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Project Title
Land at Ashby Road, Markfield

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Drainage Technical Note

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Alison Homes East Midlands Ltd

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EXECUTIVE SUMMARY

I. This Drainage Technical Note has been produced in accordance with National and Local Planning Policy on behalf of Alison Homes East Midlands Limited to support the Reserved matters application for the construction of 93 residential dwellings, site access and onsite highways, SuDS system and landscaping on Land at Ashby Road, Markfield.

II. The proposed development necessitates the construction of site-specific surface water drainage infrastructure. This infrastructure must comply with the requirements set forth by the National Planning Policy Framework (NPPF), which mandates the use of Sustainable Drainage Systems (SuDS) in all major developments where feasible.

III. The Lead Local Flood Authority strongly advocates for the integration of SuDS within new developments. All new drainage systems will be designed in accordance with the following guidelines and standards:

- Planning Practice Guidance (PPG)
- Non-Statutory Technical Standards for Sustainable Drainage Systems
- Building Regulations – Approved Document H (Drainage and Waste Disposal)
- Local authority sustainable drainage guidance
- Latest version of Design Construction Guidance

IV. This report is to be read in conjunction with all planning, architectural and other reports that will accompany the planning application.

V. From the information available this report confirms that a sustainable drainage system design can be achieved which will discharge surface water in accordance with National Planning Practice Guidance (NPPG) and the CIRIA SuDS hierarchy while providing storage for all storm return periods up to and including the 1:100-year rainfall event with an allowance for climate change.

VI. This report concludes that the site is not at risk of flooding from tidal or fluvial sources, overland flows, or groundwater.

VII. In terms of foul and surface water drainage the proposed development is suitable at this location.

1.0 PLANNING POLICY CONTEXT

1.1 Leicestershire County Council (LCC) has published an Interim LLFA Guidance Note on Sustainable Drainage Systems (SuDS). This document outlines the key requirements for surface water management and flood-risk considerations for new developments.

1.2 The LCC guidance stipulates the following criteria for onsite storage and restricted discharge.

- The existing discharge rate should be clearly identified and expressed in litres per second (l/s) and litres per second per hectare (l/s/ha).
- The proposed discharge rate should be clearly identified and expressed in litres per second (l/s) and litres per second per hectare (l/s/ha).
- Evidence should be provided to substantiate existing and proposed flow rates. Section 24 of CIRIA C753 'The SuDS Manual' provides guidance regarding the selection and calculation of run-off estimation methods, including a useful summary in Table 24.1.
- To minimise the risk of system blockage the council would allow 5 l/s as the minimum discharge rate from a site.
- Brownfield sites must achieve greenfield run-off rates unless is adequately demonstrated to not be reasonably practicable or technically viable. In such instances, the applicant should seek to reduce discharges rate as much as reasonably practicable or technically viable. The proposed brownfield discharge rate should never represent an increase over the calculated existing discharge rate.

1.3 The following surface water strategy has been developed in accordance with local policy and SuDS requirements, ensuring compliance and effective management of surface water.

1.4 Adhering to these guidelines will ensure that the proposed development meets the necessary standards for sustainable drainage, promoting environmental sustainability and regulatory compliance.

2.0 EXISTING SITE

Site Location

2.1 The development site is located on Land to the north of Ashby Road, Markfield. There nearest postcode is LE67 9UB at Ordnance Survey grid reference SK 48886 10653.

2.2 The site is surrounded by Ashby Road to the south and east while agricultural land lies to the east and A50 Road to the north. At site location plan can be found below in Figure 1.0

Figure 1.0: Site Location plan

Site Description

2.3 The development site is approximately 3.45ha in area and comprises agricultural fields/undeveloped land. It is therefore classified as greenfield

2.4 A topographical survey indicates that the site generally falls from south to north. Ground levels fall from approximately 206m AOD to 195.5m AOD along the eastern site boundary.

2.5 A copy of the topographical survey is in **Appendix A** at the rear of this report.

Existing Drainage

2.6 Ordnance Survey (OS) mapping indicates the presence of three unnamed watercourses. Two ditches are orientated south / north to the sites- boundary with one ditch orientated east to west. As stated in the FRA report and Technical Note – Surface Water Outfall both prepared by Martin Andrews Consulting Ltd (MAC) indicate ditches flows under A50 to the north. Extract from MAC can be bound below in Figure 2.0.

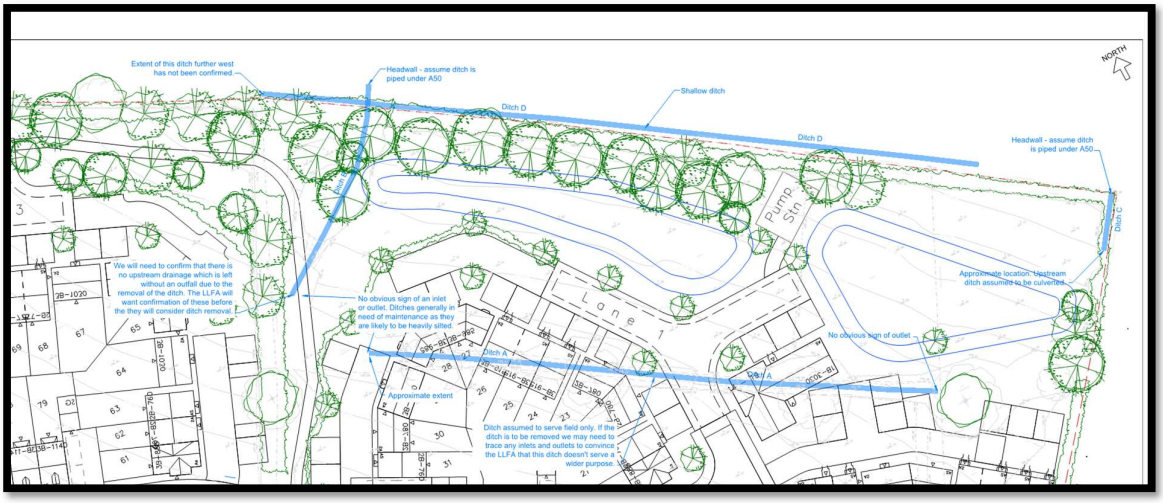

Figure 2.0: MAC Technical Note Extract

2.7 The site currently has no positive surface or foul water drainage systems serving the site.

2.8 There are no recorded public surface water sewers within the vicinity of the site.

2.9 The nearest public foul sewer is situated to the south of the site at Ashby Road.

2.10 Details of the public foul sewer and an extract from the MAC Technical Note indicating the locations of existing ditches can be found in **Appendix B.**

2.11 Rainfall currently discharges partly through infiltration into the ground and partly as overland greenfield runoff, flowing north towards the existing onsite ditches and headwall outlet.

2.12 Pre-developed greenfield runoff rates have been established using the HR Wallingford tool and the updated FEH methodology.

2.13 The pre-developed greenfield runoff rates have been calculated using the hard-paved contributing area (positively drained areas). The total contributing area includes the proposed roads, car parking, roof areas, and part of the open-space land from which runoff will be cut off by the proposed drainage system. Altogether, this totals 1.6 ha.

2.14 It should be noted that the site is graded towards the north, with part of the soft landscaping graded at 1:3 and intercepted by the on-site drainage. In accordance with the new National Standard for Sustainable Drainage Systems (SuDS) Standard 3, paragraph 3.29, these areas are to be included in the greenfield runoff calculations. Together with the hard-paved areas, this totals 2.02 ha.

Standard 3, para 3.29 states that: *The entire development area that could potentially drain to the proposed surface water drainage system in an extreme event shall be used for estimating greenfield runoff rates and volumes (including both permeable and impermeable surfaces).*

Greenfield runoff calculation results are listed below:

- QMed 10.5 l/s
- Qbar (FEH) 11.8 l/s
- 1:1 year 9.8 l/s
- 1:10 year 17.6 l/s
- 1:30 year 23.6 l/s
- 1:100 year 30.4 l/s

2.15 A copy of the HR Wallingford Greenfield Runoff Calculation can be found in **Appendix C** at the rear of this report.

Geology and Groundwater

2.16 The British Geological Survey (BGS) identifies the proposed development site as being underlain by Superficial Head Deposits across the western half of the site and Oadby Member deposits across the eastern half. The bedrock geology is indicated to comprise the Gunthorpe Member (mudstone).

2.17 An intrusive ground investigation was undertaken by GRM Development Solutions Ltd, which included the installation of six gas and water monitoring standpipes and the excavation of three soakaway pits. Three soakaway tests were carried out in accordance with the BRE 365 method, all of which indicated insufficient infiltration at the test locations. The results confirmed that the strata of the Oadby Member and the Head Deposits are not suitable for the disposal of surface water via infiltration.

2.18 One infiltration pit has been excavated in the north-west (SA03) of the site, a second in the north-east (SA01), and the third in the south-east (SA02). All infiltration pits revealed gravelly clay and silty clay soils to a total depth of 1.2 m BGL with very poor infiltration potential. Deeper borehole logs indicate that the Oadby Member consists of silty clay down to 7.7 m BGL. Therefore, infiltration methods for surface water runoff disposal have been ruled out.

2.19 A table of all infiltration testing is summarised as follows:

Trial Pit No.	Depth (m)	Test 1	Test 2	Test 3
SA01	1.4	Test Failed		
SA02	1.3	Test Failed		
SA03	1.2	Test Failed		

2.20 A copy of the site investigation report is located in **Appendix D** at the rear of this report.

Hydrogeology

2.21 The only identified local surface wate feature comprise the existing onsite ditches. There are no recorded surface wate abstraction licenses within 500m.

2.22 EA mapping shows site is not located in a groundwater Source Protection Zone (SPZ)

3.0 PROPOSED DEVELOPMENT

Description

3.1 The development proposals are for the erection of 93 residential dwellings, site access and onsite highways, SuDS system and landscaping on Land at Ashby Road, Markfield.

3.2 A copy of the site layout plan is in **Appendix E** at the rear of this report.

Impermeable Areas

3.3 The anticipated impermeable areas of the various elements of the development are summarised as follows. An allowance for 10% Urban Creep has been included within the impermeable areas stated:

- Roof Areas 4,895m^2
- Hardstanding 9,204m^2
- Attenuation Basin 1,311m^2

Total 15,410m^2 – 1.541ha

3.4 A copy of the impermeable areas plan is in **Appendix F** at the rear of this report.

Rainfall Climate Change Allowance

3.5 The latest climate change allowances (available online https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances), which supports the NPPF in making an allowance for climate change within drainage design. The allowances provide predictions of anticipated change for peak river flow by river basin district and peak rainfall intensity.

3.6 The table below shows the anticipated changes in extreme rainfall intensity. The anticipated increases in peak rainfall across the London Management Catchment for the 1% annual exceedance rainfall event are as follows:

Epoch	Central Allowance	Upper End Allowance
2050s	20%	40%
2070s	25%	40%

Table 5.1: Climate Change Allowances

*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

3.7 Based on the latest allowances and a life span of the development of 70 to 100 years, an increase of 40% has been applied to peak rainfall to this development.

Surface Water Drainage

3.8 CIRIA report C753 The SuDS Manual provides guidance on surface water drainage. The aim for surface water runoff is to match greenfield runoff rates and volumes, where reasonably achievable.

3.9 For surface water discharge, the drainage hierarchy notes the following list of drainage options in order of preference:

1. Infiltration to ground
2. Discharge to a watercourse
3. Discharge to a surface water sewer
4. Discharge to a foul water sewer

3.10 Based on the findings above, and following confirmation of low infiltration rates during on-site testing, the proposed surface water drainage strategy involves discharging surface water into the existing watercourse via an on-site attenuation basin.

3.11 The proposed SuDS system will provide sufficient storage to accommodate a 1:100 year storm event including an additional 40% to account for the predicted effects of future climate change.

3.12 The proposed site levels have been designed with consideration for the implementation of Sustainable Drainage Systems (SuDS), where feasible, to manage and convey surface water runoff into the main on-site drainage network.

3.13 Due to the site's topography surface water runoff is to be collected and discharged into the proposed onsite attenuation basin located along the north-easter boundary of the site. Surface water runoff is to be attenuated prior to being discharged into the existing watercourse.

3.14 Surface water runoff is to be attenuated and discharged at a restricted rate of 10.5 l/s, matching the existing Qmed.

3.15 This restriction ensures that the attenuation basin is fully utilised to manage surface water runoff before release into the existing watercourse, thereby strengthening the overall drainage strategy by minimising the risk of flooding downstream.

3.16 The surface water drainage strategy for the development has been carefully designed to ensure compliance with best practice standards and local policy requirements. All surface water runoff generated across the site is proposed to be collected and conveyed to a strategically located main detention basin situated in the north-eastern corner of the site. This basin has been sized appropriately to accommodate runoff from the entire site, including during extreme storm events, and to attenuate flows effectively prior to final discharge. Following attenuation, the runoff is to be discharged into the existing onsite watercourse, which forms part of the natural drainage system.

Foul Water Drainage

3.17 Foul Water from the site is proposed to drain via gravity into the onsite pumping station. Foul runoff is then to be pumped into the existing Public Foul Sewer controlled by Severn Trent within North Street.

3.18 The design of the foul drainage network has been based on Design and Construction Guidance. Based which states a foul flow of 4000 litres per dwelling per day. For 93 dwellings a peak flow of 4.3l/s has been calculated.

3.19 Due to the natural topography of the site, foul water runoff is to be discharged into the onsite pumping station and pumped into the existing public foul sewer located in Ashby Rad. An adoptable foul water pumping station is proposed to be strategically located to the east of the site. The proposed pumping station is to be designed to meet the adoptable standards with suitable hardstanding for tanker access.

3.20 The required 24-hour emergency foul water storage has been calculated in accordance with SSG App C Design Guidance with a standard design criterion of 160 litres per dwelling. For a total of 93 dwellings, the required emergency storage volume is: 93 dwellings × 160 litres/dwelling = 14,880 litres (14.88 m^3)

3.21 This volume provides the necessary 24-hour emergency storage capacity in the event of a pump failure, ensuring the system can safely contain foul flows without surcharge or risk to property or the environment.

3.22 A copy of the proposed drainage strategy plan, drainage calculations and typical construction details is located in **Appendix G** at the rear of this report.

Water Quality

3.23 The proposed development is residential. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is very low to medium.

3.24 The surface water scheme has been designed to include mitigation to ensure that surface water is suitably treated, and any pollution risk adequately managed prior to discharge.

3.25 Surface water runoff from the main access road, classified as medium risk, is proposed to be routed through the proposed dry swale before being discharged into the attenuation basin. Runoff will be treated through the dry swale and permeable sediment forebay berm, preventing the discharge of total suspended solids (TSS), metals, and hydrocarbons into the existing watercourse downstream.

3.26 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of relevance to the development proposals are as follows:

	Pollution Hazard Level	Total Suspendered Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads (below 300 movements)	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change, all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7

Table 5.2: Pollution Hazard Indices

3.27 Pollution Mitigation Indices for each SuDS component within the proposal are as follows:

Type of Mitigation	Total Suspendered Solids (TSS)	Metals	Hydrocarbons
Dry Swales	0.5	0.6	0.6
Detention Basin	0.5 x 0.5	0.5 x 0.5	0.5 x 0.6
Total:	0.75	0.85	0.85

Table 5.3: Pollution Mitigation Indices

3.28 A factor of 0.5 has been used to account for the reduced performance of secondary component associated with already reduced inflow concentrations.

3.29 The surface water drainage design combines the use of dry swale with filtration forebay and attenuation basin. The proposed drainage meets the target treatment level required for a site with Pollution Hazard Level of 'Very Low to Medium Risk'.

3.30 For further information on the water quality proposals please see the site-specific water quality provision table located on the drainage strategy plan provided.

4.0 CONCLUSIONS

4.1 The development proposals are for the erection of 93 residential dwellings, site access and onsite highways, SuDS system and landscaping on Land at Ashby Road, Markfield.

4.2 A suitable SuDS drainage system is proposed which accords with the requirements of national and local policy.

4.3 Surface water will be discharged into the existing onsite watercourse at a restricted rate.

4.4 Preliminary calculations confirm that surface water runoff generated by the proposed development can be attenuated on site for all rainfall events up to the 1:100 year event including an allowance for climate change.

4.5 Foul drainage will be lifted by the use of onsite pumping station into the existing Severn Trent Public sewer located in Ashby Road.

4.6 Water quality improvement will be provided as part of the SuDS system proposed.