	MF	MAGNETIC
CL	CONCRETE	AG	AGRICULTURE
CEU	CEMENT	PF	POST BOX
SE	CONCRETE	BS	BUS
GC	CONCRETE	RS	ROCKING CHAIR
EC	ELECTRIC CODE	SV	SHIRT
EP	ELECTRIC CODE	DF	DRY RAIN
EC	ELECTRIC CODE	EC	ELECTRIC CODE
EC	ELECTRIC CODE	TP	TRUCK
PF	FLORIDA CODE	TV	TELEVISION
GS	GRASS	UTL	UTILITY LIGHT
OMK	OMK MARKER	AM	AMERICAN
SU	SUN	SV	SHIRT
		SP	SPEAKER

LEVELS SHOWN ARE SET TO CORRESPOND SURVEY GPS COORDINATES

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Assumptions are summarized with the stated notes to the drawing.



APPENDIX C

YW Sewer Record



433766 : 409754	Map Name : SE3309NE	Title
Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582 (Dd) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HM30 © Crown copyright and database 2016. All rights reserved Ordnance Survey Licence number 100020432		Notes Partial Key Road Sewer = R Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS This plan is furnished as a general guide only and no warranty as to its completeness 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 connections are shown. Date Req : 17/06/2017, 10:48:48 Date Gen : 17/08/2017, 10:48:55 Source : Sewer Network Enquiry



APPENDIX D

Correspondence with Barnsley MBC LLFA

francisco.aguilar

From: Atkins , Wayne <WayneAtkins@barnsley.gov.uk>
Sent: 22 August 2017 09:19
To: francisco.aguilar
Cc: Grayson , Ian
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Francisco,

Unfortunately Barnsley MBC Highways Department have a policy of not accepting flows from private developments in the Highway Drainage Network due to issues with ownership and responsibility for repair and possible pollution incidents in the future.

Regards

Wayne Atkins
Principal Engineer – Drainage
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: francisco.aguilar [mailto:francisco.aguilar@wyg.com]
Sent: 21 August 2017 10:57
To: Atkins , Wayne
Cc: Grayson , Ian
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Hello Wayne,

As we just discussed, YW has indicated that there is a 225mm diameter highway drain under the A61 in Mapplewell as shown in the attached plan.

Could you please indicate if Barnsley Council as Highway Authority would accept the discharge of surface water runoff from the proposed developments into this highway drain?

Thank you for your help

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our [brochure](#)

WYG
Arndale Court, Headingley, Leeds, West Yorkshire, LS6 2UJ
Tel: +44 113 219 2284

www.wyg.com

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Registered Office: Arndale Court, Otley Road, Headingley, Leeds, West Yorkshire LS6 2UJ VAT No: 431-0326-08.



From: Atkins , Wayne [<mailto:WayneAtkins@barnsley.gov.uk>]
Sent: 16 August 2017 10:39
To: francisco.aguilar <francisco.aguilar@wyg.com>
Cc: Grayson , Ian <iangrayson@barnsley.gov.uk>
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Francisco,

Unfortunately there is no watercourse under Wakefield Road at this location. Surface water from part of the old factory discharged down the adjacent railway embankment into the old signal ducting, since the railway bridge under Wakefield Road was infilled this now causes flooding issues to the public footpath on the old railway line.

Obviously this situation cannot be mimicked by your proposal and you will need to find an alternative outfall for surface water from the site.

Regards

Wayne Atkins
Principal Engineer – Drainage
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: francisco.aguilar [<mailto:francisco.aguilar@wyg.com>]
Sent: 08 August 2017 14:52
To: Atkins , Wayne
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi Wayne,

Apologies for that. I attach the proposed masterplan that indicates the site location with the OS background.

Thank you

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our [brochure](#)

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Tel: +44 113 219 2284



From: Atkins , Wayne [<mailto:WayneAtkins@barnsley.gov.uk>]
Sent: 08 August 2017 14:33
To: francisco.aguilar <francisco.aguilar@wyg.com>
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi,

There is no location plan attached to your enquiry, please can you send one.

Thanks

Wayne Atkins
Principal Engineer – Drainage
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: HighwayDrainage
Sent: 08 August 2017 10:40
To: Atkins , Wayne
Subject: FW: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi Wayne

Just confirm for me please and ill send the forms out.

Kim Fox

Network Resilience Technical Assistant
Environment & Transport
Place Directorate
BMBC
Tel : 01226 773589
Email: kimfox@barnsley.gov.uk

From: francisco.aguilar [<mailto:francisco.aguilar@wyg.com>]
Sent: 08 August 2017 10:28
To: HighwayDrainage
Cc: tom.beavis
Subject: Ordinary Watercourse in Wakefield Road, Mapplewell

Dear Sir/Madame,

We have been commissioned to undertake a Flood Risk Assessment to support a planning application for the development of a new Lidl store and a residential development on a brownfield site adjacent to the A61 – Wakefield Road in Mapplewell. Please find attached a location plan for convenience.

Yorkshire Water has advised in their response to our pre – development enquiry that there is a culverted watercourse under Wakefield Road. Could you please confirm if this is the case, and provide details of the watercourse? This would be our preferred discharge point for surface water runoff from the development in the event that infiltration proves to be unfeasible.

Assuming that this watercourse exists, we would be grateful if you could advise if Barnsley Council has enabled any local regulations regarding ordinary watercourse in addition to the Land Drainage Act 1991; and if there are any records of flooding in the location or additional information that we may need to be aware of.

Thank you for your help,

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our [brochure](#)

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From: Atkins , Wayne <WayneAtkins@barnsley.gov.uk>
Sent: 20 December 2017 10:15
To: tom.beavis
Cc: francisco.aguilar; Gary.Rafferty@lidl.co.uk
Subject: RE: Proposed development at Wakefield Road in Mapplewell- Discharge to highway drainage.

Tom,

As stated previously to Francisco, we do not allow flows from private developments into the Highway Drainage system. In particular in this area we already have flooding issues with the Highway Drainage system so therefore believe there are issues with either the capacity of the drain or with damage to the drain therefore we can not allow additional flows into this drain.

I am unaware of where this drain outfalls but if YW state that it connects into the sewage system and are obviously happy with you discharging 5 l/s into the system I would suggest you ask them for permission to connect into one their sewers in the area which discharges to the same system.

I understand the issue with laying a sewer to the local watercourse but with regard to access to third party land I would suggest going through YW's requisition process where their powers of entry can be used.

Regards

Wayne Atkins
Principal Engineer – Drainage
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

E-mail: wayneatkins@barnsley.gov.uk

From: tom.beavis [mailto:tom.beavis@wyg.com]
Sent: 18 December 2017 16:06
To: Atkins , Wayne
Cc: francisco.aguilar; Gary.Rafferty@lidl.co.uk
Subject: Proposed development at Wakefield Road in Mapplewell- Discharge to highway drainage.

Wayne

I refer to previous correspondence you have had with Francisco Aguilar on the above site, in which we requested a connection to the existing 225mm diameter highway drain that drains along the west of Wakefield Road and I understand eventually discharges into the Yorkshire Water surface water system further south.

Can you please provide a copy of your highway drainage records for the area which show the point of connection to the YW sewer system as at present we do not have these

In your response to Francisco, you stated that Barnsley MBC Highways Department have a policy of not accepting flows from private developments in the Highway Drainage Network due to issues with ownership and responsibility for repair and possible pollution incidents in the future.

Following further investigations we have identified that the use of infiltration and the site is underlain by very silty clays so infiltration not viable. The only other alternative is to lay a long off site sewer along the old railway line (up to 580m) and discharge into a local watercourse, however, this will involve crossing third party land as well and obtaining such an agreement may not be possible.

Having further discussed the matter with Yorkshire Water and bearing in mind there are no economic alternatives, they have proposed that we use Section 115 of the Highways Act to allow the additional flows of 5 l/s (or greater if

possible) to be drained into the existing 225mm diameter highway drain. Can you confirm if this would be an acceptable way forward and what if any, additional information you would require to progress this option.

It should be noted that there is a strong political pressure for the development to progress and bearing in mind that there are no reasonable alternative options for draining the surface water flows, can Barnsley MBC Highways reconsider our proposal.

If you wish to discuss any matter relating to the above please contact me on 0113 219 2292

Regards

Tom Beavis
Associate

For more information about WYG Engineering, please have a look at our [brochure](#)

WYG

Arndale Court, Headingley, Leeds, West Yorkshire, LS6 2UJ

Tel: +44 113 219 2292

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APPENDIX E

Greenfield Runoff Rates

WYG Group Limited		Page 1
. . .		
Date 02/08/2017 10:55 File	Designed by francisco.aguilar Checked by	
XP Solutions Source Control 2015.1		
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 2 Soil 0.450 Area (ha) 1.000 Urban 0.000 SAAR (mm) 652 Region Number Region 3 Results 1/s QBAR Rural 4.0 QBAR Urban 4.0 Q2 years 3.8 Q1 year 3.5 Q30 years 7.1 Q100 years 8.4		
©1982-2015 XP Solutions		



APPENDIX F

Proposed Indicative Drainage



Drainage Layout Plan (1:500)

Key:

Proposed Surface Water Drainage

Proposed Foul Water Drainage

Impermeable Area
Proposed Impermeable Area 14960m2

GREENFIELD RUN OFF (IH124 METHOD)

RURAL GREENFIELD RUN OFF @ 4.0ha - 6.0l/s

It is therefore proposed (subject to agreement) that surface water flows from the development be restricted to a peak flow of 6.0l/s.

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Notes:

1. This drawing is to be read in conjunction with all relevant architect's and engineer's drawings.

2. It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement.

RWP AND SVP/FOUL CONNECTIONS ARE SUBJECT TO FINAL CONFIRMATION BY ARCHITECT



Drainage Strategy

The site is located within flood zone 1 with a low risk of flooding from rivers or the sea.

The site is currently Greenfield. Calculations using IH124 method indicate the Greenfield run-off based on the site area is 6.0l/s.

Under SuDs guidance the first point of discharge for surface water is percolation via soakaway. It is proven that the ground conditions are not be suitable for soakaways. For details of the percolation test results please see report in site investigation.

NPPF guidelines require that surface water arising from a developed site should as far as practicable be managed in a sustainable manner to mimic the surface water flows arising from the site prior to development.

Surface Water:

Greenfield flow is calculated at 6.0l/s. Subject to agreement with LLFA

The proposed impermeable area is 14960m2. Based on a flow restriction of 6.0l/s and modelling using Micro Drainage software the attenuation requirement for a peak return period of 1 in 100year plus 30% climate change is **1030.2m3**.

Attenuation to be provided via **CARLOW CONCRETE TANK (27x15x2.5m Deep)**. The flows will be restricted to 6.0L/sec. The pump will act as a flow control devise.

Surface water sewer to connect into a new surface water sewer. Off site route to be confirmed.

Foul Water:

Foul from the site will be an adopted network which will gravitate to an adopted foul pumping station in the south east corner of the site. This will be pumped to an new adopted Foul sewer which will connect to the existing 225Ø foul sewer which runs adjacent to Wakefield Road in the rear of plots on Eastfield Crescent subject to a section 106 application with YW. Off site route and exact connection point to be confirmed.

A	Surface water layout revised	27-3-18	RTM
No.	Revision	Date	Drwn
Status			
TOPPING ENGINEERS CONSULTING CIVIL & STRUCTURAL ENGINEERS Windsor House, Cornwall Road Harrogate, HG1 2PW T: 01423 622 955 W: www.topping-engineers.com E: info@topping-engineers.com			
Client			
Netherton Building and Construction Ltd			
Project			
Former William Freeman Site Wakefield Road, Mapplewell			
Drawing title			
Drainage Strategy			
Drawn	RTM	Chkd	
Contract No.	17547	Date	Nov 2017
		Scale	var
		Revision	A



APPENDIX G

Supporting Micro Drainage Calculations

Topping Engineers Ltd					Page 1																																																																																																																																					
Windsor House Cornwall Road Harrogate HG1 2PW			Former William Freeman Site Watefield Road, Mapplewell Storage Check 6.0L/sec																																																																																																																																							
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Topping Engineers Ltd				Page 2	
Windsor House Cornwall Road Harrogate HG1 2PW		Former William Freeman Site Watefield Road, Mapplewell Storage Check 6.0L/sec			
Date 27/03/2018 File STORAGE CHECK 27.03.18		Designed by RTM Checked by			
Micro Drainage		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	8.979	1.479	6.0	610.1	O K
120 min Winter	9.305	1.805	6.0	744.6	O K
180 min Winter	9.487	1.987	6.0	819.6	O K
240 min Winter	9.603	2.103	6.0	867.6	O K
360 min Winter	9.755	2.255	6.0	930.3	O K
480 min Winter	9.853	2.353	6.0	970.4	O K
600 min Winter	9.916	2.416	6.0	996.6	O K
720 min Winter	9.957	2.457	6.0	1013.7	O K
960 min Winter	9.997	2.497	6.0	1030.2	O K
1440 min Winter	9.983	2.483	6.0	1024.1	O K
2160 min Winter	9.879	2.379	6.0	981.3	O K
2880 min Winter	9.764	2.264	6.0	933.9	O K
4320 min Winter	9.495	1.995	6.0	822.8	O K
5760 min Winter	9.219	1.719	6.0	709.2	O K
7200 min Winter	8.958	1.458	6.0	601.4	O K
8640 min Winter	8.723	1.223	6.0	504.5	O K
10080 min Winter	8.514	1.014	6.0	418.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	49.937	0.0	616.4	70	
120 min Winter	30.956	0.0	754.6	128	
180 min Winter	23.058	0.0	832.2	186	
240 min Winter	18.577	0.0	882.1	244	
360 min Winter	13.656	0.0	943.8	360	
480 min Winter	10.974	0.0	975.3	476	
600 min Winter	9.254	0.0	984.8	592	
720 min Winter	8.046	0.0	978.2	708	
960 min Winter	6.447	0.0	960.5	932	
1440 min Winter	4.709	0.0	924.4	1364	
2160 min Winter	3.432	0.0	1538.2	1712	
2880 min Winter	2.739	0.0	1621.3	2164	
4320 min Winter	1.989	0.0	1680.7	3072	
5760 min Winter	1.583	0.0	1908.6	3920	
7200 min Winter	1.325	0.0	1997.1	4696	
8640 min Winter	1.147	0.0	2074.0	5456	
10080 min Winter	1.015	0.0	2139.5	6160	
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Topping Engineers Ltd		Page 3																																																
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Topping Engineers Ltd		Page 4
Windsor House Cornwall Road Harrogate HG1 2PW	Former William Freeman Site Watefield Road, Mapplewell Storage Check 6.0L/sec	
Date 27/03/2018	Designed by RTM	
File STORAGE CHECK 27.03.18	Checked by	
Micro Drainage		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 11.000

Tank or Pond Structure

Invert Level (m) 7.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	412.5	2.000	412.5	2.600	0.0
1.000	412.5	2.500	412.5		

Pump Outflow Control

Invert Level (m) 7.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.500	6.0000	1.000	6.0000	1.500	6.0000	2.000	6.0000

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APPENDIX H

Typical SUDS Details

Flood Risk Assessment



1 Typical Swale Details



Photo showing possible use of swales to discharge housing run off

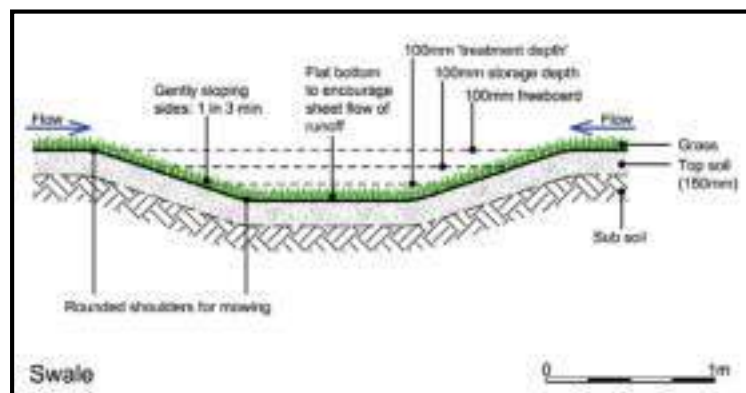


Photo showing typical swale located adjacent to highway

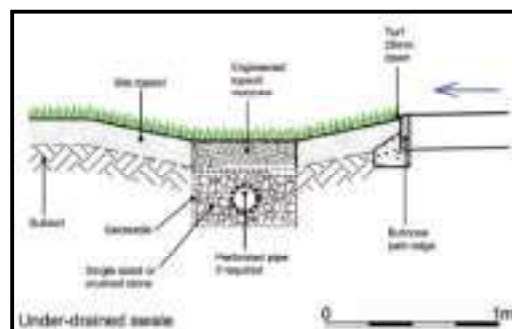
Flood Risk Assessment



Photo showing typical swale located within open space areas with footbridge.



Typical section through proposed swale.



Typical swale detail with infiltration trench at base

2 Typical Filter Strip Details



Photo showing edge of carriageway filter strip

3 Typical Edge of Carriageway Details

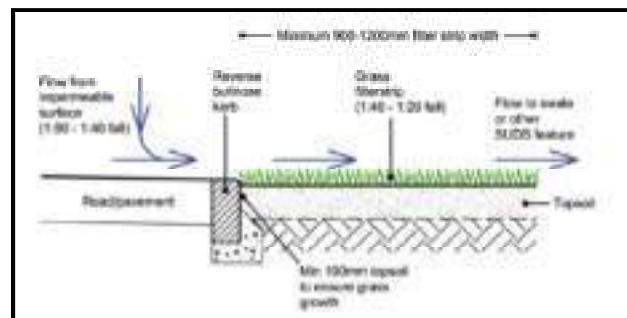


Photo showing edge of carriageway detail

Flood Risk Assessment



Photo showing gully into swale



Typical Detail showing edge of carriageway discharge to swale

4

Typical Detention Pond Details





APPENDIX I

YW Pre Development Enquiry

Mr F Aguilar
WYG Management Services Ltd
Arndale Court
Arndale Otley Road
Headingley
Leeds
LS6 2UJ

Yorkshire Water Services
Developer Services
Sewerage Technical Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482
Fax: (01274) 372 834

Your Ref: A104788
Our Ref: T012355

Email:
Technical.Sewerage@yorkshirewater.co.uk

For telephone enquiries ring:
Chris Roberts on 0345 120 8482

4th August 2017

Dear Mr Aguilar,

Wakefield Road, Mappelowell HU7 3GB - Pre Planning Sewerage Consultation on R649307 - RESIDENTIAL

Thank you for your recent enquiry. Our charge of £153.00 (plus VAT) will be added to your account with us, reference WYG074. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months.

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

Foul water domestic waste should discharge to the 225 mm diameter public foul sewer recorded in Wakefield Road, at a point to the west of the site.

Surface Water

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.

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, with regard to surface water disposal from the site.

It is understood that a culverted watercourse is located in Wakefield Road to the west of the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable).

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, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0345 120 84 82.

An off-site foul and surface water sewer 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 0345 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 0345 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 0345 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. No land drainage to be connected/discharged to public sewer.

As a last resort, highway drainage may be accepted under certain circumstances. If it can be demonstrated, through satisfactory evidence, that SUDS are not a viable option, there are no watercourses or highway drains available and if capacity is available within the public sewer network, highway drainage discharges to the public sewer network may be permitted. In this event, the developer may be required to enter into a formal agreement with Yorkshire Water Services under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

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 sincerely



Chris Roberts
Sewerage Technician
Developer Services

francisco.aguilar

From: Chris.Roberts@yorkshirewater.co.uk on behalf of technical.sewerage@yorkshirewater.co.uk
Sent: 29 August 2017 13:13
To: francisco.aguilar
Subject: Development Enquiry - Proposed LIDL and Residential Development in Wakefield Road, Mapplewell, Barnsley - R649307
Attachments: image001.png; image002.png; image003.png; image004.png; image005.png

Hi Francisco,

The 225 mm public foul sewer does not have any capacity available to accept any discharge of surface water. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority with a view to establishing a suitable watercourse for discharge.

Regards

Chris

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| From:   |
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| "francisco.aguilar" <francisco.aguilar@wyg.com>
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| To:     |
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| "technical.sewerage@yorkshirewater.co.uk" <technical.sewerage@yorkshirewater.co.uk>,
"Chris.Roberts@yorkshirewater.co.uk"
| <Chris.Roberts@yorkshirewater.co.uk>,
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>-----|
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| Cc:     |
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|-----|
| "tom.beavis" <tom.beavis@wyg.com>
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>-----|
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|----->
| Date:    |
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| 16/08/2017 10:46
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| Subject: |
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|RE: Development Enquiry - Proposed LIDL and Residential Development in Wakefield Road, Mapplewell, Barnsley
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Hi Chris,

Please find attached the email from Barnsley Council LLFA indicating that there is no nearby watercourse in Wakefield Road.

Infiltration tests will be carried out to assess the feasibility of infiltration (provided ground contamination is not an issue). However, could Yorkshire Water accept that if infiltration tests are unsuccessful, discharge from both the LIDL site and the new residential site could be discharged to the YW sewer in Wakefield road at greenfield runoff rates?

Thank you for your help

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our brochure

WYG
Arndale Court, Headingley, Leeds, West Yorkshire, LS6 2UJ
Tel: +44 113 219 2284

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Registered Office: Arndale Court, Otley Road, Headingley, Leeds, West Yorkshire LS6 2UJ VAT No: 431-0326-08.

-----Original Message-----

From: Chris.Roberts@yorkshirewater.co.uk [mailto:Chris.Roberts@yorkshirewater.co.uk] On Behalf Of technical.sewerage@yorkshirewater.co.uk
Sent: 04 August 2017 15:01
To: francisco.aguilar <francisco.aguilar@wyg.com>
Subject: Development Enquiry - Proposed LIDL and Residential Development in Wakefield Road, Mapplewell, Barnsley

Dear Francisco,

Please find my response below.

(See attached file: WAKE.pdf)(See attached file: roberts4_radEB0A8.PNG)

Regards

Chris Roberts
Sewerage Technical Team

Dear Sir/Madame,

Please find attached the completed form regarding a pre development enquiry on the site above. An indicative masterplan is also attached for convenience.

There are no watercourses near the site, and infiltration may not be a feasible discharge mechanism for surface water runoff. An investigation is being carried out to confirm whether soakaways would present a viable solution. We would like to obtain confirmation from YW that in the event that infiltration proves to be unfeasible, surface water can be discharged to the foul sewer under Wakefield Road, as it seems to act, according to records, as a combined sewer.

Foul water may require to be pumped as levels may not allow for a gravity connection.

Thank you for your help,

Regards,

Francisco Aguilar
Flood Risk & Drainage Engineer

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Tel: +44 113 219 2284

www.wyg.com

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Francisco,

Unfortunately there is no watercourse under Wakefield Road at this location. Surface water from part of the old factory discharged down the adjacent railway embankment into the old signal ducting, since the railway bridge under Wakefield Road was infilled this now causes flooding issues to the public footpath on the old railway line.

Obviously this situation cannot be mimicked by your proposal and you will need to find an alternative outfall for surface water from the site.

Regards

Wayne Atkins
Principal Engineer – Drainage

Environment & Transport

Place Directorate

Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: francisco.aguilar [mailto:francisco.aguilar@wyg.com]
Sent: 08 August 2017 14:52
To: Atkins , Wayne
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi Wayne,

Apologies for that. I attach the proposed masterplan that indicates the site location with the OS background.

Thank you

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our brochure<
http://www.wyg.com/uploads/files/discipline_brochures/WYG-Engineering-Brochure.pdf?utm_medium=email&utm_campaign=Engineering&utm_content=Brochure_Download&utm_source=Email_Footer
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><<https://twitter.com/wygggroup>><<http://www.linkedin.com/company/wyg-grou>
>p><
<https://www.facebook.com/WYG-216194275241716>><
<https://www.instagram.com/wygggroup/>>

From: Atkins , Wayne [<mailto:WayneAtkins@barnsley.gov.uk>]
Sent: 08 August 2017 14:33
To: francisco.aguilar <francisco.aguilar@wyg.com< <mailto:francisco.aguilar@wyg.com>>>
Subject: RE: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi,

There is no location plan attached to your enquiry, please can you send one.

Thanks

Wayne Atkins
Principal Engineer – Drainage

Environment & Transport

Place Directorate

Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk<<mailto:wayneatkins@barnsley.gov.uk>>

From: HighwayDrainage
Sent: 08 August 2017 10:40
To: Atkins , Wayne
Subject: FW: Ordinary Watercourse in Wakefield Road, Mapplewell

Hi Wayne

Just confirm for me please and ill send the forms out.

Kim Fox

Network Resilience Technical Assistant

Environment & Transport

Place Directorate

BMBC

Tel : 01226 773589

Email: kimfox@barnsley.gov.uk<<mailto:kimfox@barnsley.gov.uk>>

From: francisco.aguilar [<mailto:francisco.aguilar@wyg.com>]
Sent: 08 August 2017 10:28
To: HighwayDrainage
Cc: tom.beavis
Subject: Ordinary Watercourse in Wakefield Road, Mapplewell

Dear Sir/Madame,

We have been commissioned to undertake a Flood Risk Assessment to support a planning application for the development of a new Lidl store and a residential development on a brownfield site adjacent to the A61 – Wakefield Road in Mapplewell. Please find attached a location plan for convenience.

Yorkshire Water has advised in their response to our pre – development enquiry that there is a culverted watercourse under Wakefield Road. Could you please confirm if this is the case, and provide details of the watercourse? This would be our preferred discharge point for surface water runoff from the development in the event that infiltration proves to be unfeasible.

Assuming that this watercourse exists, we would be grateful if you could advise if Barnsley Council has enabled any local regulations regarding ordinary watercourse in addition to the Land Drainage Act 1991; and if there are any records of flooding in the location or additional information that we may need to be aware of.

Thank you for your help,

Regards

Francisco Aguilar
Flood Risk & Drainage Engineer

For more information about WYG Engineering, please have a look at our brochure<
http://www.wyg.com/uploads/files/discipline_brochures/WYG-Engineering-Brochure.pdf?utm_medium=email&utm_campaign=Engineering&utm_content=Brochure_Download&utm_source=Email_Footer
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