DRAINAGE STRATEGY

Hoyland Common



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1 INTRODUCTION

1.1.1 RPS Group has been commissioned by Newlands to prepare the drainage strategy for its site in Hoyland, near Barnsley to support the Hybrid planning application for a development of employment uses (B1, B2 and B8), new link road, associated works including provision of internal access roads, drainage and landscaping

- Outline with all matter reserved apart from means of access for up to 71,515 sq. m of employment uses (B1, B2, B8)
- Full application for 31,568 sq. of B8, new link road including new roundabout to link with Hoyland south Masterplan Area (Local Plan references HS68, HS65, HS61, HS58, HS6, SL5)

1.1.2 The proposed development comprises of a National distribution centre with accompanying haulage, operational and parking areas, alongside multiple open plots for other commercial developments and a single plot for a proposed residential development indicated within the regional council's local plan, refer to drawing **HOYLA-RPS-SI-XX-DR-D—0330 in Appendix A**

In addition to the proposed development above, is the requirement for further accompanying infrastructure, including a major highway reconfiguration for the diversion of the A6135/Sheffield road to access the development plots and a significant drainage scheme to cater for the storm water and foul water generated as a result of the development and the new hardstanding areas. This report specifically reviews the main segment of the proposed drainage infrastructure which includes the drainage within the highway, and the main carrier drainage which conveys storm water to the outfalls at the southern development boundary. This report will not define the strategies for each individual development plot.

1.1.3 The purpose of this report is to confirm the strategy for the foul and surface water drainage systems within the site plan. This report has been prepared in conjunction with a Flood Risk Assessment, RCEF76268.

1.1.4 The contents of this report are to be read in conjunction with all supporting drawings and/or documents referenced herein, appended to this report or submitted in support of the Outline Planning Application for this development.

1.2 Site Location and Extents

1.2.1 The proposed development site is located approximately 6.5km to the south of Barnsley city centre in Yorkshire, at National Grid reference 435439, 399598

1.2.2 The area of the proposed development encompasses an area of a total of 50 ha that extends for a length of around 2km from the proposed diversion of the existing highway (A6135) at the northern end of the site at Tankersley Roundabout, to the southern outfall of the proposed drainage infrastructure, to the east of Tankersley park.

2 EXISTING SITE

2.1 Description

2.1.1 The site from the proposed Hoyland development is located approximately 6.5km south of Barnsley, directly adjacent to the east of junction 36 of the M1 motorway. Approximate National Grid coordinates for the site are 435439mE, 399598mN. The proposed development site comprises of an area of approximately 50 hectares. The existing site currently has several points of access, primarily via Tankersley Lane, Black Lane or Sheffield Road (A6135) which all pass-through different segments of the developable land.

2.1.2 The existing site currently encompasses several areas which have a variety of land uses. At the northern end of the site (directly adjacent to M1 junction 36 and to the north of Tankersley lane), the land is currently utilised for agricultural purposes and sport and leisure events, which include the use of existing football and cricket pitches. At the southern end of the site, the land is predominately agricultural.

2.1.3 The topographical survey for the developable land was undertaken was undertaken in 3 separate phases, with the latest two phases undertaken by Ellam Land Surveys in March 2019 and February 2020. According to the survey there is a general fall in ground level from East to West across the majority of the proposed development site.

2.1.4 In order to facilitate construction of the proposed commercial developments, it will be necessary to undertake preliminary earthworks to build-up the existing ground levels to create level areas for the construction of commercial units. The required earthworks would primarily be required in the eastern plots where the existing ground levels fall away significantly from east to west.

2.1.5 Geotechnical survey reports have been produced by Applied Geology and form part of this planning submission, reference AG3080-19-AK21 and AG3080-19-AK36

2.2 Existing Drainage Features

2.2.1 Following desktop study and site investigations, it is understood that the existing site has 6 outfall points discharging surface water. These are denoted as follows:

1. Motorway Drain A – this appears to link into the Birdwell Roundabout Attenuation built for the road and collects the existing field run-off within a perimeter French drain
2. Motorway Drain B – this appears to be a low point collecting water from the field and a low ditch collecting from Tankersley Road, this then opens into the field and follows the field boundary to the outfall point. Although no formal outfall could be seen in the dense vegetation but did show signs of ponding water but no water present.
3. Motorway Drain C – this appears to be a low ditch discharging towards the motorway but with no formal c evidence of how it was connected
4. Motorway Sheet flow – the field south of Tankersly Lane also included a low point that shed flows of water onto the motorway which had a series of gullies collecting it
5. South Eastern Outfall in a 400mm culvert that runs by Sheffield road and connects to a culvert under the railway to the south and entering the Harley Dike
6. South Western outfall appears to be a series of ditches and culverts through the Bell Ground woods and the field to the south, eventually entering the Western culvert under the railway to the south and entering the Harley Dike

2.2.2 The South Eastern catchment, which includes existing drainage from properties on the perimeter of the site, collects approximately 26.1Ha of the proposed development site and connects to the Harley Dike down the eastern edge of the site in an existing Culvert. The Culvert is identified as 400mm on the topographic survey. This culvert is believed to become above ground about 180m to the south beyond the Parkside Farm. This channel then goes below ground and is then assumed to head towards a culvert (unknown size) under the railway, behind the station House building. From the south of the railway line this then meanders to Longley Spring cottage and connects to the Harley Dike as it crosses Sheffield Road. It is not proposed to reutilise this outfall.

The South Western catchment collects approximately 16.789Ha of the proposed development site, this is then funnelled by walls and a shallow ditch to the woodland area where it then appears to sheet flow and funnel through low sections of the topography to the Western Culvert and into Harley Dike

The Northern catchment is split into two outfalls, both appearing to connect to the existing Highway drains. As the site is re-levelled it is proposed to only retain these connections for the remaining green infrastructure on the embankments on the new highway and outside the revised plot areas, to the Motorway Drain A with site area. This will be a substantial reduction on existing flows from the field currently entering these drains

2.3 Geology and Ground Conditions

2.3.1 At present, geotechnical investigations of the development site include basic desktop study, and topsoil analysis report carried out by TIM O'HARE ASSOCIATES in March 2020. The topsoil report has confirmed that the topsoil across site generally comprise of a variety of clay soils. It was noted that the samples collected by the analysis appeared to have undergone structural degradation (albeit this may have been in part caused by damage to the soil during sampling when the soil was wet), and this could indicate that the soils are likely to suffer from a "*lack of drainage and insufficient aeration, particularly in a wet and plastic state*" (TIM O'HARE 2020).

2.3.2 Applied geology Geotechnical survey reports have been produced and form a separate part of this planning submission, reference AG3080-19-AK21 and AG3080-19-AK36

2.4 Infiltration

2.4.1 Based on the Applied Geology geotechnical information available, the site is showing typical infiltration rates with very low infiltration rates not adequate for the use of soakaways. Therefore, at this stage the proposals for the outline drainage strategy is based upon the assumption that there will be no infiltration from the site. However, BRE Digest permeability testing will need to be scheduled to confirm whether the site has any areas viable for surface water infiltration.

2.5 Flood Risk

2.5.1 According to the Flood Risk Assessment, (RPS Report RCEF76268 included as a separate report as part of the Planning application)**.** The site is in a Low Flood Risk Zone (as shown on the EA website);

- As the site is within Flood Zone 1 and is therefore considered to have less than 1 in 1000 annual probability of fluvial flooding.
- There are some small areas of surface water flooding shown within the site, however, these will largely be altered and collected by the development and development drainage.

The risk of flooding from groundwater is considered to be low; the investigative work carried out by Applied Geology did not encounter significant amounts of groundwater.

2.5.2 The SuDS being proposed.

- For all the proposed plots along with the majority of the road, surface water will be stored within an attenuation Basin located at the southern end of the site, discharged at the QBAR discharge rate based only on the area of contributing catchment for the South western ditch located to the south of the site.
- Surface water attenuation will be provided for events up to the 1 in 100 year plus 30% allowance for climate change as required by BMBC.

2.6 proposed development

2.6.1 Primarily it is proposed that the Hoyland development scheme will create a new central UK hub and distribution centre for Hermes courier service. In addition, it is anticipated that the development will facilitate the opportunity and expansion for both Hermes and non-Hermes related commercial business within the district of Hoyland.

The overall development is proposed to be divided into five different plot areas as follows:

- The main plot area for Hermes distribution centre
- Four separate commercial plots for other businesses
- And a separate plot for residential expansion (highlighted within the district council's local plan)

3 DESIGN CONSTRAINTS / PARAMETERS

3.1 Surface Water Drainage Design Constraints

3.1.1 Constraints placed on the design of surface water drainage serving the proposed development are as follows:

- For greenfield developments within the Barnsley metropolitan district, the peak rate of run-off from the development to any surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield run-off rate for the same event. Therefore, the surface water discharge rate for all storms up to and including the 1 in 100-year return period, with an additional 30% allowance for future climate change will be limited to Qbar. The discharge rates are subject to approval from Barnsley metropolitan district, as Lead Local Flood Authority (LLFA) and the Environment Agency.
- Storm simulations are to be carried out using Flood Studies Report (FSR) rainfall data for all events as agreed with BMBC
- Infiltration is considered to be unviable (see 2.4 above), so it is proposed to convey storm water to the Western culvert an into Harley Dike – It is proposed that the for the surface water from the southern catchment will pass through this outfall after passing through a proposed storage Basin, subject to Environment Agency approval.
- On the residential development parcel, impermeable catchments are assumed to be 60%
- Attenuation features to be designed to have 300mm freeboard over the critical 1:100 year + climate change water level.
- The surface water drainage design has been carried out in accordance with C753 'The SuDS Manual', 'Sewage Sector Guidance Appendix C, the Flood and Water Management Act 2010 and any additional requirements set out Barnsley Metropolitan Borough Council (as Lead Local Flood Authority – LLFA), the Environment Agency and the Local Water Authority.

3.2 Surface Water Hydraulic Design Variables

3.2.1 The proposed surface water drainage design has been carried out using the industry standard MicroDrainage software suite, incorporating the following parameters;

- Catchment Area: approximately 50 ha; contributing impermeable area 47Ha
- FSR Data
- FSR Rainfall Model - England & Wales
- PIMP (%) 100
- M5-60 (mm) 19.000
- Ratio R 0.362
- Maximum time of Concentration (mins) 30
- Volumetric Runoff Coefficient 0.750
- Design return periods: 1 in 1, 1 in 30 & 1 in 100 year
- Climate change: Rainfall profiles increased by 30% during the 1 in 100-year event.
- CV (proportion of rainfall forming surface water run-off): Summer 0.75, Winter 0.84
- Maximum allowable discharge rate, refer to **Appendix B** (Qbar, based on contributing area from UK SUDS):
  - Southern Catchment area = 16.789Ha – 82.41l/s
- Ignore infiltration for peak flow design.

3.2.2 The new surface water drainage systems have been designed to satisfy the following criteria;

i) No surcharging to be permitted during the critical 1 in 1-year return period;

ii) No flooding to be permitted during the critical 1:30 year return period;

iii) Controlled flooding may be permitted during the critical 1 in 100-year return period, with an additional 30% allowance for future climate change.

The proposed drainage system has been modelled as a network within MicroDrainage and simulations have been run for the 1:1, 1:30 and 1:100-year return period, the latter with an additional 30% allowance for future climate change. The MicroDrainage calculations can be found in **Appendix C**.

4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.1 Discharge Rates

4.1.1 Due to infiltration being considered unviable for site-wide surface water drainage disposal as discussed in 2.4.1 above, the proposed surface water drainage strategy is to restrict the post-development discharge rate to Greenfield rates for all storms up to the 1:100 year + 30% climate change event, in accordance with the Lead Local Flood Authority (Barnsley Metropolitan Borough Council) requirements. As it is proposed to discharge the flows from the southern catchment to Harley Dike via a storage Basin this discharge rate will also be subject to approval from the Environment Agency to ensure that flood risk is not increased downstream of the development.

4.1.2 The Hoyland development was split into two separate regions (The Northern and Southern Catchments) however based on the proposed plot layouts and the existing and proposed levels it is proposed to discharge into only the southern outfalls;

1. Through a proposed storage basin before discharging into the existing Western culvert joining Harley Dike (An existing EA watercourse)

Using UK SUDS, existing rural run-off rates for each of the development areas have been calculated, the UK SUDS calculations can be found in **Appendix B.**

4.2 Surface Water Drainage Strategy

4.2.1 As stated in 4.1.2 above, the catchment that will be served by the network totals approximately 50Ha. In terms of impermeable area post-development, the contributing area has been estimated based on a proposed density of

- 90% per parcel for plot 1 and 2
- 90% per parcel for plot 3, 4 and 5
- 60% for the residential plot
- 100% for all roads
- 20-30% for Green embankments and verges

4.2.2 It is proposed to install an adopted underground piped gravity system to serve the Hoyland development that will incorporate spurs into each future development plot to allow for future connections. In terms of the site wide drainage system, this is a robust approach as the plot catchments are taken into the network as single point inflows, plot with minimal allowance for the potential storage in the upstream pipe networks with plots.

4.2.3 Each system has been designed in line with 'Sewage Sector Guidance Appendix C. Cut-off filter drains will also be incorporated to deal with areas of soft landscaping that are to be reprofiled due to the earthworks operations; these filter drains will be connected to existing land drainage in the site area.

4.2.4 In order to achieve the restricted discharge rate, it will be necessary to provide attenuation storage. It is proposed that the storage within the southern catchment will be within a proposed adopted and private Basin system, constructed upstream of the outfall at the western culvert directly adjacent to Bell woods, with attenuation for the whole site provided here.

4.2.5 Immediately downstream of the proposed storage basin system, it is intended to install a flow control, Hydro-brake or similar equivalent, that will control the flows sufficiently to ensure that even during the critical 1 in 100 year event, surface water discharge from the Southern catchment does not exceed the agreed 82.4l/s Qbar rate.

5 SUDS

5.1 Objectives

5.1 Surface water runoff on new developments should be managed at source, with flows controlled to mimic the natural pre-development rates to reduce downstream impact wherever possible. Water should be conveyed through SuDS components of the surface water management train to ensure effective pre-treatment and appropriate flow control prior to discharge from site, thus giving due consideration to water quality and water quantity whilst creating & sustaining better places for people and nature, local amenity & diversity.

5.2 Strategy

5.2.1 The general drainage strategy for the proposed site is based on SuDS, in accordance with CIRIA C753 'The SuDS Manual' to reduce the impact on the receiving watercourse.

5.2.2 In addition to the water flow and quality benefits, the on-site SuDS measures seek to provide biodiversity enhancements for the local environment. The nature and location of the future development would suggest a lesser importance is placed with regards to potential amenity benefits.

5.3 Water Quantity

5.3.1 Run-off from the Hoyland development will be restricted to a combined total of 82.4l/s, equivalent to the pre-development Qbar flow rate for the existing southern outfall catchment, This is substantially smaller than the total site Qbar discharge rate as the site collects and diverts flows from other catchments. This diverted flow will greatly improve the highway catchment network to the North by reducing the load from the original farm fields and sports ground.

5.3.2 This restricted discharge will be achieved on site by constructing a storage basin system before the southern rail culvert crossing. As per Chapter 23 of C753 'The SuDS Manual', the attenuation will be located immediately upstream of the proposed outfalls. This feature is illustrated on RPS drawing **HOYLA-RPS-SI-XX-DR-D--0334-336** included in **Appendix A**. Discharge from the Basin is controlled via vortex flow controls installed immediately upstream of the outfalls from the site.

5.4 Water Quality

5.4.1 Surface water quality management is an important requirement for all storm drainage proposals. The proximity of Plots 1 and 2 to the existing site of bell woods as a wildlife site highlights importance to this issue on the development. With regards to the quality of the discharge from site, C753 describes a Simple Index Approach based on assessing the pollution hazard indices for a particular catchment / development and also providing indicative mitigation indices for typical SuDS features. Table 26.2 of C753 extracted below identifies pollution hazard indices for the varying land usage pertinent to this application.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Based on the above, the proposed development can be broken down and categorised as follows:

Catchment	Pollution Hazard Level	TSS	Metals	Hydrocarbons
Roofs	Low	0.3	0.2	0.05
Highways	Medium	0.7	0.6	0.7
Commercial Haulage yard	High	0.8	0.8	0.9

5.4.2 However, the plots themselves will be responsible for dealing with any on plot drainage pollution issues like haulage yards, this is anticipated to be dealt with by the possible construction of appropriate class 1 Separator systems, permeable paving, filter strips and/or other appropriate methods to suit the future development uses.

5.4.3 Table 26.3 indicates indicative pollution hazard level mitigation indices for different SuDS measures

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yuj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

5.4.4 Based on Tables 26.2 & 26.3 illustrated above, the Basin should provide the majority of treatment required for the run-off from the proposed infrastructure development except for hydrocarbons. However, when used in combination with a final discharge Swale and utilising trapped gullies and on plot treatment systems such as interceptors or permeable paving. this will provide enough treatment to mitigate the pollutive impact of the development on storm water drainage system.

5.4.5 In addition to the quantity and quality improvements discussed above, using basins for the attenuation storage can provide amenity benefits to the local community, as well as biodiversity benefits to the local environment.

5.4.6 The following table provides details of the proposed water quality treatments associated with the potential pollutants from the site wide catchments;

Southern Catchment	Pollution Hazard Level	TSS	Metals	Hydrocarbons
		Pollutants		
Roofs	Low	0.3	0.2	0.05
Highways	Medium	0.7	0.6	0.7
Worse case	**Medium**	**0.7**	**0.6**	**0.7**
		Mitigation		
Basin		0.5	0.5	0.6
Remaining		**0.2**	**0.1**	**0.2**
Where the Basin alone is not enough to mitigate the potential pollutants (In particular hydrocarbons) associated with the development therefore additional mitigation is required.				
		Additional Mitigation		
Swale		0.25 (1/2 0.5)	0.3 (1/2 0.6)	0.3 (1/2 0.6)
Remaining Pollutants		**0.0**	**0.0**	**0.0**

6 MAINTENANCE

The following information indicates the typical maintenance regime that will need to be implemented by the Developer / End User to ensure continued satisfactory operation of the site drainage systems. The maintenance activities would be split into three categories, namely Regular, Occasional & Remedial, as detailed in the table below;

TABLE 32.1 Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Regular maintenance consists of basic tasks carried out on a frequent and predictable schedule, including inspections/monitoring, silt or oil removal (if required more frequently than once per year), sweeping of surfaces and litter/debris removal.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis that the regular tasks. Guidance on the components pertinent to this drainage proposal are detailed in the extracted Table 16.1 below.

Remedial maintenance comprises the intermittent tasks that may be required to rectify faults associated with system, although the likelihood of faults can be minimised by good design, construction and regular

maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, so timings are difficult to predict.

In addition to general cleaning, Tables 16.1 and 22.1 indicate the minimum required maintenance regime that needs to be implemented post construction for the SuDS elements that will comprise the bulk of the proposed drainage system – see extracts from C753 below. In addition to this, Table 14.2 indicates the potential maintenance requirements for the anticipated proprietary plot level full/bypass retention separators, however further advice would need to be sought from the Manufacturers.

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

It is currently understood that unless the site or individual plots of the site are sold (typically the commercial development parcels), the responsibility for the maintenance of the core drainage Attenuation and Swale system will lie with the Water authority with the second Basin area being retained privately by the Developer, Newlands Developments. The Highway network and the main infrastructure Surface water drainage will be offered for adoption to the relevant Highway authority or Yorkshire water. Foul water drainage networks are all proposed to be adopted by Yorkshire water, However until the development exceeds 50% capacity for plots 1-3, the maintenance will be the responsibility of the developer (Newlands Developments Ltd). The proposed SuDS for this project will be have shared ownership.

Basin 1 and the swale will be adopted by Yorkshire Water and will in turn take on the ongoing maintenance for these facilities. Basin 2 will remain in the ownership of Newlands Developments so will require future maintenance provided by a maintenance contract. it is anticipated that Basin maintenance will be linked with the maintenance requirements for the Green spaces within the whole site.

7 FOUL WATER DRAINAGE

7.1 Foul Water Drainage Design

It is proposed to design and construct a new below ground foul water drainage system to convey commercial wastewater from the proposed development plots to the existing Yorkshire Water public sewer network to the northeast of the application area. The drainage network for the Hoyland Development will be constructed on the perimeter of the site areas and situated within the proposed highway network as illustrated on RPS drawing **HOYLA-RPS-SI-XX-DR-D-0331-334** included in **Appendix A.** It is envisaged that the entire network will be designed and constructed in accordance with 'Sewage Sector Guidance Appendix C as well as BS EN 752. The development network will be subject to a S104 agreement with Yorkshire Water. Yorkshire Water retain the rights to a full S104 agreement for the development until the site is fully developed.

7.2 Peak Foul Water Discharge Rate

'Sewage Sector Guidance Appendix C' has been used to calculate the peak foul flows from the residential, and commercial sites. The following breakdown applies:

Residential - 4000 l/unit/day Peak flow

Commercial – 0.6l/s/ha Peak flow

Peak Flows Hoyland development

Type	No. Units/Area	Peak Flow (l/s)
Residential	Units	
Plot 6	101	4.68 l/s
Commercial	Area (Ha)	
Plo1 1	18.35	11.01 l/s
Plot 2	9.02	5.412 l/s
Plot 3	5.09	3.054 l/s
Plot 4	2.03	1.218 l/s
Plot 5	1.70	1.02l/s
	Total	**26.4 l/s**

7.3 Pumping

Due to the site's low-lying ground levels and scarce availability of any existing foul drainage networks, close in proximity to the Hoyland Development site. The original point of connection proposed by Yorkshire Water (Fitzwilliam St, Hoyland to the Northeast of the development) has proved of insufficient capacity to accept the proposed flows following detailed modelling. Yorkshire Water has since offered an alternation at a point off Stead Lane/Warren View to the East of the project.

The proposed pumping station will be offered to YWS for adoption and will discharge at 13.2/s (or as agreed with YWS) to comply with section D5.6.1 in Sewer sector Guidance, that's states

The design flow rate of the pump units in foul pumping stations serving less than 500 dwellings should be at least the maximum of:
a) half the incoming peak design flow rate (see Clause B3.1.1); and

b) the flow rate required to achieve a minimum flow velocity in the rising main in accordance with D6.3.1.

With the system providing online emergency storage with telemetry control to manage flows.

Based on SSG v2, Foul pumping stations serving less than 500 dwellings, as a minimum, the storage should equate to 160 litres per dwelling, and for commercial or industrial developments one hour of peak design flow rate. For pumping stations serving 500 dwellings or more, the sewerage company should be consulted to determine the storage requirements.

Type	No. Units/Area	Peak Flow	Storage (m^3)
Residential	101	160 l/s	16.16
Commercial	35.67 ha	21.7 l/s	78.12
	Total		**94.28m3**

8 CONCLUSIONS

8.1 Surface Water Drainage Design

8.1.1 The proposed surface water network has been designed to be incorporated into the proposed landscape providing both amenity and environmental benefits. It will provide the Hoyland development area with a sustainable drainage network to manage extreme storm events up to 1 in 100 year + 30% (Climate Change) storm events.

a. The entire surface water network in The Hoyland development has been designed in accordance with Sewage Sector Guidance Appendix C as well as BS EN 752. The development network will be subject to a S104 agreement from Yorkshire Water.

b. The proposed Network will provide betterment to the greenfield runoff currently discharging from this site as flows have been limited to Qbar rates for the existing site catchment, but includes for area outside this catchment so will reduce the catchment area and subsequent flooding risk for the Eastern catchment and the M1 Motorway/BMBC Highway drains..

8.2 Foul Water Drainage Design

8.2.1 The proposed foul water network will provide the Hoyland development area with a sustainable gravity foul drainage network, linked to an adopted pumping station.

a. The entire foul water network in the Hoyland development has been designed in accordance with Sewage Sector Guidance Appendix C as well as BS EN 752. The development network will be subject to a S104 agreement from Yorkshire Water.

APPENDICES

Appendix A

Proposed strategic Layout Plans

Appendix B

RPS UK SUDS Calculations

Appendix C

RPS MicroDrainage Calculations