RLRE Consulting Engineers

Land at Newark Road, Sutton-in-Ashfield

Flood Risk Assessment &

Drainage Strategy

Land at Newark Road, Sutton-in-Ashfield

FLOOD RISK ASSESSMENT

& DRAINAGE STRATEGY

For

Hallam Land Management Ltd

24 June 2022

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-	18.06.17	Draft Issue	ML	KH
P01	20.02.17	Final Issue	ML	KH
P02	15.02.22	Report updated	AWM	AP
P03	24.06.22	Refer to Summary Section	ML	KH

Summary

Latest Revision Updates Summary	Summary of report updates since previous revision: • Report title amended. • Updates summary section added. • NPPF references updated. • EA and BGS mapping updated. • Latest SFRA data reviewed. • Fresh historic flood enquiries made to the EA and LLFA. • Flooding sections updated to suit LLFA response. • Fresh Developer Enquiry made to STW. • Culvert GPR survey update added, and plan added to appendices. • Latest masterplan added to appendices. • Drainage strategy drawing updated to suit illustrative masterplan EMS.2254-102 Revision E. • Attenuation calculations updated in MicroDrainage software.
Conclusion	All forms of flood risk have been reviewed for the proposed development site, which is located within Flood Zone 1, and it is considered that the site and surrounding land would be at a low flood risk following redevelopment. A robust drainage strategy has been proposed to deal with both foul and surface water which would be generated by the redeveloped site, with no surface water flooding occurring for storms up to and including the 1 in 100 year plus climate change event. Flow routing has been considered to ensure that in the event of a blockage, existing adjacent landowners are not subject to an increased flood risk. It is therefore considered that from a flood risk and drainage point of view, the proposed development is appropriate.
Introduction	Rodgers Leask Ltd has been commissioned by Hallam Land Management Ltd to undertake a Flood Risk Assessment and Drainage Strategy for the proposed development of the parcel of land at Newark Road, Sutton-in-Ashfield, Nottinghamshire.

<table>
<tr><td></td><td>This report has been commissioned in support of an outline planning application to Ashfield District Council.

This Flood Risk Assessment and Drainage Strategy has been prepared in accordance with the Department for Communities and Local Government (DCLG) National Planning Policy Guidance, and the publication 'National Planning Policy Framework' published 27th March 2012, last updated 20th July 2021 which supersedes 'Planning Policy Statement 25 (PPS25) Development and Flood Risk' (2010). However, this report also conforms to PPS25 and is in line with current guidance and best practice.</td></tr>
<tr><td>Site Location Description and Details</td><td>The site has an overall area of approximately 21.21 hectares and is located south of Newark Road, Sutton-in-Ashfield; centred at approximate OS GR: E451701, N358195.

The site lies south of Newark Road; west of Coxmoor Road and is currently Greenfield. For the purpose of the runoff calculations the site will be treated as Greenfield.

A topographical survey of the site area has been undertaken. The site slopes generally from south east to north west. The highest part of the site is located in the south eastern corner and reaches a level of 177.23mAOD. The lowest part of the site is adjacent to Searby Road in the far north-west of the site at a level of 143.34mAOD.</td></tr>
<tr><td>Definition of the Flood Hazard and Probability</td><td>All means of flood risk at the site have been assessed and it has been demonstrated that the site is not at risk of flooding, nor would it pose a risk to adjacent land following development subject to the recommendations contained within the report being adhered to.</td></tr>
<tr><td>Predevelopment Surface Water Runoff</td><td>The Greenfield runoff rates for the total development site area, calculated using the ICP SUDS method in MicroDrainage are as follows:

<table>
<tr><td>Storm Event (yr)</td><td>QBAR</td><td>1</td><td>30</td><td>100</td></tr>
<tr><td>Discharge (l/s)</td><td>96.1</td><td>79.8</td><td>188.4</td><td>247.1</td></tr>
</table>
</td></tr>
<tr><td>Development Proposals and Site Surface Water Strategy</td><td>The development is approximately 21.21ha in area and is proposed for up to 300 residential dwellings and associated infrastructure.

Soakaway testing was carried out by Rodgers Leask Environmental as part of their initial site investigation works. The resulting infiltration rates are considered too poor to be used as part of a robust drainage strategy solution.</td></tr>
</table>

	It is therefore anticipated that infiltration would not be suitable as the primary means of disposal of surface water runoff from the proposed development. The site is currently Greenfield and discharges surface water mainly via overland flow that discharges to a ditch that runs along the majority of the western boundary of the site. Although it has been observed that the watercourse connects via a series of overflow gullies and culvert network to the surface water sewer in Searby Road, it is recommended that the condition, size and level of this apparatus is assessed at detailed design stage. It is therefore proposed that the development site would discharge surface water directly to the surface water sewers in Searby Road as part of a robust drainage strategy. The LLFA will require discharge rates to be limited to 5 l/s/ha for development areas, however a more conservative rate of 4.7 l/s/ha will be used based on a pro-rata QBAR rate calculated by ICP SUDS method. Preliminary modelling based on a total impermeable area of 10.897ha suggests an approximate total of 7906m3 attenuation storage will be required. The proposed site will be split into three catchments and attenuated separately. It is proposed to attenuate flows using above ground balancing facilities, with the final discharge being either directly or indirectly to the surface water sewers in Searby Road. It is proposed that each parcel within the site would incorporate SuDS features, such as filter strips, filter trenches or mini swales, with all parcels draining via an underground pipe network into the ponds. It is proposed to discharge green/landscaped areas to the existing ditch network within the site, but it is recommended that betterment be provided by intercepting and conveying surface water via swales with check-dams and planting that also allows infiltration where practicable, to inhibit flow. Overland flow routes will be carefully considered for blockage and exceedance events to ensure that routing is away from both existing and proposed buildings. It is considered that by adhering to the strategy outlined above, the volumes of surface water runoff generated by the developed site will be managed such that such that the downstream risk of surface water flooding will be reduced during higher category storm events. Furthermore, the climate change allowances made

	within the design will ensure that the reduction in flood risk will be maintained for the lifetime of the proposed development.
Climate Change	The proposed surface water drainage system should be designed to accommodate the 1:30 year rainfall event without any surface water flooding and should be capable of retaining the 1:100 year plus 40% climate change storm event on site without flooding any buildings.
Pre Development Foul Water Regime	As the site was previously Greenfield, there are currently no provisions for foul water drainage on the site.
Proposed Developed Site Foul Water Strategy	It is proposed to discharge flows for the 300 dwelling site to two connection points in Searby Road. A Sewer Capacity Assessment was carried out by Severn Trent Water to assess the capacity of the downstream network. The report and subsequent discussions have concluded that the downstream sewer network and Sewage Treatment Works have sufficient capacity to drain the development.

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1 Introduction

1.1 Terms of Reference

1.1.1 Rodgers Leask Ltd has been commissioned by Hallam Land Management Ltd to undertake a Flood Risk Assessment and Drainage Strategy for the proposed development of the parcel of land at Newark Road, Sutton-in-Ashfield.

1.1.2 This report has been commissioned in support of an outline planning application to Ashfield District Council.

1.1.3 Discussions have been held with Nottinghamshire County Council as Lead Local Flood Authority (LLFA), the Environment Agency (EA) and Severn Trent Water (STW) with regard to flood risk and drainage.

1.1.4 This Flood Risk Assessment and Drainage Strategy has been prepared in accordance with the Department for Communities and Local Government (DCLG) National Planning Policy Guidance, and the publication 'National Planning Policy Framework' published 27th March 2012, last updated 20th July 2021 which supersedes 'Planning Policy Statement 25 (PPS25) Development and Flood Risk' (2010). However, this report also conforms to PPS25 and is in line with current guidance and best practice.

1.1.5 This report has been produced on behalf of the client, Hallam Land Management, and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Rodgers Leask Ltd.

1.2 Guidance

1.2.1 The Planning Practice Guidance was published on the 27th March 2012 and contains guidance on Flood Risk and Climate Change (last updated 20th July 2021).

1.2.2 The National Planning Policy Framework (NPPF) document was published 27th March 2012, last updated 20th July 2021.

1.2.3 The latest version of PPS 25 was released on the 29th March 2010 and is now superseded by the NPPF.

1.2.4 NPPF can be downloaded free of charge from the internet at the following link:

http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf

1.2.5 Flood risk assessments: climate change allowances was published on the 19th February 2016, last updated 10th May 2022 and can be downloaded free of charge from the internet at the following link:

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

1.3 Documents Reviewed

- Topographical Survey Drawing Number HLM/MSE/3277, by Hallam Land Management Ltd, dated 28th March 2017.
- Geo-environmental investigation reports by Rodgers Leask Environmental (RLE) dated 13th September 2017, 18th May 2018 and 8th February 2022.
- British Geological Survey website accessed on 20th June 2022.
- Environment Agency website accessed on 20th June 2022.
- Ashfield District Council Strategic Flood Risk Assessment (SFRA) by Ashfield District Council, dated February 2009.
- Nottinghamshire County Council Preliminary Flood Risk Assessment (PFRA) by JBR Consulting, dated June 2011.
- Nottinghamshire County Council Local Flood Risk Management Strategy dated June 2016.
- River Trent Catchment Flood Management Plan, by the Environment Agency, dated December 2010.

2 Background Information

2.1 Site Location, Description and Details

2.1.1 Figure 2.1 below indicates the location of the site.

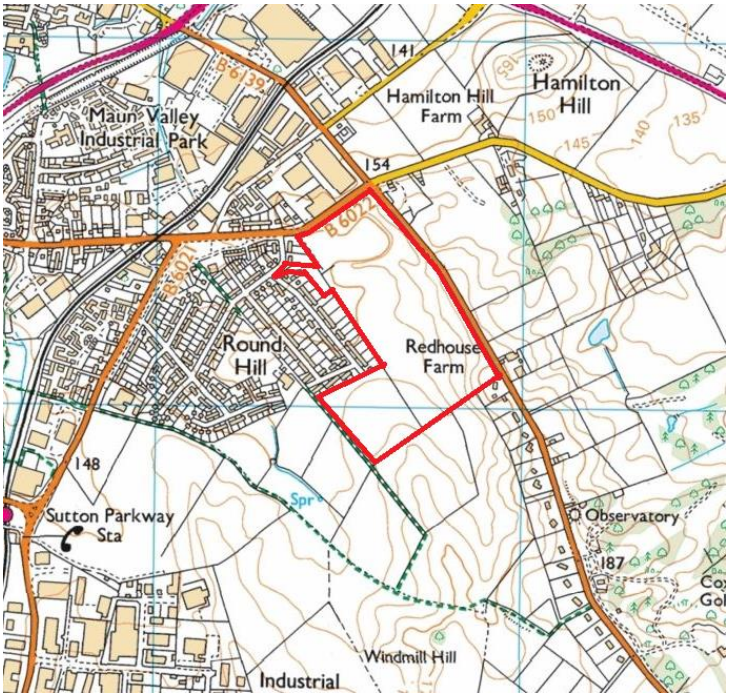

Figure 2.1 Land at Newark Road, Sutton-in-Ashfield – Site Location Plan

2.1.2 The site, as outlined above in Figure 2.1, has an overall area of approximately 21.21 hectares and is located south of Newark Road, Sutton in Ashfield; centred at approximate OS GR: E451701, N358195.

2.1.3 The site lies south of Newark Road; west of Coxmoor Road and is currently Greenfield.

2.1.4 A topographical survey of the site area has been undertaken and is included in Appendix A. The site slopes generally from east to west, and is particularly steep along the eastern side of the site. The highest part of the site is located in the south eastern corner and reaches a level of 177.23mAOD. The lowest part of the site is located on the western boundary at a level of 144.34mAOD.

2.2 Main Drainage Catchment Context

2.2.1 The site is currently Greenfield and has an overall area of approximately 21.21 hectares. Surface water runoff generated by the site currently drains via a

combination of limited infiltration and overland flow to an existing drainage ditch which flows along the majority of the western boundary of the site.

2.2.2 The Severn Trent Water (STW) sewer records are included in Appendix B. STW have noted in their Developer Enquiry response (see Appendix I) that adopted manhole ref. 5001 may be within the site, however this manhole is shown by the topographical survey to be just outside of the site boundary. This has also been verified on site by a Rodgers Leask Engineer. There are no public sewers within the boundary of the site. A highway drain is indicated within Newark Road to the north west of the site, and public surface water, foul water and combined water sewers are located adjacent to the site in Searby Road.

2.3 Approach to the Assessment

2.3.1 This assessment seeks to consider the risks of flooding both to the site and to the wider area as a consequence of the development proposal. This also requires assessment of the development constraints of the site and the opportunities offered by the existing infrastructure and natural environment in order to propose a strategy by which the site can be developed both economically and sustainably. This assessment draws upon our investigations regarding the local area.

3 Flood Risk Assessment

3.1 Definition of the Flood Hazard and Probability Baseline Conditions

3.1.1 Fluvial Flood Risk:

The site is located within the River Trent catchment; in the Sherwood sub-catchment.

The site is approximately 300m from the River Maun, which is culverted in sections as it runs to the north of the site.

Nottinghamshire County Council (Lead Local Authority – LLFA) was contacted regarding the site. The LLFA have responded noting that the area to the west of the site (Searby Road) and further west into the housing estate have a history of repeated flooding incidents. These incidents are not understood to be associated with fluvial sources however. Due to the local topography, flooding at the locations reported would not pose a risk of flooding the proposed site.

The Environment Agency was also contacted regarding the site; there are no records of historic fluvial flooding within the vicinity of the site.

The site lies in Flood Zone 1 where flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. Appendix G contains the Environment Agency's Flood Map for Planning for the site.

As such, the site is not considered to be at risk of flooding from fluvial sources.

3.1.2 Tidal Flood Risk:

The site is approximately 90 kilometres from the nearest coastal location and at an altitude of approximately 160m above mean sea level. The site is therefore not considered to be at risk of flooding from tidal sources.

3.1.3 Surface Water Flood Risk:

Reviewing the Environment Agency's online flood mapping, the south western corner of the site is traversed by an area at low risk of flooding from surface water, with a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).

This area follows the path of a natural valley identified both in the topographical survey and during the site walkover.

The existing drainage ditch, which follows the majority of the western boundary of the site, is also shown to contain areas at low risk of surface water flooding at various intervals along its length. It is considered that following development the rate of runoff entering this ditch will be greatly reduced, decreasing the associated risk to adjacent properties in the process.

Historical mapping data indicates the presence of a watercourse to the west of the site until at least 1955, which would have acted as a receptor for surface water runoff from the site during extreme rainfall events. The 1967 mapping indicates the Searby Road development completed, with the watercourse largely gone apart from a small section immediately adjacent to Newark Road. By 1974, further development has taken place, and the section of watercourse shown in 1967 has disappeared.

The Ashfield District Council SFRA makes reference to runoff from adjacent land being a potential source of flooding for properties off Searby Road and Sotheby Avenue. It further states that grids on land drainage ditches are inspected on a regular basis and work actioned accordingly, and that drainage consultant reports have been obtained in relation to the flooding issues.

The fields immediately south of the site currently drain to a ditch that terminates at the site boundary. There is anecdotal evidence that a culvert connects this ditch to the ditch that runs inside the proposed site, along the majority of the western boundary. A buried pipe was identified using Ground Penetrating Radar (GPR) along the supposed line of the culvert, which suggests connectivity between the informal watercourses, refer to GPR survey plan within Appendix J.

The ditch within the site runs northwards before heading west towards Searby Road. A series of gullies and chambers are located adjacent to the ditch which are connected via a culvert network that outfalls to the public surface water sewer in Searby Road, which suggests that the gullies serve as an overflow to the ditch. Refer to Rodgers Leask drainage strategy plan in Appendix F for further details.

It is recommended that the culvert, in the southern part of the site, be investigated further at detailed design stage, possibly through a series of slit trenches.

It is also recommended that the base of ditch within the site be regraded where possible to aid flow. This is likely to alleviate existing concerns from residents regarding the ditch.

A series of cut off drains or channels should be installed to direct overland flow away from proposed properties within the layout and directly to the existing ditch network, utilising a series of baffles to reduce the rate of flow and increase the time of entry.

The proposed surface water drainage system should be capable of accommodating the 1:30 year rainfall event without any surface water flooding, and should be capable of retaining the 1:100 year plus 40% climate change storm event on site without flooding any buildings.

As such, it is considered that the site will be at a low risk of flooding from either flows generated on-site, or from overland flows from off-site. Furthermore, it is considered that the flood risk to nearby existing properties as a result of flows originating from the site will be reduced following development.

3.1.4 Flood Risk from Ground Water:

An intrusive site investigation was carried out by Rodgers Leask Environmental Ltd (RLE) in April 2017, confirmed the ground conditions to typically comprise Made Ground Topsoil / Natural Topsoil overlying granular and cohesive Made Ground deposits overlying weathered bedrock of the Lenton Sandstone Formation deposits. The British Geological Survey's Geology of Britain viewer corroborates this, stating that the site lies on Lenton Sandstone formation with no superficial deposits.

The Ashfield District Council SFRA identifies the ground conditions as being highly porous, with the land surface being prevailingly dry. The Nottinghamshire County Council PFRA indicates that there are high levels of groundwater in Ashfield.

Nottinghamshire County Council (Lead Local Flood Authority – LLFA) was contacted and conjectured the site to have significant ground water issues, with natural springs forming substantial new channels that cross the field regularly. Refer to correspondence contained within Appendix H.

The 'areas susceptible to groundwater flooding' maps contained within the Nottinghamshire County Council PFRA identify the site as being in an area with a 25-50% susceptibility to flooding from groundwater.

2no. historic borehole records located in close proximity to the northern boundary of the site indicate that groundwater levels were approximately 12mbgl. However, no historic borehole records were available within the boundaries of the site.

As part of the 2017 RLE site investigation, groundwater monitoring points were installed in the northern section of the site. All but one monitoring point remained dry, with groundwater recorded at 1.85m bgl at the other location. Exploratory holes were undertaken as deep as 7m with no groundwater encountered. Further groundwater monitoring undertaken in 2018 returned similar results with no higher groundwater levels recorded above the 2017 level. The water encountered is considered likely to be perched water, rather than being reflective of the groundwater table.

A Phase 1 geo-environmental desk study was undertaken by RLE in February 2022, there are no incidents of springs or issues recorded on historic mapping or hydro-geological mapping available for the site. No evidence of springing, issuing or groundwater emergence was observed during multiple site visits by Rodgers Leask Engineers; however some indication of overland flow channels was noted in several locations, which is considered to be caused by overland surface water runoff during heavy rainfall events. The site is underlain by permeable strata comprising sands and gravels, the ground conditions are not thought to be conducive with springing or issuing groundwater.

As such, it is considered that the site will be at low risk of flooding from groundwater allowing for a typical seasonal variation.

3.1.5 Flood Risk from Infrastructure:

The site is approximately 700m from King's Mill Reservoir. Long-term flood risk mapping has been reviewed and shows the site to be outside of the area at risk from flooding from reservoirs.

Severn Trent Water is the statutory water undertaker and is responsible for the public sewer systems within the Ashfield area.

The Ashfield District Council SFRA identifies a number of locations around Sutton in Ashfield and Kirkby in Ashfield where it is believed that flooding from sewers has occurred. It is not considered that any of the flood events were close enough to the site to have impacted it directly, however.

As such, the site is not considered to be at risk of flooding from infrastructure.

3.2 Development Description and Planning Context

3.2.1 The current development proposals are for up 300 residential units and associated infrastructure. An illustrative Masterplan showing the developable area and proposed access location is included in Appendix C.

3.2.2 The expected or estimated lifetime of the proposed development is likely to be a minimum of 100 years.

3.2.3 In accordance with the NPPF, the residential end use is deemed More Vulnerable in terms of flood risk vulnerability classification. All forms of development are appropriate in Flood Zone 1.

3.2.1 References have been taken from the Ashfield District Council SFRA, however, there is very little information regarding the site specifically within the report.

3.3 Pre Development Surface Water Runoff

3.3.1 The site is currently Greenfield and discharges surface water runoff via overland flow and some limited infiltration. Overland flow discharges mainly to the ditch that runs along the majority of the western border of the site. The ICP SuDS calculations can be seen in Appendix D.

3.3.2 Nottinghamshire County Council as LLFA have confirmed that 5l/s/ha is an acceptable rate of runoff from the site.

3.3.3 Using the ICP SUDS method within MicroDrainage software, the Greenfield runoff rates based on the total development area of 21.21 ha are as follows:

Storm Event (yr)	QBAR	1	30	100
Discharge (l/s)	96.1	79.8	188.4	247.1

3.3.1 Soakaway tests were carried out by RLE as part of the site investigation works. The resulting infiltration rates are considered too poor to be used as part of a robust drainage solution. This conclusion was discussed with Nottinghamshire County Council (LLFA) and also Severn Trent Water, refer to correspondence contained within Appendix H.

3.3.2 In accordance with the more conservative discharge rate calculated using the ICP SUDS method a pro-rata discharge rate of 4.7l/s/ha (QBAR) will be used to calculate restricted surface water flows from the proposed site. This has been calculated by dividing the total discharge rate of 96.1 l/s by the total development area of 21.21 ha.

3.4 Design Considerations for Exceedance and Climate Change

3.4.1 The proposed surface water drainage system should be designed to accommodate the 1:30 year rainfall event without any surface water flooding and should be capable of retaining the 1:100 year plus 40% climate change storm event on site without flooding any buildings.

3.5 Development Proposals and Surface Water Strategy

3.5.1 The development is approximately 21.21ha and is proposed for up to 300 residential dwellings and associated infrastructure.

3.5.2 Soakaway testing has been carried out at the site, which has confirmed that the rates of infiltration are poor. The presence of a historic landfill in the northern section of the site would preclude the use of infiltration devices in this area. As a result it is considered that infiltration would not be suitable as the primary means of disposal of surface water runoff from the proposed development.

3.5.3 It is however recommended that further consideration should be given to small infiltration features, such as filter drains or trenches, at the detailed design stage where feasible to contribute towards a reduction in the overall volume of runoff leaving the developed site.

3.5.4 The site currently drains mainly via overland flow to the ditch that runs within the site. It is recommended that surface water runoff from landscaped areas within the development continues to discharge to the ditch network where levels permit. Where this is not possible a direct connection to the public surface water sewer network should be considered.

3.5.5 It is proposed to intercept areas of overland flow which are currently contributing to the existing downstream flooding issues and convey land drainage from landscaped areas using swales with check-dams and a planting regime to inhibit flow, increasing the time of entry to the ditch network. Where possible the swales will allow water to infiltrate into the sub-soil, however infiltration devices should not be used within the vicinity of the historic landfill.

3.5.6 Flows will be restricted to 4.7l/s/ha, which will provide betterment for the higher category storms such as the 30 year and 100 year plus an allowance for climate change (refer to section 3.3.2). Drainage for the proposed site has been split into three catchments based upon the topography of the site, and will discharge directly or indirectly to the public surface water sewer network in Searby Road.

3.5.7 Preliminary modelling was undertaken for the catchment areas, with development areas assumed as 65% impermeable and the remaining landscaped areas assumed as 20% impermeable. 65% includes a ratio of impermeable areas plus an allowance for 6% increase due to urban creep, in accordance with Non-

Statutory Technical Standards for Sustainable Drainage. The ration of 20% for non-paved areas is taken from CD 526 of Design Manual for Roads and Bridges. Modelling indicates the following approximate attenuation storage volumes will be required:

Northern Catchment (Attenuation Pond 1)
Existing Catchment area = 2.84ha
Total Impermeable Area (proposed catchment area) = 2.058ha
Approximate volume of storage required = 1445m³
Maximum discharge rate (based on 4.7/l/s/ha) = 13.4l/s

Central Catchment (Attenuation Pond 2)
Existing Catchment area = 6.5ha
Total Impermeable Area (proposed catchment area) = 4.681ha
Approximate volume of storage required = 3283m³
Maximum discharge rate (based on 4.7/l/s/ha) = 30.5 l/s

Southwestern Catchment (Attenuation Pond 3)
Existing Catchment area = 4.15ha
Total Impermeable Area (proposed catchment area) = 4.158ha
Approximate volume of storage required = 3178m³
Maximum discharge rate (based on 4.7/l/s/ha) = 19.5 l/s

3.5.8 Attenuation storage has been calculated using MicroDrainage software (refer to Appendix E) to ensure no flooding during the 1 in 100 year plus 40% climate change storm event with a maximum permitted discharge rate. The exact volume of attenuation required should be re-visited at detailed design stage once the site layout has been finalised, to reflect the impermeable areas to be drained.

3.5.9 It is proposed to attenuate flows using balancing ponds, with swales utilised to convey surface water where practicable. It is proposed that each parcel within the site would incorporate additional SuDS features if feasible, such as filter strips, filter trenches or mini swales, with all parcels draining via an underground pipe network into the ponds.

3.5.10 It is proposed to discharge green/landscaped areas to the existing ditch network within the site, but it is recommended that betterment be provided by intercepting and conveying surface water via swales with check-dams and planting that also allows infiltration where practicable, to inhibit flow.

3.5.11 Overland flow routes will be carefully considered for blockage and exceedance events to ensure that routing is away from both existing and proposed buildings.

3.5.12 It is considered that by adhering to the strategy outlined above, the additional volumes of surface water runoff generated by the redeveloped site will be managed such that such that the downstream risk of surface water flooding will be reduced during higher category storm events. Furthermore, the climate change allowances made within the design will ensure that the reduction in flood risk will be maintained for the lifetime of the proposed development.

3.5.13 A copy of the Drainage Strategy drawing (P16-530-200) is contained within Appendix F.

3.6 SuDS

3.6.1 SuDS have been considered as part of the drainage solution. Typically, SuDS techniques are used to mimic the natural drainage of the land, infiltrating surface water into the ground or discharging it into a local water course. Where this occurs it is important to ensure that the quality of water is as clean as possible to prevent the spread of any pollutants. This is also the case when discharging surface water to a surface water sewer as in most cases these types of sewers discharge into water courses.

3.6.2 Water treatment will generally be provided via a combination of methods, which may include ponds, swales, tanked permeable paving, filter strips and filter trenches. To avoid contamination there will be no infiltration features utilised within the footprint of the historical landfill. SuDS features will be used in combination to achieve the required minimum mitigation indices for the site, in accordance with CIRIA C753.

3.6.3 It is considered that by adhering to the SuDS strategy above, the necessary treatment will be provided to allow compliance with CIRIA C753 guidance.

3.7 SuDS Maintenance

3.7.1 Any swales or ponds serving the site will be offered up for adoption by the local authority or will be adopted by a private management company, and will require regular maintenance including:

- Regular litter removal
- Inlet and outlet inspection quarterly and clearing when necessary
- Vegetation management including regular mowing as required
- Sediment removal as required

3.7.2 Filter Strips

- Regular litter removal

- Vegetation management including regular mowing as required
- Sediment removal as required

3.7.3 Filter Trenches

- Regular litter removal
- Inlet and outlet inspection quarterly and clearing when necessary
- Sediment removal as required

3.8 Pre Development Foul Water Regime

3.8.1 The site is currently Greenfield and as such there is no current foul water discharge from the site.

3.9 Proposed Developed Site Foul Water Strategy

3.9.1 A developer enquiry was submitted to Severn Trent Water; two possible connections points in Searby Road were identified as outfalls by response. Severn Trent initially identified potential capacity issues in the downstream network and requested that a Sewer Capacity Assessment was undertaken. The developer enquiry response is contained within Appendix I.

3.9.2 A Sewer Capacity Assessment was undertaken by Pick Everard on behalf of Severn Trent Water in August 2017, for the proposed 300 dwelling development. The assessment concluded that capacity improvements were not required to accommodate flows from the proposed development, but that modelling had identified capacity issues at the Sutton in Ashfield Sewage Treatment Works. The Sewer Capacity Assessment response is contained within Appendix K.

3.9.3 Following further investigation Severn Trent Water subsequently concluded by in email (dated 26th May 2022) that the Sewage Treatment Works has sufficient capacity to drain the development. Refer to correspondence in Appendix H.

3.9.4 It is proposed to discharge foul flows from the northern section of the site (approximately 180 dwellings) to the public combined water sewer in Searby Road, between manhole SK51583301 and SK51583303. It is proposed to discharge foul flows from the southern section of the site (approximately 120 dwellings) to manhole SK51585001.

3.9.5 Under the Water Industry Act (1991) developers have a right to connect foul and surface water flows from new developments to public sewers. The Act places a general duty on sewerage undertakers, to provide the additional capacity that may be required to accommodate additional flows and loads arising from new

domestic development. This relates to both sewerage infrastructure (including sewers and pumping stations) and sewerage treatment works.

4 Recommendations

4.1 Recommendations and Residual Risks

4.1.1 All means of flood risk at the site have been assessed and it has been demonstrated that the site is not at risk of flooding. Furthermore, it is considered that the existing flood risk to neighbouring properties as a result of overland flows will be reduced, subject to the recommendations below being adhered to. There are no residual risks identified to be remaining provided the above flood risk management and mitigation measures set out in this report are implemented.

4.1.2 An outfall to the surface water sewers in Searby Road either directly or indirectly, via on site sustainable drainage networks incorporating water treatment, should be considered as the primary means of surface water discharge.

4.1.3 The proposed surface water drainage system will be designed to accommodate the 1:30 year rainfall event without any surface water flooding and will be capable of retaining the 1:100 year plus 40% climate change storm event on site without flooding any buildings.

Disclaimer

We would note that all comments made in this report are based on the sources stated in Section 1.1. This report and its recommendations are intended for the use of Hallam Land Management for the above site only.

Appendices

Appendix A – Topographical Survey

Appendix B – Severn Trent Water Records

Appendix C – Site Masterplan

Appendix D – ICP SUDS Calculation

Appendix E – Attenuation Storage MicroDrainage Calculations

Appendix F –Drainage Strategy Drawing

Appendix G – Environment Agency Flood Map for Planning

Appendix H – LLFA and STW Correspondence

Appendix I – STW Developer Enquiry Correspondence

Appendix J – GPR Survey

Appendix K – STW Sewer Capacity Assessment

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