Harworth Estates Ltd

Proposed Development at Mapplewell Lane

North Gawber, Barnsley

Flood Risk and Runoff Assessment

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1 Executive Summary

Opus Joynes Pike (OJP) were commissioned to carry out a flood risk and run-off assessment for proposed residential development on land off Mapplewell Drive, Mapplewell, Barnsley.

The site has been assessed in accordance with the requirements of Planning Policy Statement 25 (PPS25) to identify the site specific flood risk for this area and determine the suitability of the proposed development for this site.

The site was identified from the Flood Zone information given on the Environment Agency website as within Flood Zone 1 (FZ1) an area of low fluvial flooding potential.

Furthermore, site drainage proposals will incorporate sustainable drainage techniques, wherever possible, and surface water attenuation will be used to control surface water run-off and limit flows from the proposed development.

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2 Introduction

The Government has placed increasing priority on the need to take full account of the risks associated with flooding at all stages of the planning and development process, to reduce future damage to property and loss of life. PPS25 Development and Flood Risk identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications.

The purpose of this report is to assist our client and the local Planning Authority to make an informed decision on the flood risks associated with the site redevelopment.

Local Planning Authorities have the powers to control development in accordance with the guidelines contained in PPS 25, and are expected to apply a risk-based approach to development with the sequential test in Annex D Table D.1. This sets out a sequential characterisation of flood risk in terms of annual probability of river, tidal and coastal flooding.

In accordance with the sequential test in PPS 25 sites are to be classed as follows:

Flood Zone	Appropriate Uses
Flood Zone 1 - Low Probability – This zone comprises land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%)	All uses of land are appropriate in this zone
Flood Zone 2 - Medium Probability – This zone comprises land assessed as having between 1in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 10000 annual probability of sea flooding (0.5%-0.1%) in any year	The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this Zone Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test is passed
Flood Zone 3a - High Probability – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	The water-compatible and less vulnerable uses of land in Table D.2 area appropriate in this zone. The highly vulnerable uses in Table D.2 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table D.2 should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this should be designed *and constructed to remain operational and safe for* users in time of flood.

Flood Zone 3b - Functional Floodplain – This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to: Remain operational and safe for users in times of flood; Result in no net loss of floodplain storage; Not impede water flows; and Not increase flood risk elsewhere. Essential infrastructure in this zone should pass the Exception Test.

3 Existing Site

3.1 Site Description

The site is located in the Barnsley suburb of Mapplewell, approximately 3.7km north west of Barnsley town centre.

The site is approximately 17.36ha in area and roughly rectangular in shape. It is centered on approximate National Grid Reference 433050, 409740.

A plan showing the location of the site is included in Appendix A.

The site lies some 0.6km to the north of the River Dearne.

Previously the site was part of Mapplewell Colliery. It is bounded by existing residential development along Spark Lane to the west, recent industrial development to the north along Mapplewell Drive, Carr Green Lane to the East and open grass land to the south.

The site has been subject to significant remediation works and various phases of landscaping over the years.

Topographical information for the existing site is included in Appendix C. This indicates that the site generally falls from north west to south east with various interceding banks and plateaus between.

The levels along the northern boundary vary from just over 96.0mAOD in the west to 89.0mAOD in the east. The southern boundary falls from 75.0mAOD in the west to 68.0mAOD in the east.

There are no developed areas within the boundaries of the site. It is therefore assumed that the existing site can be classified as 100% permeable.

3.2 Existing Site Drainage

There are two drainage ditches recorded within the boundary of the site. The largest ditch is approximately 500m long and flows west to east around 75m north of the southern boundary.

The second, significantly smaller ditch, is approximately 250m long and follows part of the eastern boundary.

A plan showing the routes of the existing ditches is included in Appendix F.

Both ditches have suffered marked deterioration over time. The larger ditch is also culverted for parts of its run. This ditch is fed by a 750mm diameter surface water pipe discharging adjacent to the football pitch in the north west of the site.

The smaller ditch appears to pick up only surface run-off from the existing site. It flows southwards and connects to the larger ditch towards the south east corner of the site.

3.3 Adopted Drainage

Correspondence received from Yorkshire Water is included in Appendix E. This confirms the surface water outfall to the north east of the site. It also indicates that a 450/525mm diameter combined sewer follows the western boundary crossing the site along the southern boundary.

Yorkshire Water have not indicated that there are flooding problems with their adopted assets in this area.

3.4 Land Drainage

It is also noted that the other ditches / land drains are located on the opposite side of the southern boundary.

These appear to connect to the same ditch system to which the site in question discharges.

This main system flows southwards from the area of the site and connects to the River Dearne, across open land to the south.

3.5 Redevelopment Proposals

An indicative development plan is included as Appendix H of this report.

The site masterplan shows the current indicative layout for outline planning purposes. The layout of the site is likely to evolve as the planning process progresses.

The development will yield approximately 3.04ha of site roads and private drives plus 2.50ha of roof area and driveways, giving a total of 5.54ha or 32% of the total site area.

It should be noted that a significant portion of the masterplan layout is devoted to the provision of green areas and open space which will also help to mitigate flooding issues within the development.

As it is to be developed as residential it will be classified as 'More Vulnerable' in accordance with PPS25 Annex D table D.2.

4 Sources and Extent of Existing Flooding

4.1 River Dearne

With reference to the Environment Agency's indicative flood plain information published on the internet (see Appendix B should this be D) the site can be classified as being in flood zone 1, an area of low fluvial flood risk.

4.2 Land Drainage

Correspondence received from Barnsley MBC indicates that the assets located to the west of the site have previously flooded, a copy of this response is included in Appendix D.

It is thought that the main cause of this flooding is the discharge from the public sewer, noted previously, and the lack of maintenance of the existing ditch across the site.

These factors have combined to cause flooding onto the public highway in Spark Lane. The extent and depth of this flood is not recorded.

4.3 Adopted Drainage

There are no specific issues related to the adopted drainage in this area although the combination of the surface water outfall and the poor condition of the existing drainage ditch does appear to be the cause of the flooding in Spark Lane.

4.4 Overland Flow

Due to the presence of the existing carriageways to the west, north and east the potential routes of overland flow will be intercepted by these roads and directed away from the development site.

4.5 Site Redevelopment

Potentially the redevelopment of the site could impact upon the flood profile in this area. The introduction of new impermeable areas and more effective drainage could increase the peak run-off from the site and the response of the system as a whole.

This may impact on the downstream infrastructure and will require mitigation.

5 Flood Risk Assessment

5.1 River Dearne

Given the distance of the site from the watercourse and the intervening topography the River Dearne is discounted as a flood risk for this site.

5.2 Land Drainage

The flood risk associated with the existing drainage ditches is principally the result of lack of maintenance and the subsequent deterioration of the system within the site.

The partial culverting of the ditch across the site also increases the flood risk locally.

The existing ditch sections, where they are still intact, have a base channel width of around 1.5m, a maximum depth of 1.6m with sides at around 1v in 1.5h. This gives a cross sectional area of approximately 5.5m^2.

It is thought that these ditch dimensions are more a result of the ad-hoc ground works on the site rather than describing the 'natural' profile. It is therefore necessary to make an assessment of the required capacity based on the anticipated inputs to the system.

The required capacity of the ditch will be a function of the potential flow from the surface water outfall and the estimated run-off from the existing greenfield site.

The 750mm diameter surface water outfall at the head of the ditch on site does not currently have any recorded level or gradient information. However, the two upstream manhole cover levels are recorded. Assuming that the invert fall matches the cover level fall, the pipe has an indicative gradient of 1v in 70h.

This assumption should be verified by further on-site investigation. At the minimum, and in lieu of any specific flow information from Yorkshire Water, the maximum gradient of the last three runs of the outfall should be measured and used to determine anticipated surface water input to the ditch.

Based on the above assumptions the anticipated flow from the 750mm diameter outfall will be approximately 1.5m^3s^{-1} (K_s=0.6mm).

The second element in determining the flow is the likely run-off from the existing site. The simplified method for assessing the anticipated run-off is to assume the standard 5l/s/ha as noted by BMBC (see correspondence in Appendix D) and factor this for the 1 in 100 year event.

The growth factor for Hydrological Region 4 for the 1 in 100 year event is 2.6, taken from Institute of Hydrology 124 Method. This gives a Q_{BAR} figure of (5 x 17.36ha) = 86.8l/s and Q_{100} = 225.7l/s.

The combined capacity of the drainage ditch would then be in the region of 1.7m^3s^{-1}. This should be modified to account for potential climate change to give a design flow capacity of 2.07m^3s^{-1}.

5.3 Adopted Drainage

Flood issues associated with the adopted drainage system in this area have been discussed as part of Section 5.2.

5.4 Site Redevelopment

The introduction of additional impermeable areas on any site will potentially increase the run-off response and flood risk of any downstream areas.

It is necessary to balance the run-off generated by the development to the capacity of the existing drainage systems such that there is no overall increase in flood risk and where possible to incorporate a reduction in flood risk locally.

The site currently drains by natural systems, with run-off into the ditches generated as overland flow.

It has been recommended by BMBC that a figure of 5l/s/ha is assumed for the allowable discharge rate for the development. Based on the overall areas identified in 3.5 this gives the following allowable discharge rate;

Development Area 17.4 x 5 = 87l/s

6 Run-Off Assessment

To mitigate any potential flood risk caused by the development and attributable to a possible increase in impermeable area, it is necessary to demonstrate that the site can be suitably drained and have no impact on the existing flood scenario.

The surface water drainage system should also seek to reduce flood risk, wherever possible, in addition to including mitigation measures against potential future climate change.

In this case the development of the site will increase the impermeable area footprint of the site and commensurately the potential run-off.

It is therefore proposed that the site will attenuate flows from the new developed areas prior to discharging to the existing adopted system crossing the site.

6.1 Control of Surface Water

Part H of the Building Regulations 2002 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

(a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,

(b) a watercourse, or, where that is not reasonably practicable,

(c) a sewer.

6.2 Infiltration Systems

With reference to Scott Doherty Associates Ltd – Ground Investigation Department dated March 2008, it is evident that the site it underlain by over 4m of made ground generally consisting of clay rich colliery spoil and waste material.

The borehole logs indicate that under this deposited material, the site lies on a band of weathered mudstone.

Given the identified ground conditions, the use of infiltration based systems would not be viable for this site.

6.3 Watercourse

The drainage ditches crossing the site are well suited for the discharge of surface water from the development.

They already receive run-off from the existing site and connect to an extensive network of other ditches flowing towards the River Dearne to the south.

6.4 Adopted Drainage

There are no adopted systems in the area suitable for the connection of surface water.

6.5 Mitigation Measures

As the adjacent drainage ditch is the only viable outfall location for the surface water system it will be necessary to attenuate run-off generated by the development to 1 in 100 years with an allowance for the impact of climate change, in accordance with PPS25.

For this preliminary design the outfall rate will be reduced by 20% in line with the requirements of PPS25 to give a design discharge rate of **70l/s** for the overall development.

Using the allowable discharge defined above, the estimated proposed impermeable area given in 3.5 (5.54ha) and FSR site characteristics of M5-60min = 19.0 and Ratio r = 0.38, the estimated volume of attenuation required for the development will be between 2169m^3 and 3075m^3.

The range of figures represents the myriad combinations of flow control device and storage structure available.

It is proposed that the existing drainage ditches receive some 'naturalisation' as part of the overall site development. This would include the localised reshaping and planting of the channels to produce a more integrated and biologically diverse watercourse than currently exists. The potential works to the channel are discussed in more detail in Section **Error! Reference source not found.**.

6.6 Flood Routing

The performance of the system during extreme events (>1 in 100 years) should also be considered at this stage.

The routing of potential surface water run-off, should the capacity of the proposed system be exceeded, needs to be built into the layout of the site such that the residual risk of flooding from this element can be easily mitigated.

By identifying the most vulnerable manholes in the system, flooding routes on to public open space, landscaped areas or gardens may be incorporated relatively easily and economically at the planning stage. If there is insufficient volume available in surface storage systems then additional attenuation will be required on site.

6.7 Peak Run-off and SuDS

The use of non-traditional and SuDS based collection systems such as swales and porous surfaces should be considered at this stage as an additional method of improving the run-off profile of the development. These collection systems can extend the time of concentration thereby reducing the peak run-off from the site and easing flooding pressures downstream. This would benefit not only the site and the downstream areas but also assist in improving the quality of water discharged from the site.

The application of the 'SuDS Manual' CIRIA report C697[1] for new developments requires that the runoff from sites is not only restricted to meet the Greenfield runoff characteristics but also that SuDS systems are utilised to improve the quality of the runoff prior to outfall to watercourses.

The application of suitable SuDS systems can help in the removal of most soluble and particulate contamination from suspended solids to hydrocarbons.

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

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

Systems at the top of the hierarchy provide a combination of attenuation, treatment and ecology and are deemed the most sustainable options. There are always specific scenarios where systems are more suitable than others and at this stage it is not possible to guide the development towards a particular strategy. However, included below are summaries of some of

[1] http://www.ciria.org/

the main types of SuDs systems that may be applied to the development outlining the main benefits and constraints to their application.

SuDS Systems – Swales, ponds and basins

The nature of these systems is such that the run-off from the development can be treated by biological action and stilling to significantly improve the quality of water discharged from the system.

Basins also provide large areas of open space that can be developed for recreational uses or as new habitats for wildlife.

Both systems do however take up significant amounts of developable land and have residual maintenance and liability issues attached to their implementation.

The ponds and swales could easily be accommodated in a suitably detailed site layout at this stage, and couple this with the works to the existing drainage ditches.

Filter Strips and Swales

Often used adjacent to roads and footpaths, swales and filter strips can be used to collect water directly from linear systems, percolate the flow, attenuate and then discharge the flow to either a traditional system or a secondary SuDS device.

The use of these systems is more suited to linear application such as along roads as the typical cross section is relatively small and longer runs are required to provide attenuation volume.

The filter strips will be smaller in plan area than a swale although the swale can be landscaped to effectively be a verge to the carriageway, combining two functions.

Land take can be relatively small in comparison to other systems and both types perform well in improving water quality. Potentially these systems would be suited to the outfalls from the collection systems within the developed area. The swales would be used to convey the collected flow from the site drainage system to the existing drainage ditch/attenuation areas.

Porous Paving

Larger areas of block paved hardstanding can easily be converted to provide significant volumes of storage. These systems also encourage biological treatment of flow and extraction of oils and heavy metals from the run-off.

Land take is reduced as storage is located under carparks and access roads. However, maintenance is potentially a long term issue and the possibility of the paving being damaged, dug up and not properly reinstated or not regularly swept could lead to compromising the future capacity of the system.

This system will negate the need for a separate collection system such as kerbs and gullies. It will also assist in reducing the flood profile of the site by significantly attenuating the run-off from the development within the sub base material.

There is no specific amenity provided by the system other than enabling other areas to be utilised for development rather than potentially sterilizing areas with an easement for a sewer or stand-off for a basin.

These systems may be incorporated into normal carparking areas but may not be suitable for areas accessed by larger vehicles or within adopted carriageway areas. There is the potential for it to be used on a plot by plot basis as localised attenuation and treatment.

Cellular Storage

Large volumes of storage can be provided under grassed and lightly trafficked areas by using proprietary plastic cellular systems. This will maximise the developable area of the site.

There is no specific mechanism within the system designed to treat flow but extended detention times will allow sedimentation reducing the suspended solids within the discharge.

There is no creation of amenity by the installation of these types of systems, indeed by maintaining access to the system small areas may need to be reserved.

Tank or Culvert Storage

Hard engineered tank storage systems have traditionally been used for attenuation structures for the past decade and are often specified where large volumes of storage are required (>200m^3) and available space is an issue.

The systems have no inherent water treatment properties bar potential sedimentation of the attenuated flow and offer no additional amenity benefits. In some cases the easement to the tank or culvert is such that a significant portion of land area is sterilized from development and certain planting.

There are also significant costs associated with these systems in production, transportation and installation. However, once installed the long term maintenance of the system is relatively low.

With a proven record of successful installation, tanks and culverts are regularly adopted by water authorities across the country.

Surface Storage

The use of roads, public areas and even landscaped areas as additional storage is becoming a widely accepted form of attenuation.

Water spilling from drainage systems can be collected via roads and kerbs and channelled to lower lying areas where it would be stored until the capacity in the existing system returns.

These systems have the advantage of requiring little additional infrastructure merely detailing of the proposed roads and grassed areas.

As these systems will only be used in extreme events, when the adopted drainage system is exceeded (>1 in 30 years) they provide a very efficient way of catering for these events rather than providing permanent capacity.

There is no inherent water treatment capability in this system nor any particular increase in amenity, however the costs associated with this provision are relatively small.

Over Sized Pipework

It is often possible to provide the required volume of storage within the existing collection pipework of the proposed system. This may be incorporated by using oversized pipework designed to act as inline storage.

As the diameter of larger pipes readily available is limited the applicability of these types of systems is more suited to <200m^3 of attenuation. Above this volume the length of pipe required is excessive and difficult to suitably fit into a normal site layout.

There is no intrinsic amenity provided by the use of this system neither is there any specific level of run-off treatment over and above that of a standard pipe and gully system.

However, due to their traditional nature, the adoption of these types of systems by water authorities is straightforward and does not require any specialist input. The pipes are generally available direct from suppliers with little or no lead in time and the satisfactory long term performance of these systems is well documented.

6.8 Summary

It will be necessary to attenuate the flows for events up to the 1 in 100 year +20% for the whole site. This volume may be provided by a combination of the above attenuation systems.

The application of SuDS based systems need to be considered as the primary measure for dealing with surface water for any proposals. This would point to the use of ponds, swales and porous paving areas in the first instance in combination with cellular or tank attenuation if volumes are large.

With appropriate detailing it would be relatively economical to develop a layout with provision with all or some of these systems integrated in to the masterplan.

It is the requirement of the Environment Agency that any new developments should include a method of Sustainable Urban Drainage within the proposals. The Agency's adopted policy on SUDS is that it "will promote Sustainable Drainage Systems (SUDS) as a technique to manage surface and groundwater regimes sustainably".

The use of the existing drainage ditch as the outfall for the development in conjunction with its reprofiling creates the opportunity to provide in-line flood plain storage by way of local attenuation ponds or washlands along the line of the existing ditch. The master plan indicates crossing of the ditch to maintain footpath access and it is suggested that these locations could be used as flow control locations, either by culverts or flow control devices.

During extreme events water would be allowed to accumulate upstream of the crossings in to formed washlands that would attenuate the flow through the site.

The use of a porous paving system would also offer significant benefits both for water quality and water quantity. Porous paving systems promote evaporation of detained flow, offering a reduction in the volume reaching the outfall while the percolation of the flow significantly increase the quality.

Table 5.7 of CIRIA C697 – SuDS manual notes that porous paving systems provide high potential for the removal or reduction of suspended solids, heavy metals, nutrients, bacteria and fine suspended solids, with the highest across the board potential of all the systems assessed.

7 Mitigation and Remediation Works

7.1 Ditch Reprofiling

The ad-hoc site remediation has resulted in significantly modified drainage ditch section through the development site. It is proposed that as part of the development and landscaping of the area the ditch is returned to a more nature form.

In order to do this it will first be necessary to provide a minimum cross section for the ditch to convey the potential runoff.

The proposed route is shown on OJP drawing J-D0368-005 included in Appendix G. show app G in contents

The ditch should be profiled to provide sufficient replacement conveyance capacity as determined in 5.2, as $2.07m^3s^{-1}$.

The capacity of the channel is determined using the Chézy Equation for steady flow. This is a function of the slope and channel resistance to flow thus;

$$Q = \frac{Am^{3/2} i^{1/2}}{n}$$

Where

n = Mannings Roughness
i = Bed slope (m/m)
A = Area (m^2)
m = Hydraulic Radius (m)

Based on the preliminary regrade levels of the site the minimum landform gradient along the route of the rerouted ditch is approximately 1v in 400h.

The Manning's roughness co-efficient is taken to be 0.035, this is representative of a ditch in poor condition. This has been selected to represent a 'natural' channel rather than a purposely maintained grass lined swale.

It will therefore be necessary to reprofile the channel with the required capacity at this gradient and roughness. Reaches of the ditch at higher gradient will potentially pass forward more flow, the effects of this should be determined when the detailed design of this channel is implemented.

The flow profile anticipated within the channel is also important in determining the suitable morphology. The nominal channel should be capable of conveying the 'normal' flow at controlled velocities i.e. fast enough to not cause significant backwater effects and slow enough to promote sedimentation and tertiary treatment.

The Q_{BAR} rate represents the approximate peak 1 in 2 year flow rate, the majority of 'normal' flows will be significantly less than this. Taking the normal flow as 50% of Q_{BAR} the nominal channel should be designed for approximately 35l/s.

The central channel will be approximately rectangular in cross section. To provide the 35l/s capacity required at 1v in 400h the nominal channel will need to measure 1.3m wide by 250mm deep.

The main channel will provide flow capacity of $2.07m^3s^{-1}$ and measure 6.7m wide with side slopes 1v in 3h with a central 1.3m wide base.

This typical cross section is shown on OJP drawing J-D0368-005 included in Appendix G.

The landscaping and planting of the channel gives the opportunity to increase biodiversity in an ecology corridor including and bounding the route. It will also assist in the tertiary treatment of the flow resulting in improvements in water quality at the outfall from the system.

Localised modifications to the bed level and channel slopes can be made to create wet areas, 'shelves' and gullies which will serve to provide a variety of different habitats.

7.2 On Line Attenuation

The reprofiling of the channel will also enable the provision of on-line attenuation along the route of the drainage ditch.

It would be proposed that the footpath route shown on the masterplan is used to provide flow control within the drainage ditch. This would act to locally restrict flow and attenuate it within washlands created upstream of the crossing. The control of the flow can either use a throttled pipe or flow control device.

The creation of these washlands would have a significant positive impact upon the local biological diversity within the area and also help to return the ditch ecosystem to a more natural state.

Combined with the new footpaths through the area, the development offers the opportunity for the creation of a valuable local amenity and combined sustainable surface water drainage system.

7.3 Flood Routing

As noted previously the performance of the system during an extreme event needs to be considered at the planning stage. The current proposed layout offers several opportunities for flood routing within the development.

The football pitch shown to the south east of the site would ideally be used as emergency surface attenuation. This would involve flooding the pitch during extreme events and then slowly releasing this back in to the drainage system.

It will be necessary to carefully design each of the proposed elements of the drainage system such that they act in concert during extreme events. This will include the site drainage system and the SuDS elements discussed herein.

8 Conclusions

Following this assessment it is considered that the development site can be classified as within Flood Zone 1, an area at low risk of fluvial flooding (>1 in 1000 years).

It is determined that the site can be suitably developed for residential use in line with the requirements of PPS25.

The existing ditches that cross the site are to be partially re-routed and reprofiled as indicated on OJP drawing J-D0368-005. This ditch system will enable development of the site but also positively impact upon the reported flooding issues associated with the existing system.

The rerouting exercise will also enable the opportunity to create a significant local amenity in the form of a wildlife corridor along the route of the amended ditch system.

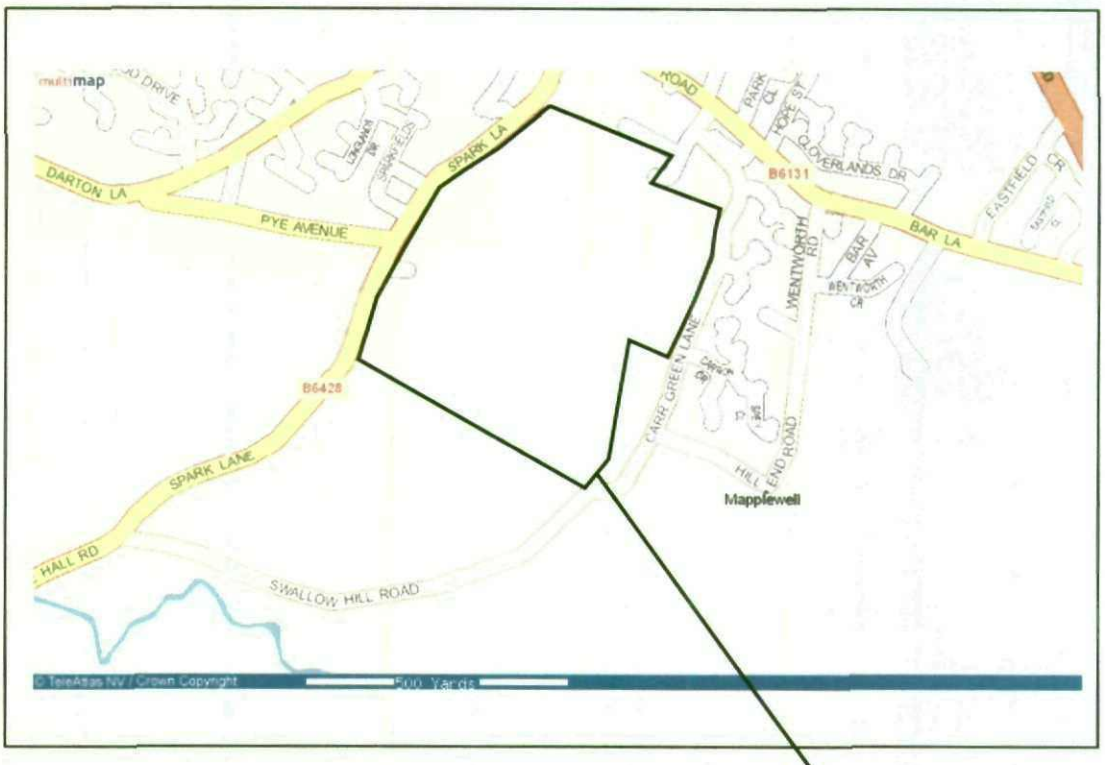
It is also demonstrated that the site drainage can be detailed such that additional run-off is suitably controlled and attenuated onsite to have a positive impact on the local flood regime.

Approximately 2169m^3 and 3075m^3 of onsite attenuation will be required for events up to the 1 in 100 year +20% scenario.

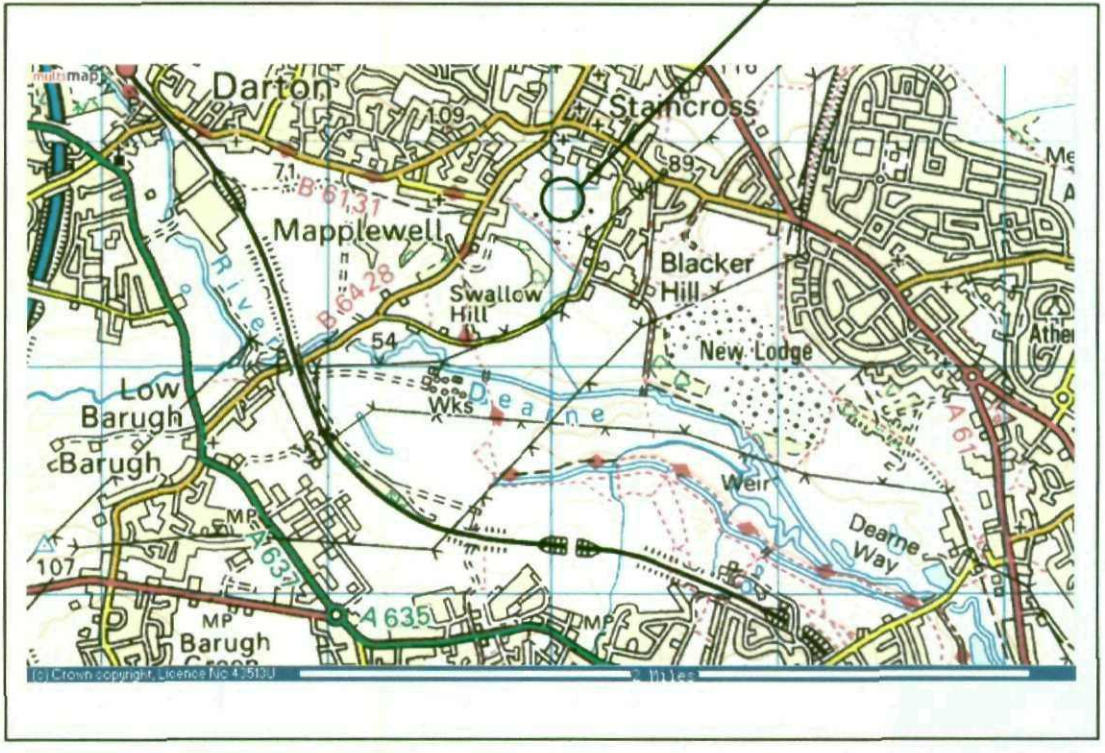
It should be noted that infiltration based schemes have not been considered further due to the anticipated impermeability in the observed underlying ground conditions in this area.

Flood routing and non-traditional collection systems, such as permeable paving, should also be considered as part of the detailed design of the surface water system to further improve the run-off profile of the proposed development.

Appendix A - Site Location plan – OJP Drawing ref J-D0368-001



SITE LOCATION
Grid Ref SE 330 097
Post Code S75 6FW



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	BY	CHECKED	DATE
DESIGN	AP		
DRAWN	AP		
APPROVED			

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Sidings Court
Doncaster
DN4 5NL

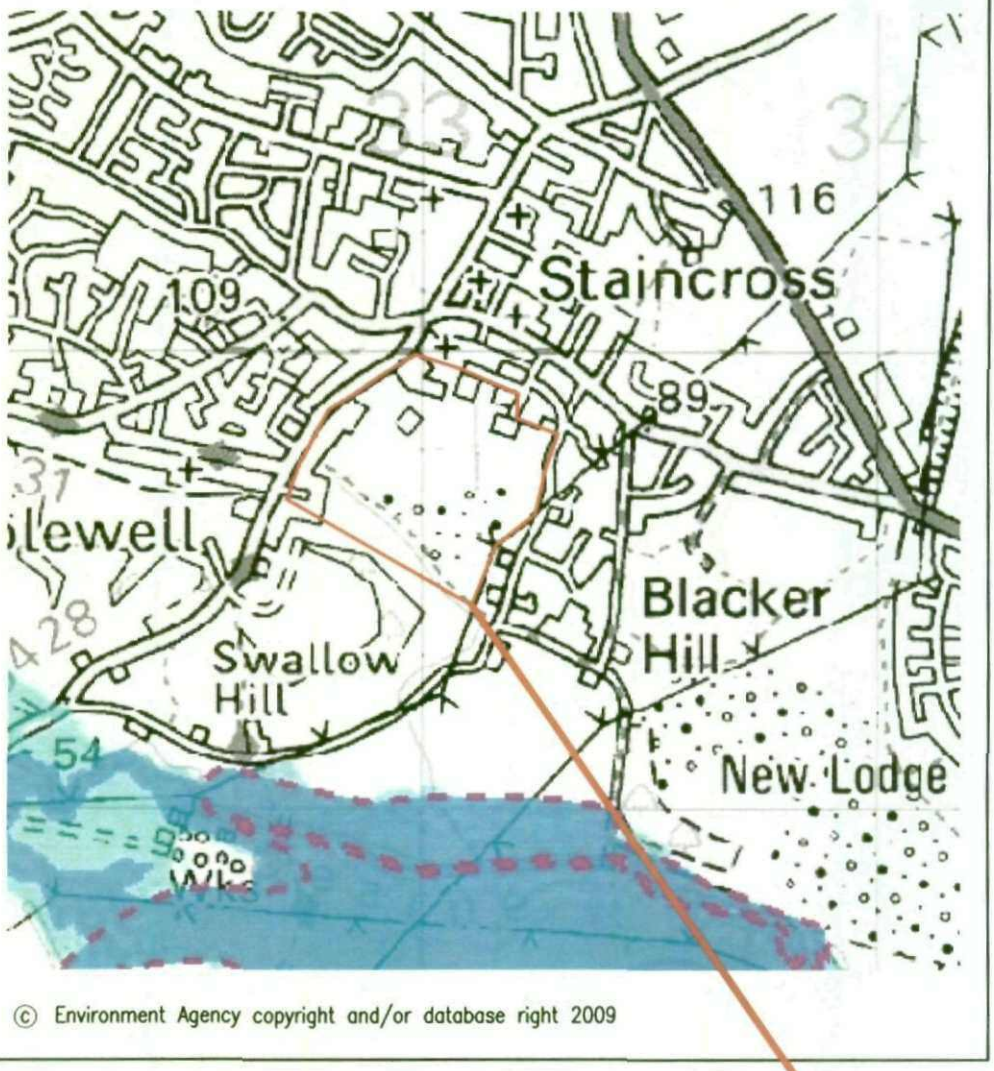
Tel: 01302 322295
Fax: 01302 322296

TITLE: PROPOSED DEVELOPMENT AT MAPPLEWELL LANE NORTH GAWBER

SITE LOCATION PLAN

STATUS	PRELIMINARY	FILE	
SCALE	PLOT DATE	DRAWING NUMBER	REVISION
NTS		J-D0368 - 001	-

Appendix B - Environment Agency Flood Zone Map OJP drawing ref J-DK010-602



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SITE LOCATION

KEY

- FLOOD ZONE 2
- FLOOD ZONE 3
- FLOOD DEFENCES
- AREAS BENEFITING FROM FLOOD DEFENCES

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	BY	CHECKED	DATE
DESIGN	AP		
DRAWN	AP		
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Fax: 01302 322296

TITLE: PROPOSED DEVELOPMENT AT MAPPLEWELL LANE NORTH GAWBER, BARNSLEY

EA FLOOD MAP

STATUS		FILE
PRELIMINARY		
SCALE: NTS	PLOT DATE:	DRAWING NUMBER: J-D0368 – 002
		REVISION: –

Appendix C - Site Topographical Information

Appendix D - Barnsley MBC – Highways and Engineering Department Correspondence

BARNSLEY
Metropolitan Borough Council

Highways and Engineering

Assistant Director: A. J. Carnall, BSc, M.Eng, M.I.C.E., M.I.H.T.
PO Box 601, Barnsley S70 9FA

My Ref. EMDRD/SK Your Ref. L001AJP - 12080010

Enquiries to Mr. S. Kilner Dial Direct (01226)772116 Fax. (01226)772196

Date 31st January, 2008

Dear Andrew,

PROPOSED RESIDENTIAL DEVELOPMENT at LAND off MAPPLEWELL DRIVE, MAPPLEWELL

I refer to your letter dated 9th January 2008 and would make the following comments with respect to the surface water drainage of this site.

I would confirm that the watercourses on this site are under riparian ownership. As described in your letter, a run off from the site into the local watercourse system should be limited to a green field rate; in this case I would recommend a figure of 5 litres/second/Hectare.

I would comment about the individual watercourses crossing this site identified on the attached plan.

The main contributor of flows into the watercourse on the western boundary is a public surface water sewer serving a large catchment of Mapplewell village. This watercourse is problematic in that as the original course has been lost at Point A, flows find their way into the drainage system serving the adjacent reclamation site to the south. This problem causes flooding to the public highway in Spark lane during times of storm, so the original course should be reinstated into the area of the on site pond.

The watercourse on the eastern boundary at Point B has suffered through a lack of maintenance. This watercourse should be reinstated to a proper functioning condition to discharge flows into the receiving watercourse in Swallow Hill Road at Point C.

Any change in the original alignment to any watercourse to cater for the development will need formal consent from the Environment Agency.

Other options to drain this site should be considered such as a SUDS system, as required by Planning Police Statement No.25. Reconnection to the watercourses should only be considered if an alternative solution is not possible.

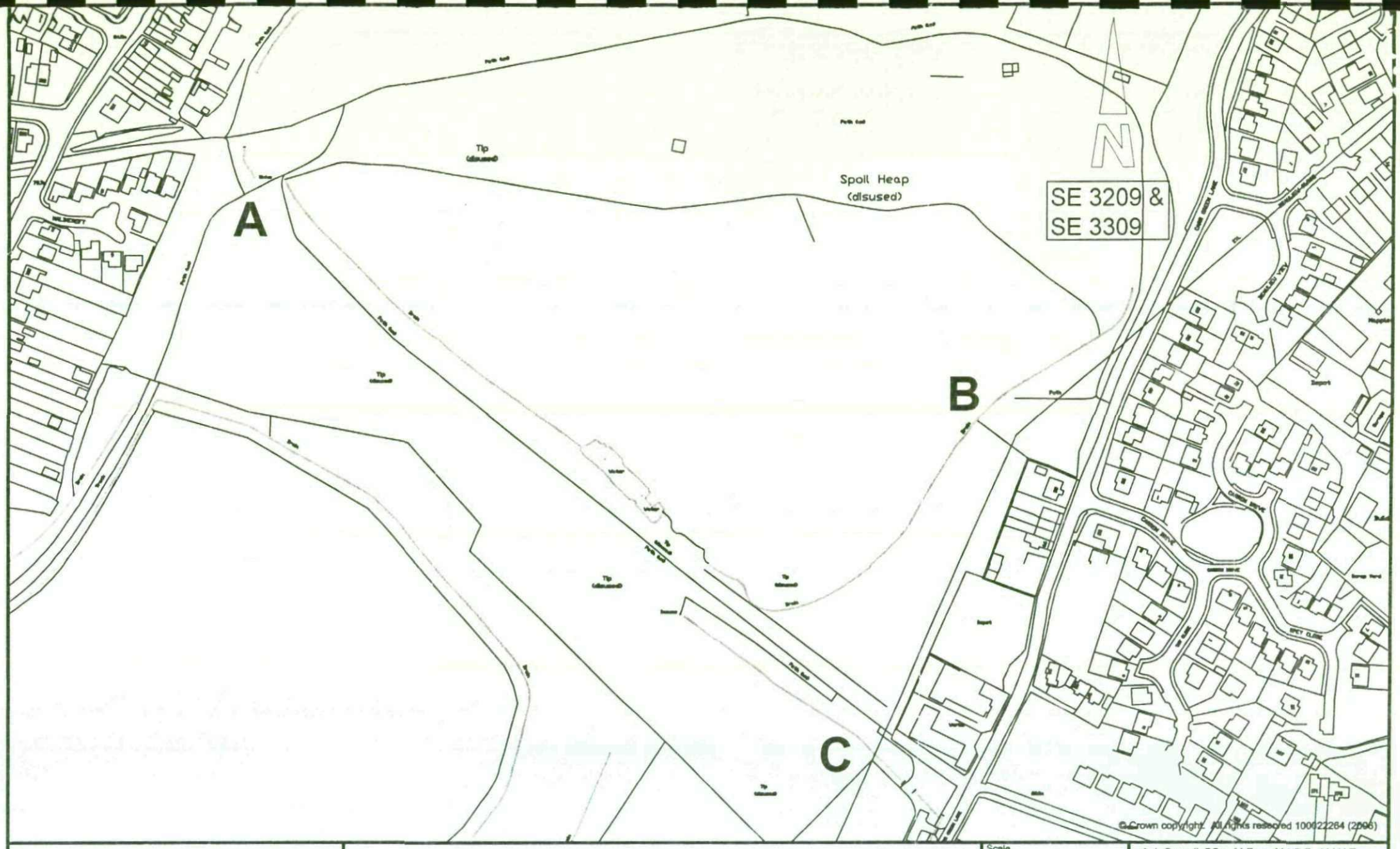
I would add that due to the size and scope of the proposal, a formal Flood Risk Assessment to fully comply with the requirements of should be submitted with any planning application.

Yours Faithfully

Steve Kilner
Principal Engineer

Mr Andrew Precious
Joynes Pike and Associates Ltd
1-2 Aire House
Richmond Business Park
Sidings Court
DONCASTER DN4 5NL,

JPA - DONCASTER
Project Number 12080010
Review: PNF
05 FEB 2008
File:



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BARNSLEY
Metropolitan Borough Council
Highways & Engineering

LAND OFF MAPPLEWELL DRIVE, MAPPLEWELL
WATERCOURSE CLEANING

Scale	1/2500
Drawn	W.A
Date	JAN. 08
Checked	
File	

A.J. Carnall BSc., M.Eng., M.I.C.E., M.I.H.T.,
Assistant Director, Highways & Engineering,
Central Offices, Kendray Street,
Barnsley S70 2TN.
Tel. (01226) 770770 Fax. (01226) 772222

Drawing No. DRAWING No. 1

Appendix E - Yorkshire Water Pre-Planning Enquiry Response and Asset Records

YorkshireWater



cc: MJ
MJ B3/
MJ2

Yorkshire Water
Waste Water - Sewerage
New Development Team
Knostrop WWTW
Knowsthorpe Lane
LEEDS
LS9 0PJ

Tel: (0113) 235 4148
Fax: (01274) 372 834

Email:
Planning.Sewerage@yorkshirewater.co.uk

Ben Bailey Homes Ltd
Elizabeth House
Cliff Street
MEXBOROUGH
S64 9HQ

For the attention of Laura Gommersall

Your Ref:
Our Ref: H003105 /sew/ndt/peh

For telephone enquiries ring:

Philip Hoffmann on (0113) 235 4148

3rd April 2007

Dear Madam,

Land at Spark Lane, Mapplewell, Barnsley - Pre-Planning Sewerage Enquiry - Residential Development

Thank you for your enquiry of 20th March 2007. Our charge of £80.00 (plus VAT) will be added to your account with us, reference BBH 012?. 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:

There are 450mm and 525mm diameter public combined sewer recorded crossing/close to the site. No buildings are to be erected within 6 (six) metres, nor trees planted within 5 (five) metres of these public sewer. It may not be acceptable to raise or lower ground levels over the sewers, nor to restrict access to the manholes on the sewers. If you wish to have these sewers diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0845 124 24 29.

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 525mm diameter public combined sewer recorded to the south of the site.

The local public sewer network does not have capacity to accept any discharge of surface water from the proposal site. The developer is advised to contact the Environment Agency/local Land Drainage Authority with a view to establishing a suitable watercourse for discharge. It is noted that watercourses are located through and to the south of the site. These appear to be the obvious place for surface water disposal.

Off-site foul and surface water sewers 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 124 24 29 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 124 24 29.

Prospectively adoptable sewers 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 New Development Team at Sheffield (telephone 0845 124 24 29) 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, the developer will 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.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form by telephoning 0845 124 24 29.

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,

P.E. Hoffman

New Development Team

Appendix F - Existing Drainage Ditch System OJP Drawing J-D0368-004

Appendix G - Proposed Drainage Ditch Rerouting OJP Drawing ref J-D0368-005

Appendix H - Proposed Indicative Development Layout