Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/003/23**
Address	Land at Hudson Road Industrial Estate, Melton Mowbray
Area	8.13ha
Current land use	Greenfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	Located in the centre of Melton borough, to the north-east of Melton Mowbray, the site is within the downstream reach of the Thorpe Brook catchment which drains an area of approximately 15.8km^2. The catchment is predominantly rural, with Thorpe Brook flowing southwards (approximately 140m west of the site) from Waltham on the Wolds to Melton Mowbray, where it joins the River Eye.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates the site is located on a south-western slope, with the high ground to the north-eastern corner where the maximum elevation is 97.7m AOD. The lowest elevation is found along the western boundary at an elevation of 78.1m AOD.
Existing drainage features	There is a drainage ditch along the western boundary of the site. Thorpe Brook flows southwards approximately 130m west of, and parallel to, the site. Additionally, there is an unnamed ordinary watercourse approximately 325m east of the site, which is a tributary of the River Eye. The site is likely to drain into the ditch and Thorpe Brook.
Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 0% of the site Flood Zone 3a covers 0% of the site Flood Zone 2 covers 1% of the site Flood Zone 1 covers 99% of the site. *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the*

	percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%). **Available data:** The 2011 detailed hydraulic model for River Wreake and Tribs was used in this assessment (only extent and depth outputs available). This model has been incorporated into the EA's Flood Map for Planning. **Flood characteristics:** There is minimal fluvial flood risk shown in the site as it is almost entirely within Flood Zone 1. Flood Zone 2 encroaches very marginally into the western corner. The 0.1% AEP modelled event indicates a depth here of 0.8m. Flood Zone 3 is not within the site however it is about 10m west of the western boundary, indicating that there is fluvial risk near the site boundary.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers 0% of the site **1% AEP** covers less than 1% of the site **0.1% AEP** covers less than 1% of the site *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** In all AEP events, there are no flow paths within the site. However, there is a significant flow path to the immediate west of the site, which encroaches marginally onto the western boundary. This flow path is associated with Thorpe Brook and the flood extents do not extend onto the site beyond the drainage ditch along the western boundary.
Reservoir	The site is not shown to be at risk of reservoir flooding in the EA's reservoir flood maps.

Groundwater	The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the site has less than 50% susceptibility to groundwater flooding. The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site has negligible risk. It is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (LE13 1) with 19 recorded sewer flooding incidents, according to Severn Trent Water's incident records (for the period from January 1990 to April 2024), however the incidents are not located in the vicinity of the site with only three incidents occurring along Thorpe Road.
Flood history	Historic flooding records provided by Leicestershire County Council identify one instance of highway flooding near the south-west corner of the site, in 2016. Melton Borough Council have identified that after periods of heavy rainfall, water pools on Thorpe Road and Crossfield Drive, blocking access here. The EA's historic flooding and recorded flood outline datasets show there are no historic flood outlines at the site, but there are outlines of historic flooding from Thorpe Brook approximately 300m south-west of the site.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows there are no formal flood defences within the vicinity of the site.
Residual risk	Thorpe Brook enters a culvert under Crossfield Drive approximately 140m west of the site, presenting residual risk to the site in the event of a blockage which could cause water to back up and encroach on the site.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of climate change outputs from the detailed modelling, the Flood Map for Planning Flood Zone 2 can be used as an indication of the 1% AEP plus climate change flood extent. Flood Zone 2 shows fluvial flood risk to the immediate west of the site from Thorpe Brook, which flows southwards approximately 130m west of the site, with the extent marginally encroaching on the western corner of the site. • Based on the indicative climate change scenario, the site is not shown to be very sensitive to climate change as there is only a slight increase in extent between Flood Zone 3a and Flood Zone 2, which is likely a result of the surrounding topography. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 40% climate change. • The depths remain the same for the 1% AEP and the design event, but the extent increases. However, the increase from the design event compared to the present day 0.1% AEP event is minimal. • In addition, there is no risk shown to the site during the 3.3% AEP event, however during the 3.3% AEP plus 35% climate change event, the extent significantly increases and encroaches into the western boundary of the site. • This indicates that the western edge of the site is likely to be at increased flood risk from surface water in the future due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Emergency planning

Flood warning	The south-western boundary of the site is covered marginally by the EA's River Wreake in Leicestershire Flood Alert Area (034WAF404). The site is not located in a Flood Warning Area.
Access and egress	Existing access is into the south-west corner of the site from Crossfield Drive, via a grassy track. Crossfield Drive joins the main road, Thorpe Road (A607), 170m to the west. In the 1% AEP fluvial event, safe access and egress within the site are maintained, however access/egress to the surrounding area is impeded. Fluvial extents cover Crossfield Drive to a maximum depth of 1.4m and the nearby section of Thorpe Road to a maximum depth of 0.6m. As velocity information from the fluvial model is not available, the velocity shown in the surface water modelling can be used as an indication. In the surface water design event (1% AEP plus 40% climate change) maximum velocities on Crossfield Drive reach 0.9m/s and on Thorpe Road reach 1.5m/s. With the predicted maximum depths of 1.5m, this could affect access/egress in this direction. In the 3.3%, 1% and 0.1% AEP surface water events access and egress on Crossfield Drive and Thorpe Road is impeded. In the surface water design event, the maximum hazard rating is 'Danger to All' implying safe access and egress may not be possible in this direction. Safe access and egress may be possible if access from Lag Lane to the east of the site can be included as part of the proposed development. Safe access and egress will need to be demonstrated in the 1% AEP plus climate change surface water and fluvial events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.
Dry Islands	The site is not located on a dry island.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils** • Geology at the site consists of: ○ Bedrock consisting of mudstone, siltstone, limestone and sandstone that forms the Liad Group.

	○ Superficial deposits consisting of clay, silt, and sand alluvium to the west, glacial sand and gravel to the south, and till to the east. • Soils at the site consist of: ○ Slowly permeable, seasonally wet, slightly acidic but base rich loamy and clayey soils. ○ Lime rich loamy and clayey soils with impeded drainage. **Sustainable Drainage Systems (SuDS)** • The site is not considered to be susceptible to groundwater flooding. This should be confirmed with site investigations. • BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff. • The site is not in a Groundwater Source Protection Zone and there is no historic landfill within the site. • The site is within the Soar R Nitrate Vulnerability Zone, and an undifferentiated Secondary Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. Infiltration methods and strategies at the site should be subject to infiltration testing which should be conducted at the site to determine their suitability. • Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority (LLFA). It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local

	Planning Authority, Lead Local Flood Authority, and Environment Agency) at an early stage to understand possible constraints. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered, however infiltration methods and strategies at the site should be subject to infiltration testing which should be conducted at the site to determine their suitability. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable' and the site is in Flood Zone 1. Therefore, the exception test will not be required, provided development is proposed outside of the areas of fluvial and surface water risk along the western boundary of the site and safe access and egress can be provided.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** At the planning application stage, a site-specific FRA will be required as the site is within Flood Zone 1 but is shown to be at surface water flood risk during its lifetime.

	Guidance for site design and making development safe: • Development should be steered outside of the appropriate 1% AEP plus climate change flood extent, or Flood Zone 2 where detailed fluvial modelling is not available, at the western boundary of the site. • A detailed hydraulic model of Thorpe Brook with blockage scenarios may be required at FRA stage to accurately represent the risk from this watercourse and set the height of any mitigation measures. • The CIA identified this site to be within a high-risk catchment for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from the surface water flow route at the western boundary of the site should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. • Arrangements for safe access and egress along Crossfield Drive and Thorpe Road, or along Lag Lane to the east of the site, will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

The site is predominantly unaffected by fluvial and surface water flooding, however the western boundary may encounter fluvial flood risk due to Thorpe Brook. Additionally, there are significant access and egress issues in all AEP events including the design event. Additionally, there is residual risk from the potential blockage of the culvert for Thorpe Brook to the west of the site. The following points should also be considered in development of this site:

- In the absence of high-resolution detailed modelling for climate change, all development should be steered away from the extent of Flood Zone 2 along the western boundary of the site.
- Modelling of Thorpe Brook with blockage scenarios should be conducted to inform a site-specific FRA. The FRA should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This will be informed by detailed fluvial/surface water modelling to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest models are used where possible. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.
- Safe access and egress (preferentially dry) to all areas of the site should be demonstrated during the 1% AEP plus climate change surface water and fluvial events. If there are significant issues, a Flood Warning and Evacuation Plan should be prepared which considers the likely onset and duration of flooding, including during a breach scenario, and demonstrates how residents can safely be evacuated and/or shelter safely in situ during the fluvial and surface water design events.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, with development to be steered away from the areas identified to be at risk of surface water flooding along the western boundary of site. This is in line with the sequential approach to site layout.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/010/23**
Address	Land west of Normanton Lane, north of Normanton
Area	22.81ha
Current land use	Greenfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	The site is located in the northern-most area of Melton borough and is within two management and river catchments. The west of the site drains into the River Devon catchment in the Humber River Basin District, and the east drains into Ease Drain catchment in the Anglian River Basin District, both of which are predominantly rural catchments. The River Devon flows northwards approximately 800m west of the site, and the site is in the downstream part of the catchment which has an approximate drainage area of 79.7km^2. The site is in the upstream part of the Ease Drain catchment which has an approximate drainage area of 18.8km^2 with the Ease Drain flowing northwards approximately 2.5km east of the site.
Topography	The Environment Agency (EA) 1m resolution LiDAR indicates that the site is on a topographic high point, sloping down from the centre of the site to the west for half the site, and sloping down from the centre of the site to the east for the other half. The maximum elevation is 35.6m AOD at the central area of the site, and the minimum elevation is 22.2m AOD in the north-west corner of the site.
Existing drainage features	There are no existing drainage features within the site, however there are drainage ditches to the north-west of the site. Due to the topography, it is likely the site drains to both the River Devon to the west and the Ease Drain to the east.

Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 0% of the site Flood Zone 3a covers 0% of the site Flood Zone 2 covers 0% of the site Flood Zone 1 covers 100% of the site *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).* **Available data:** The EA's Flood Map for Planning has been used within this assessment. It should be noted that the extents from the River Devon model are 280m south-west of the site and appear to end abruptly. A site-specific FRA should confirm the risk to the site based on detailed hydraulic modelling which covers the area of the River Devon upstream of the existing model extent. However, the site is significantly elevated above the River Devon and it is unlikely that it would be affected by even an extreme event. **Flood characteristics:** There is no fluvial flooding shown to the site in any modelled scenario and the site is entirely within Flood Zone 1.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers 2% of the site Max depths are between 0.3 and 0.6m Max velocities are less than 0.25m/s **1% AEP** covers 4% of the site Max depths are between 0.3 and 0.6m Max velocities are less than 0.25m/s **0.1% AEP** covers 8% of the site Max depths are between 0.3 and 0.6m Max velocities are between 0.5 and 1.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).*

	Available data: The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** The site is affected during the 3.3% AEP, 1% AEP, and 0.1% AEP events, predominantly in the south-east corner of the site. In the 3.3% AEP and 1% AEP events, there is an area of ponding in the south-east corner of the site as well as some smaller areas of ponding along the eastern boundary. In the south-east corner, maximum depths are between 0.3 and 0.6m, with a maximum velocity that is less than 0.25m/s and a maximum hazard rating of 'Danger to Some'. In the 0.1% AEP event, there is additional surface water ponding to the east and north-west of the existing building in the north of the site. The maximum depth within these areas of ponding is between 0.3 and 0.6m, and the maximum velocities are between 0.25 and 0.5m/s with a maximum hazard rating of 'Danger to Most'.
Reservoir	The site is not shown to be at risk of reservoir flooding in the EA's reservoir flood maps.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site has negligible risk. It is not considered to be susceptible to groundwater emergence, due to the nature of the local geological deposits. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) 1km resolution map shows the site has less than 50% susceptibility to groundwater flooding. Bottesford Parish Council report that there is significant and persistent groundwater flooding within the northern area of the site after high rainfall events. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (NG13 0) with 8 recorded sewer flooding incidents, according to Severn Trent Water's incident records (for the period from January 1990 to April 2024). None of these

	incidences are located within the site. Part of the site is within Anglian Water's boundary, however data was not available at the time of publication.
Flood history	Historic flood records provided by Leicestershire County Council show no incidents at the site, however there was a recorded incident 300m to the south in 2012 from the River Devon. The EA's historic flooding and recorded flood outlines do not show any flood outlines within the site but do show historic flooding associated with the River Devon approximately 500m northwest of the site.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows that there are no formal defences along the River Devon near to the site.
Residual risk	There is no residual risk to the site from flood risk management structures.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP plus climate change flood extent. Flood Zone 2 does not cover the site. • Based on the indicative climate change scenario, the site is likely to remain at low risk of fluvial flooding in the future. **Surface Water** • The latest climate change allowances have been applied to the RoFSW maps to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 40% climate change. • During the design event, the extents are slightly larger than present-day, however depths and velocities are similar to the 1% AEP event. There is a small area in the south-east corner where the hazard rating increases to 'Danger for Most.' This indicates

	that the site is slightly sensitive to increased flood risk from surface water due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Emergency planning

Flood warning	The site is not located in an EA Flood Warning or Flood Alert Area.
Access and egress	Current access and egress is at the northwest corner of the site via Normanton Lane which runs parallel to the eastern boundary of the site, and via a track which enters the northern boundary of the site. Safe access and egress are maintained in all AEP surface water events including the design surface water event (1% AEP plus 40% climate change allowance) at the current access points. Normanton Lane is accessible in both directions.
Dry Islands	The site is not located on a dry island.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock comprised of mudstone, siltstone, limestone and sandstone that form the Lias Group.
	  ○ Superficial geology consisting of clay, silt and sand alluvium deposits.
	• Soils at the site consist of:
	  ○ Lime rich loamy and clayey soils with impeded drainage.
	Sustainable Drainage Systems (SuDS)
	• The site is not considered to be susceptible to groundwater flooding. However, issues have been noted by Bottesford Parish Council therefore this should be confirmed with site investigations.
	• BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Offsite discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff.

	• The site is not in a Groundwater Source Protection Zone, there is no historic landfill within the site, and the site does not fall into a Superficial Aquifer Designation Zone. • The site is within two nitrate vulnerability zones including the Smite R Nitrate Vulnerability Zone and the Lower Witham Nitrate Vulnerability Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. • Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority (LLFA). It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner. • The area of surface water ponding in the south-east corner of the site provides an appropriate location for an attenuation basin.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.

	• Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable' and the site is in Flood Zone 1. Therefore the exception test is not required for this site.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site is greater than 1ha and is shown to be at surface water risk during its lifetime. **Guidance for site design and making development safe:** • Development should be steered outside of the appropriate 1% AEP plus climate change surface water flood extent in the south-east corner of the site, along the eastern boundary, and to the east and north-west of the existing building in the north of the site. • The CIA identified this site to be within two high-risk catchments for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes near the eastern boundary of the site should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from

	the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. • If additional access routes are created, arrangements for safe access and egress will need to be provided for the 1% AEP surface water events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

The site is impacted by surface water flooding in the south-east corner and around the existing building. However, the site is at minimal risk from fluvial flooding and there is no residual risk or access/egress issues. Therefore, development is likely to proceed if it is steered away from areas at surface water risk. The following points should be considered in development of this site:

- A site-specific Flood Risk Assessment should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. Developers should consult the Environment Agency to ensure the latest model for the River Devon is used. Additional updates including extending the model area may be required. Furthermore, a site investigation should investigate the risk posed by groundwater emergence at the site due to reports from Bottesford Parish Council of flooding in the north of the site.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling. Development should be steered away from the areas identified to be at risk of surface water flooding within the site, mainly in the southeast and near the eastern boundary of the site. This is in line with the sequential approach to site layout.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/015/23**
Address	Airfield Farm, Dalby Road, Melton Mowbray
Area	8.57ha
Current land use	Brownfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	The site is located in the south of Melton borough in the rural outskirts of Melton Mowbray, within the upstream reaches of the 'Eye/Wreake from Langham Brook to Soar' catchment which drains an area of approximately 98.1km^2. The River Eye flows westwards through the catchment approximately 2km north of the site, from Stapleford to the south-west of Melton Mowbray where it joins the River Wreake.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site is located on an east facing slope. The highest point of elevation is 110.4m AOD in the south-west corner of the site, and the lowest elevation of 91m AOD is in the north-east corner of the site. The site is steeper in the eastern half as the site encounters the ordinary watercourse at its boundary.
Existing drainage features	Along the eastern boundary, there is an ordinary watercourse which is the upper reach of Edendale Brook, flowing northwards. This is a tributary of the River Eye which is approximately 2km north-west of the site. Within the centre of the site there is a drainage feature made up of three small ponds.
Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 0% of the site Flood Zone 3a covers 0% of the site Flood Zone 2 covers 0% of the site Flood Zone 1 covers 100% of the site

	The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%). **Available data:** The EA's Flood Map for Planning has been used within this assessment. **Flood characteristics:** There is no fluvial flooding shown to the site in any modelled scenario and the site is entirely within Flood Zone 1. The area of flood risk shown from the watercourse along the eastern boundary of the site is picked up in the surface water mapping.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers less than 1% of the site **1% AEP** covers less than 1% of the site **0.1% AEP** covers 5% of the site Max depth is between 0.3 and 0.6m Max velocity is between 1.0 and 2.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** In the 3.3% AEP and 1% AEP events, there are flow paths along the eastern boundary of the site associated with the ordinary watercourse (Edendale Brook). In the 0.1% AEP event, the flow path associated with Edendale Brook encroaches further onto the site along the eastern boundary. The maximum depths here are between 0.3 and 0.6m with a maximum hazard rating of 'Danger to Most'.

	Additionally for the 0.1% AEP event, there are two flow paths flowing eastwards within the northern area of the site, and there is an area of ponding near the existing buildings at the site. The maximum velocities are between 0.5 and 1m/s near the buildings, and between 1.0 and 2.0m/s along the flow paths. The hazard rating in these areas is 'Caution'.
Reservoir	The site is not shown to be at risk of reservoir flooding in the EA's reservoir flood maps.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site has negligible risk. It is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the site has less than 25% susceptibility to groundwater flooding. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (LE13 0) with 11 recorded sewer flooding incidents, according to Severn Trent Water's incident records (for the period from January 1990 to April 2024). However, these are not in the vicinity of the site.
Flood history	Historic flooding records provided by Leicestershire County Council identify no instances of historic flooding within the site or in the vicinity. The EA's historic flooding and recorded flood outline datasets show there are no historic flood outlines within the site or in the vicinity.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows there are no formal flood defences within the vicinity of the site.
Residual risk	There is no residual risk to the site from flood risk management structures.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP event plus climate change flood extent. Flood Zone 2 does not cover the site. • Based on the indicative climate change scenario, the site is likely to remain at low risk of fluvial flooding in the future. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 40% climate change. • The extent of the design event encroaches further onto the eastern side of the site than the present-day 1% AEP event. Also, during the design event, additional flow paths develop across the site which is are similar to the present-day 0.1% AEP event, reaching a maximum depth of 0.2m with a hazard rating of 'Caution'. • In addition, there is no flood risk shown to the site during the 3.3% AEP event, however during the 3.3% AEP plus 35% climate change event, the extent increases and encroaches into the eastern boundary of the site. • Due to the additional flow paths and increased extents of flood risk, the site is likely to be at increased flood risk from surface water in the future due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Emergency planning

Flood warning	The site is not located in an EA Flood Warning or Flood Alert Area.

Access and egress	Existing access and egress are through the use of Dalby Road (B6047) which runs adjacent to the western boundary of the site. There is an access point to the existing buildings on the site, with a track which continues eastwards through the central area of the site. In all the AEP surface water events and the surface water design event (1% AEP plus 40% climate change allowance), safe access and egress is demonstrated with depths on Dalby Road of less than 0.15m and a maximum hazard rating of 'Caution'. It should however be noted that in all AEP events there is a significant flow path approximately 500m north of the site which crosses Dalby Road and could impede access and egress to/from the wider area in this direction.
Dry Islands	The site is not located on a dry island.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock consists of mudstone, siltstone, limestone and sandstones that form the Lias Group.
	  ○ Superficial deposits of diamicton till.
	• Soils at the site consist of:
	  ○ Lime rich loamy and clayey soils with impeded drainage.
	  ○ Slowly permeable, seasonally wet, slightly acidic but base rich loamy and clayey soil.
	
	Sustainable Drainage Systems (SuDS)
	• The site is not considered to be susceptible to groundwater flooding. This should be confirmed with site investigations.
	• BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff.
	• The site is not in a Groundwater Source Protection Zone and there is no historic landfill within the site.
	• The site is within the Soar R Nitrate Vulnerability Zone, and a Secondary B Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. Infiltration methods and strategies at the site should be subject to infiltration testing should be conducted at the site to determine their suitability.

	• Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. As there is significant existing hardstanding on the site, implementing SuDS could help to reduce flood risk overall to the wider catchment. • If it is proposed to discharge runoff to the unnamed watercourse to the east or a sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA, and EA) at an early stage to understand possible constraints. • Edendale Brook along the eastern boundary should be integrated into the site drainage strategy as blue-green infrastructure. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are

	>5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable'. Therefore, the exception test will not be required, providing development is proposed outside the flow path along the eastern boundary of the site.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site is within Flood Zone 1 and greater than 1ha and is shown to be at surface water flood risk during its lifetime. **Guidance for site design and making development safe:** • Development should be steered outside of the 1% AEP plus climate change flood extent for surface water along the eastern boundary and across the site. • A detailed model of Edendale Brook is likely to be required at the FRA stage to accurately represent the risk from the watercourse, any blockage modelling that may be needed, and the height of any mitigation measures. • The CIA identified this site to be within a high-risk catchment for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes along the eastern boundary and across the site should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development

	greenfield rates. Edendale Brook along the eastern boundary should be integrated into the site drainage strategy as blue-green infrastructure. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

The site is impacted in the surface water design event (1% AEP plus 40% climate change allowance). There are minor flow paths across the site, and a major flow path along the eastern boundary associated with Edendale Brook. The following points should also be considered in development of this site:

- In the absence of high-resolution detailed modelling, all development should be steered away from the eastern boundary of the site. Developers should consider the use of SuDS or green-blue infrastructure along the existing flow paths identified and incorporate this into the site design.
- Discharge of surface water from the site should be considered in line with the drainage hierarchy, subject to infiltration testing and considering the use of the nearby drainage features to the eastern boundary.
- Modelling of Edendale Brook should be conducted to inform a site-specific FRA. The FRA should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This will be informed by detailed fluvial/surface water modelling, to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest models are used where possible. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling, with development to be steered away from the areas identified to be at risk of surface water flooding along the eastern boundary and across the northern area of the site. This is in line with the sequential approach to site layout. There is significant existing hardstanding which presents an opportunity to reduce flood risk overall to the wider catchment by implementing SuDS, and restricting flows to the greenfield runoff rates.

- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/20/23**
Address	Melton Airfield, Dalby Road, Melton Mowbray
Area	92.18ha
Current land use	Brownfield/ Greenfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	The site is located in the south of Melton borough in the rural outskirts south of Melton Mowbray, within the upstream reaches of the 'Eye/Wreake from Langham Brook to Soar' catchment which drains approximately 98.1km^2. The River Eye flows westwards through the catchment approximately 2km north of the site, from Stapleford to the south-west of Melton Mowbray where it becomes the River Wreake, which continues flowing westwards until its confluence with the River Soar at Cossington.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site slopes down towards the north and north-west. The highest elevation is 120.3m AOD in the south-eastern corner of the site, with the lowest elevation in the north-western area of the site at 99m AOD.
Existing drainage features	At the north-western boundary, there is an unnamed ordinary watercourse that flows northwards. This forms a tributary of the Great Dalby Brook which flows northwards approximately 570m west of the site and joins the River Eye approximately 2.6km north-west of the site. There is also the upper reach of the Edendale Brook approximately 370m east of the site, which is a tributary of the River Eye. Within the site, in a pre-development scenario water is likely to drain into the ordinary watercourse at the north-western boundary.

Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 0% of the site Flood Zone 3a covers 0% of the site Flood Zone 2 covers 0% of the site Flood Zone 1 covers 100% of the site *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).* **Available data:** The EA's Flood Map for Planning has been used within this assessment. **Flood characteristics:** There is no fluvial flooding shown to the site in any modelled scenario and the site is entirely within Flood Zone 1. The area of flood risk shown from the watercourse in the west of the site is picked up in the surface water mapping.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers less than 1% of the site Max depth is less than 0.15m Max velocity is between 0.5 to 1.0m/s **1% AEP** covers less than 1% of the site Max depth is less than 0.15m Max velocity is between 0.5 to 1.0m/s **0.1% AEP** covers 5% of the site Max depth is between 0.15 to 0.3m Max velocity is between 1.0 to 2.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment.

	Description of surface water flow paths: The site is affected by surface water in all AEP events. In the 3.3% AEP event, there are four instances of ponding in the southern area of the site, with a flow path in the topographical low points in the western area of the site. Maximum depths are less than 0.15m with a maximum velocity between 0.5 and 1.0m/s and a hazard rating of 'Caution'. In the 1% AEP event, the flow path across the western area of the site is marginally larger than the 3.3% AEP flow path, where it follows the topographic low areas to flow into the ordinary watercourse at the site's north-west boundary. However maximum depths within the flow path do not exceed 0.15m and velocities remain between 0.5 and 1.0m/s with a hazard rating of 'Caution'. In the 0.1% AEP event, the flow path across the western area of the site becomes more significant, extending further southwards and increasing to depths of between 0.15 and 0.3m, velocities of between 1 and 2m/s and a higher maximum hazard rating of 'Danger for most'. The flow path follows the topographic low points to flow into the ordinary watercourse at the site's boundary. There is also additional ponding close to the southern boundary, and in the northern and central areas of the site.
Reservoir	The site is not shown to be at risk of reservoir flooding in the EA's reservoir flood maps.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site has negligible risk. It is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the site has less than 50% susceptibility to groundwater flooding. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (LE13 0) with 11 recorded sewer flooding incidents, according to Severn Trent Water's incident records (for the period from January 1990 to April 2024). However, there are no recorded incidences within the vicinity of the site.

Flood history	Historic flooding records provided by Leicestershire County Council identify no instances of historic flooding in the vicinity or within the site. The EA's historic flooding and recorded flood outline datasets show there are no historic flood outlines in the vicinity or within the site.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows that the site is not protected by any formal flood defences.
Residual risk	There is no residual risk to the site from flood risk management structures.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP event plus climate change flood extent. • Flood Zone 2 is similar to the Flood Zone 3 extent of the Great Dalby Brook west of the site and indicates the site is not likely to be very sensitive to increases in fluvial flood risk due to climate change. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 40% climate change event. • The extent of the design event significantly exceeds the present day 1% AEP event, with extents similar to the present day 0.1% AEP event. In addition, there is only a small amount of risk shown to the site during the 3.3% AEP event, however during the 3.3% AEP plus 35% climate change event, the extent increases to form a flow path in the western part of the site, and additional areas of ponding occur across the site. This indicates that the site is very

	sensitive to increased flood risk from surface water due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Emergency planning

Flood warning	The site is not located in an EA Flood Warning or Flood Alert Area.
Access and egress	Current access and egress are via numerous access points along the eastern boundary of the site off Dalby Road (B6047), which runs adjacent to the site. There is a track that runs through the western area of the site connecting the buildings in the south to those next to Dalby Road in the north. In the 3.3% AEP and 1% AEP surface water events, safe access and egress are maintained throughout the site, and Dalby Road is clear in both directions. In the 0.1% AEP surface water event and surface water design event (1% AEP plus 40% climate change allowance), safe access and egress are maintained. There is minor ponding on Dalby Road next to the site however it is shallow with a maximum depth of 0.1m, maximum velocity of 1.3m/s and a 'Caution' hazard rating. There is a significant flow path approximately 540m north along Dalby Road, which may impede access/egress in this direction. Within the site and to the south of the site, the road in the western area is crossed by surface water however these extents are shallow (maximum depth of 0.1m with a velocity of 1.3m/s) and have a hazard rating of 'Caution'.
Dry Islands	The site is not located on a dry island.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock consists of mudstone, siltstone, limestone and sandstones that form the Lias Group.
	  ○ Superficial deposits of diamicton till.
	• Soils at the site consist of:
	  ○ Lime rich loamy and clayey soils with impeded drainage.

	Slowly permeable, seasonally wet, slightly acidic but base rich loamy and clayey soil. **Sustainable Drainage Systems (SuDS)** • The site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. This should be confirmed with site investigations. • BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff. • The site is not in a Groundwater Source Protection Zone and there is no historic landfill within the site. • The site is within the Soar R Nitrate Vulnerability Zone, and a Secondary B and undifferentiated Secondary Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. • Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques, subject to infiltration testing. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area, especially to the Southern Sustainable Neighbourhood (SSN) site located downstream. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and Environment Agency) at an early stage to understand possible constraints. • Infiltration testing should be conducted at the site to determine the suitability of drainage features and drainage strategies should adhere to the drainage hierarchy.

	• Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable' and the site is within Flood Zone 1. Therefore, the exception test is not required for this site, providing development is steered away from the surface water flow path in the west of the site.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site is greater than 1ha and there is surface water risk across the site. **Guidance for site design and making development safe:** • Development should be steered outside of the 1% AEP plus climate change surface water flood extent, particularly in the western area of the site. • A detailed model of the unnamed ordinary watercourse at the north-west boundary is likely to be required at the FRA stage to accurately represent the risk from the watercourse, flood depths, and the height of any mitigation measures required. • The CIA identified this site to be within a high-risk catchment for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land

	that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes, especially in the western area of the site, should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

The site is most affected in the 0.1% AEP surface water event and the surface water design event (1% AEP plus 40% climate change allowance) which form a flow path through the west of the site. The following points should be considered in development of the site:

- Modelling of the unnamed ordinary watercourse at the north-west boundary should be conducted to inform a site-specific Flood Risk Assessment. The FRA should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This should be informed by detailed surface water modelling and investigation of any interaction with the unnamed ordinary watercourse at the north-west boundary of the site, to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest models are used where possible. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, with development to be steered away from the areas identified to be at risk of surface water flooding in the west of site. This is in line with the sequential approach to site layout.
- Where there is flood risk, particularly in the western area, developers should consider the use of conveyance SuDS and green spaces, with any drainage features designed in accordance with the drainage hierarchy.

- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/009/23**
Address	Site A, Burrough Court, Burrough on the Hill
Area	1.04ha
Current land use	Greenfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	The site is located in the south of Melton borough, in the village of Burrough-on-the-Hill. The site is upstream in the Queniborough Brook catchment, which is predominantly rural with the Gaddesby Brook flowing north-westwards approximately 920m south of the site. The catchment drains an area of approximately 76.08km^2.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site is on a south-west facing slope, with a maximum elevation of 167.1m AOD at the northern boundary of the site, and a minimum elevation of 161.2m AOD in the southern-most area of the site.
Existing drainage features	An unnamed ordinary watercourse, which is a tributary of the Gaddesby Brook, flows southwards approximately 1.1km east of the site. There are no existing drainage features within the site, and it is likely that the site drains south-westwards towards Gaddesby Brook.
Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 0% of the site. Flood Zone 3a covers 0% of the site. Flood Zone 2 covers 0% of the site. Flood Zone 1 covers 100% of the site. *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).*

	Available data: The EA's Flood Map for Planning has been used within this assessment. **Flood characteristics:** There is minimal fluvial flood risk shown in the site, as the site is entirely in Flood Zone 1.
Surface water	**Proportion of site at risk:** **3.3% AEP** extents cover 0% of the site. **1% AEP** extents cover 0% of the site. **0.1% AEP** extents cover 27% of the site. Max depths are less than 0.15m. Max velocity is between 1.0 to 2.0m/s. *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** The RoFSW map shows no risk of surface water flooding to the site in the 3.3% AEP and 1% AEP event. In the 0.1% AEP event, there is a flow path across the north of the site from the northern corner to the western corner. The flow path has a maximum depth below 0.15m, maximum velocities between 1.0 and 2.0m/s and a hazard rating of 'Caution'.
Reservoir	The site is not shown to be at risk of reservoir flooding in the EA's reservoir flood maps.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological deposits. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) 1km resolution map shows the site has less than 25% susceptibility to groundwater flooding.

	This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (LE14 2) with 5 recorded sewer flooding incidents, according to Severn Trent Water's incident records (for the period from January 1990 to April 2024). However, these incidences are not in the vicinity of the site.
Flood history	The EA's historic flooding and recorded flood outline datasets do not have a record of any flooding on or around the site. Additionally, historic flooding records provided by Leicestershire County Council do not show any records of flooding on or around the site.

Flood risk management infrastructure

Defences	The EA's AIMS data set shows there are no formal flood defences within the vicinity of the site.
Residual risk	There is no residual risk to the site from flood risk management structures.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling, the Flood Map for Planning Flood Zone 2 can be used as an indicative extent to represent 1% AEP plus climate change flood. • Flood Zone 2 does not encroach the site, therefore the site is likely to remain at low risk of fluvial flooding in the future. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on surface water flood risk. • The design event for rainfall intensities is the 1% AEP event with upper end climate allowance for the 2070s epoch, which is 1% AEP plus 40% climate change. • The extent with climate change is significantly larger than the 1% AEP extent and impacts the site unlike the present-day event.

	The flow path extending across the north-west part of the site exceeds the 0.1% AEP extent and an additional flow path develops across the centre of the site. However, the hazard rating remains at 'Caution' with maximum depths of 0.1m and maximum velocities of 1.1m/s. Development proposals at the site must consider climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Emergency planning

Flood warning	The site is not located in an EA Flood Warning or Flood Alert Area.
Access and egress	Existing access and egress to the site is through an unnamed access road off Twyford Road, into the west of the site. Marefield Lane which connects to Twyford Road north-east of the site, provides access from the south. In the 3.3% AEP and 1% AEP surface water events, there is safe access and egress at the site with depths on Twyford Road and Marefield Lane below 0.15m and velocities between 0.5 and 2.0m/s, resulting in a hazard rating of 'Caution'. In the 0.1% AEP surface water event and the design surface water event (1% AEP plus 40% climate change allowance), the extents partially cover the unnamed access road as well as Twyford Road and Marefield Lane. In the design event, the maximum depth on the access road and surrounding roads is 0.1m, and the hazard rating is 'Caution' with a maximum velocity of 1.4m/s. Therefore, the available mapping shows that safe access and egress are maintained in all directions.
Dry Islands	The site is not located on a dry island.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock comprised of mudstone, siltstone, limestone and sandstone that form the Lias Group.
	  ○ Superficial geology consisting of diamicton till.
	• Soils at the site consist of:

	○ Lime rich loamy and clayey soils with impeded drainage. **Sustainable Drainage Systems (SuDS)** • The site is not considered to be susceptible to groundwater flooding. This should be confirmed with site investigations. • BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff. • The site is not in a Groundwater Source Protection Zone and there is no historic landfill within the site. • The site is within the Soar R Nitrate Vulnerability Zone. It is also within an undifferentiated Secondary Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. Infiltration methods and strategies at subject to infiltration testing should be conducted at the site to determine their suitability. • Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority (LLFA). It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA, and EA) at an early stage to understand possible constraints. • SuDS should be designed with a holistic approach, combining ecology, landscape and drainage requirements specific to the site, incorporating Biodiversity Net Gain requirements. • Development at this site should not increase flood risk either on or off site. The design of the surface water management

	proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. Infiltration methods and strategies at the site should be subject to infiltration testing should be conducted at the site to determine their suitability. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable' and the site is in Flood Zone 1, therefore the exception test is not required for this site.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site is over 1ha whilst being in Flood Zone 1 and contains surface flood water extents for the 1% AEP plus 40% climate change allowance event. **Guidance for site design and making development safe:** • Development should be steered outside of the 1% AEP plus climate change surface water flood extent across the north and centre of the site. Developers should consider utilising this area as a green corridor or as a location for SuDS. • The CIA identified this site to be within a medium-risk catchment for the cumulative impacts of development. As such, the LPA should work with the LLFA and the EA to identify areas that should be safeguarded for future flood alleviation schemes and NFM features. There is potential for development in the catchment to contribute towards works that reduces flood risk

	and enable regeneration and contribute to the wider provision of green infrastructure. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/ essential infrastructure uses only. • Arrangements for safe access and egress via an unnamed access road off Twyford Road and via Marefield Lane will need to be provided for the 1% AEP pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

Areas of the site are affected by the 0.1% AEP surface water event and the surface water design event (1% plus 40% climate change allowance). There is no residual risk from flood defences, and access and egress are shown to be maintained safely in all AEP and design surface water events, subject to a site-specific Flood Risk Assessment. The following points should be considered in development of the site:

- A site-specific Flood Risk Assessment should demonstrate that site users will be safe in the 1% AEP surface water events, including an allowance for climate change.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, with development to be steered away from the areas identified to be at risk of surface water flooding in the northern and central area of the site. This area should be used as open space and SuDS or water compatible/ essential infrastructure uses only.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone and the undifferentiated Secondary Superficial Aquifer Designation Zone.
- Flood mitigation measures should be implemented then tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**MBC/021/23**
Address	Land north of Leicester Road, Melton Mowbray
Area	13.27ha
Current land use	Greenfield
Proposed land use	Employment

Sources of flood risk

Location of the site within the catchment	The site is located in the south of Melton borough, in the downstream reach of the predominantly rural Great Dalby Brook catchment, which drains approximately 14km^2. The Great Dalby Brook flows north-westwards 130m east of the site where it meets the River Wreake approximately 260m north of the site. The River Wreake flows westwards approximately 230m from the site at its closest point.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site is located on a north-eastern slope. The site has a maximum elevation of 79.8m AOD in the southern corner of the site, and a minimum elevation of 67.4m AOD in the north-western corner of the site. Additionally, there is an elevated rail track along the north boundary of the site.
Existing drainage features	Within the site there is an unnamed ordinary watercourse (a tributary of the Great Dalby Brook) flowing north-east across the site from the southern boundary to the eastern boundary. The watercourse encounters two short, culverted sections. In its pre-developed state, most of the site is likely to drain into the unnamed watercourse within the site, and towards the Great Dalby Brook to the east. The north-west side of the site is likely to drain in a westerly direction, partly restricted to the north by the raised railway track, although the site levels and rail track levels are shown to be similar in the centre of the northern boundary with water able to flow across.

Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers less than 1% of the site Flood Zone 3a covers less than 1% of the site Flood Zone 2 covers 2% of the site Flood Zone 1 covers 98% of the site *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).* **Available data:** The 2011 detailed hydraulic model for River Wreake and Tribs was used in this assessment (only extent and depth outputs available). This model covers the River Wreake however does not cover the Great Dalby Brook. No modelled outputs were available to inform Flood Zone 3b, so Indicative Flood Zone 3b has been used, which shows the same extent as Flood Zone 3a. The EA's Flood Map for Planning has been used to assess risk from the Great Dalby Brook. The Flood Zones do cover extents for the Great Dalby Brook but are based on broadscale modelling. **Flood characteristics:** The River Wreake (2011) outputs for the 0.1% AEP event marginally cover the north-west corner of the site. Maximum depths at this location are 0.5m. The 1% AEP event extent does not enter the site. The raised railway at the northern boundary largely confines the fluvial flood risk of the River Wreake to the north. However, the EA's Flood Map for Planning Flood Zones 2 and 3 for the River Wreake encroach on the north-western corner of the site, and Flood Zone 2 encroaches on the north-eastern corner too. The Flood Zones associated with the Great Dalby Brook do not encroach onto the site. The remainder of the site is within Flood Zone 1. There is also fluvial flood risk from the ordinary watercourse in the site, however this is picked up in the EA's Risk of Flooding from Surface Water (RoFSW) map therefore the depth, hazard and velocity flood risk associated with this watercourse is described below.

Surface water	**Proportion of site at risk:** **3.3% AEP** covers 9% of the site Max depths exceed 1.2m Max velocities are between 1.0 and 2.0m/s **1% AEP** covers 10% of the site Max depths exceed 1.2m Max velocities are between 1.0 and 2.0m/s **0.1% AEP** covers 12% of the site Max depths exceed 1.2m Max velocities are between 1.0 and 2.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** All AEP events have a similar flow path, that flows along the eastern boundary, across the north-east corner and along the northern boundary of the site, following the path of Great Dalby Brook and the River Wreake. The maximum velocity in all events is between 1.0 and 2.0 m/s along the northern border, with maximum depths that exceed 1.2m in the north-east corner. In the 3.3% AEP event, the maximum hazard rating is 'Danger to Most', in the 1% AEP event this is similar however there is a small area in the north-east corner where the maximum rating is 'Danger to all'. In the 0.1% AEP event, the maximum hazard rating of 'Danger to All' covers a larger area than in the 1% AEP event. Extents along the west half of the north boundary of the site are confined to the south of the raised railway tracks.
Reservoir	The EA's reservoir flood mapping shows that the site is affected in the Wet Day and Dry Day scenario extents of the Brentingby Flood Storage Reservoir. In the Dry Day scenario, the extent covers the north-western and north-eastern corners of the site. In the Wet Day scenario, the extent covers a

	wider area of the northern and eastern areas along the respective boundaries.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the site has three areas of groundwater levels between 0.5m and 5m within the site, in the south-east corner and across the centre of the site. In these locations, there is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. The remainder of the site is not deemed to be at risk. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the site has less than 50% susceptibility to groundwater flooding. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in a postcode area (LE13 1) with 19 recorded sewer flooding incidents, according to Severn Trent Water's available incident records (for the period from January 1990 to April 2024), however, none of these recorded incidents are shown to be in close proximity to the site.
Flood history	Historic flooding records provided by Leicestershire County Council identify no instances of historic flooding in the vicinity or within the site. The EA's historic flooding and recorded flood outline datasets show there is one instance of historic flooding within the site (at the north-eastern corner) from the River Wreake in 1998. It also shows that there are additional instances of flooding from the River Wreake just to the north of the site on the other side of the railway track in 1977, 1998, and 2000.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows there are no formal defences at the site, however there is engineered high ground along the banks of the River Wreake to the north of the site.

Residual risk	The site is at residual risk from reservoir breaches in the Wet Day and Dry Day scenarios. Additionally, the watercourse within the site is culverted in two instances (within the site and nearby vicinity). The culverts have the potential to pose a residual risk to the site in the event of a blockage, which could cause water to back up and encroach on the site.

Emergency planning

Flood warning	The site is located in the EA's River Wreake in Leicestershire (034WAF404) Flood Alert Area but is not located in a Flood Warning Area. The Flood Alert Area covers a small area of the north-east and north-west corners.
Access and egress	Existing access and egress are via a track in the southern corner of the site, with access from Leicester Road (A607) in an eastern and western direction. Safe access and egress are maintained at this location in all fluvial and surface water AEP events. However, it should be noted that access along Leicester Road heading eastwards may be impeded by Flood Zones 2 and 3 plus significant extents in the surface water design event (1% AEP plus 40% climate change), associated with the Great Dalby Brook. The surface water modelling suggests the extents here have a maximum hazard rating of 'Danger to Most'. In this event, depths on the road are between 0.3 to 0.6m with a maximum velocity of 0.5m/s. Safe access and egress will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk in the wider catchment.
Dry Islands	The site is not located on a dry island.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding.

	Fluvial • In the absence of detailed modelling with climate uplift, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP event plus climate change flood extent. • Flood Zone 2 shows fluvial risk to the north-east and north-west corners of the site, while Flood Zone 3a only covers the north-west corner, however, most of the site still remains unaffected by fluvial risk. This suggests the site is unlikely to be very sensitive to increases in fluvial flood risk associated with climate change. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 40% climate change. • The extent of the design event is slightly greater than the present day 1% AEP event, and a greater proportion of the extent in the north-east corner reaches a maximum hazard rating of 'Danger to All'. • Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock consists of mudstone, siltstone, limestone and sandstones that form the Lias Group.
	  ○ Superficial deposits consisting of clay, silt, and sand alluvium.
	• Soils at the site consist of:
	  ○ Freely draining, slightly acidic loamy soils.
	Sustainable Drainage Systems (SuDS)
	• There is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface

	water drainage system. Actual risk to the shite should be confirmed with site investigations. • BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff. • The site is not in a Groundwater Source Protection Zone. • The south-east corner of the site has an area designated by the Environment Agency as being a historic landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA, to determine potential mitigation for contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • The site is within the Soar R Nitrate Vulnerability Zone, and in a Secondary A and undifferentiated Secondary Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. • Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (PLA, LLFA and EA) at an early stage to understand possible constraints.

	• The ordinary watercourse within the site and the Great Dalby Brook to the east of the site should be integrated into the site drainage strategy as blue-green infrastructure. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. The NPPF classifies employment development as 'Less Vulnerable'. Therefore, the exception test will not be required.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site is partially within Flood Zone 2 and there is surface water risk within the site. • A detailed model of the Great Dalby Brook and the unnamed ordinary watercourse is likely to be required at the FRA stage to accurately represent the risk from these watercourses, as the Flood Zones for Great Dalby Brook are based on broadscale modelling and the RoFSW suggests the extents could be much wider. This should include any blockage modelling that may be needed and consider the height of any mitigation measures. **Guidance for site design and making development safe:**

	• Development should be steered outside of the 1% AEP plus climate change fluvial and pluvial flood extents along the northern and eastern boundaries. • The CIA identified this site to be within a high-risk catchment for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes along the eastern and northern boundaries should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. The ordinary watercourse should be incorporated into the drainage strategy as blue-green infrastructure. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Key message

The site is affected by fluvial and surface water flooding, but this is largely confined to the north-east and north-west corners and associated boundaries. There may be residual risk from the culvert within the site and north-east of the eastern boundary. Additionally, there is residual risk from reservoir extents in the Dry Day and Wet Day scenarios. The following points should be considered in development of this site:

- All development should be steered away from the areas of highest risk along the eastern and northern areas of the site in line with the sequential approach to site layout.
- A site-specific Flood Risk Assessment should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. Within the FRA, detailed modelling of the ordinary watercourse within the site and the Great Dalby Brook should be used to inform the FRA. Additionally, this will need to

include any interaction with the River Wreake to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest model for the River Wreake is used. Depending on the age of the model, additional updates including consideration of breach scenarios may be required. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.

- Safe access and egress should be demonstrated in the 1% AEP plus central climate change fluvial and surface water events.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling, with development to be steered away from the areas identified to be at highest risk of surface water flooding within the site.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**SSN**
Address	South Sustainable Neighbourhood
Area	152.95ha
Current land use	Greenfield
Proposed land use	Mixed

Sources of flood risk

Location of the site within the catchment	The site is located across three catchments: the Burton Brook catchment, the Eye/Wreake catchment, and the Great Dalby Brook catchment. The site is bounded by rural land to the east, south and west of the site, with urban extents along the northern boundary of the site. Within the predominantly rural Burton Brook catchment, which drains 20.43km^2, the site is in the downstream reach. The Burton Brook is approximately 1.7km east of the site and flows northwards into the River Eye. Within the Eye/Wreake catchment, the site is in an upstream reach in a predominantly rural area before entering the urban extent of Melton Mowbray. The catchment drains approximately 98.1km^2 and the River Eye flows westwards approximately 1.2km north of the site. The River Eye becomes the River Wreake which continues flowing westwards approximately 250m north of the north-west boundary of site. Within the Great Dalby Brook catchment, the site is in the downstream reach of the rural catchment which drains approximately 14km^2. The Great Dalby Brook flows through the site northwards where it joins the River Wreake approximately 560m from the site.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site has a varied topography with the majority of the site's topography sloping towards the three watercourses that pass through the site. The highest elevation is 115.3m AOD in the eastern area of the site, and the

	lowest elevation of 70.1m AOD is in the area surrounding the Great Dalby Brook in the western area of the site.
Existing drainage features	Within the site, there are three watercourses flowing northwards including the Great Dalby Brook, an unnamed ordinary watercourse in the western area and Edendale Brook in the eastern part of the site. All three watercourses bisect the site. Additionally, there are a series of ponds and lakes for a fishery in the western area close to the unnamed ordinary watercourse. It is expected that the site would drain into the watercourses, ponds, and eventually drain into the River Eye and the River Wreake.
Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 4% of the site. Flood Zone 3a covers 4% of the site. Flood Zone 2 covers 4% of the site. Flood Zone 1 covers 96% of the site. *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).* **Available data:** The 2011 detailed hydraulic model 'River Wreake and Tribs' was used in this assessment (only extent and depth outputs available). This model covers part of Edendale Brook however does not cover its upper reach, the unnamed ordinary watercourse in the western area, or Great Dalby Brook. The EA's Flood Map for Planning has been used to assess risk from Great Dalby Brook, while fluvial flooding from the ordinary watercourses within the site is represented in the EA's Risk of Flooding from Surface Water (RoFSW) map. **Flood characteristics:** The River Wreake (2011) outputs for the 0.1% AEP event encroach the site at the central northern boundary, at the upstream end of Edendale Brook. Maximum depths within the site at this location are 0.4m in the 0.1% AEP event. The 1% AEP event extent does not enter the site. The EA's Flood Map for Planning flood zones show Flood Zones 2 and 3 for Great Dalby Brook are similar to each other in extent within the western area of the site, and the floodplain is predominantly along the

	west bank. There is also fluvial flood risk from the unnamed watercourse and Edendale Brook in the site, however these are picked up in the EA's Risk of Flooding from Surface Water (RoFSW) map therefore the depth, hazard and velocity flood risk associated with these watercourses are described below.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers 5% of the site. Max depth is greater than 1.2m Max velocity is between 1.0 and 2.0m/s **1% AEP** covers 6% of the site. Max depth is greater than 1.2m Max velocity is between 1.0 and 2.0m/s **0.1% AEP** covers 12% of the site. Max depth is greater than 1.2m Max velocity is greater than 2.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** The site is affected by surface water in all AEP events, with three major flow paths bisecting the site, flowing from south to north, plus additional smaller flow paths and some ponding in other areas. Some flow paths can be attributed to the water in channel in the three watercourses (Great Dalby Brook, Edendale Brook and the unnamed watercourse) or ponds within the site. In the 3.3% AEP event, there is a significant flow path that follows Great Dalby Brook. The greatest depths of more than 1.2m are confined to the channel, however there is an additional flow path to the west of the channel which has maximum depths between 0.3 and 0.6m, and maximum velocities of between 1 and 2m/s with a hazard rating of 'Danger for Most'. There is also a smaller flow path which flows parallel to the Great Dalby Brook, approximately 400m east, following the unnamed watercourse. This flow path is confined to the channel until it

	reaches Kirby Lane where it pools significantly to a wider extent on both sides of the channel, to depths exceeding 1.2m, velocities up to 0.5m/s and a maximum hazard rating of 'Danger for Most'. The extents of the 3.3% AEP flow path for the Edendale Brook, exceed the width of the channel along most of the watercourse. Depths out of the channel are generally low at a maximum of between 0.15 and 0.3m/s, however the velocities reach between 1 and 2m/s giving a hazard rating of 'Danger for Most'. The depth and extent to both sides of the channel increase significantly in the field to the east of Dalby Road and where the start of Edendale Brook ponds at the northern boundary, although the maximum hazard rating remains at 'Danger for Most'. Additionally, there is some ponding in the 3.3% AEP event in the eastern corner of the site next to Burton Road (A606), with a maximum depth between 0.9 and 1.2m and hazard rating of 'Danger for Some' In the 1% AEP event, the flow paths and ponding are similar to the 3.3% AEP event but slightly greater in extent and depth. In the 0.1% AEP event, the flow paths increase further in extent, depth and velocity and additional small flow paths develop which flow towards each of the watercourses through the site. Along the three major flow paths, the maximum hazard rating outside of the channel is 'Danger for All'.
Reservoir	Reservoir flood mapping shows that the site is marginally affected in the Wet Day scenario by the Brentingby Flood Storage Reservoir at the north-west boundary, where the Great Dalby Brook flows under Leicester Road (A607). The site is unaffected by extents from the Dry Day scenario.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the majority of the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits. There are six isolated areas in the west of the site and one in the east which show groundwater levels are between 0.5m and 5m below the ground surface. This indicates a risk of flooding to subsurface assets, but it is unlikely groundwater will manifest at the surface. In these areas there are two small instances of groundwater levels between 0.025m

	and 0.5m below the ground surface, suggesting there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the western area of the site has less than 50% susceptibility to groundwater flooding, while the central and eastern areas have a less than 25% susceptibility to groundwater flooding. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in three postcode areas, LE13 0, LE13 1, and LE14 2, with 11, 19 and 5 recorded historic sewer flooding incidents respectively. This is in accordance with Severn Trent Water's available incident records (for the period from January 1990 to April 2024).
Flood history	Historic flooding records provided by Leicestershire County Council identify no instances of historic flooding in the vicinity or within the site. The EA's historic flooding and recorded flood outline datasets show there are no historic flood outlines at the site or its vicinity.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows that there are no formal flood defences in the site or its vicinity.
Residual risk	The site has residual risk from reservoir breaching in the Wet Day scenario, and from culverts along the northern boundary of the site where: • Great Dalby Brook flows under Kirby Lane and Leicester Road, • the unnamed ordinary watercourse in the west part of the site flows under Leicester Road, • Edendale Brook flows under Dalby Road and Kirby Lane. These culverts could pose a residual risk to the site in the event of a blockage, which could cause water to back up and encroach on the site.

Emergency planning

Flood warning	The EA's River Wreake in Leicestershire (034WAF404) Flood Alert Area covers the western bank of the Great Dalby Brook through the west of the site, and a small area at the central northern boundary where Edendale Brook begins. The site is not located in an EA Flood Warning area
Access and egress	Existing access and egress to the site are mainly via the roads which pass through the site including Sandy Lane in the east of the site, Dalby Road and a private farm road in the centre, and Kirby Lane, Eye Kettleby Drive and Leicester Road in the west of the site. There is currently no access from the east and generally there are limited access points to the farmers' fields throughout the site. In the fluvial events, the River Wreake model of Edendale Brook shows the 0.1% AEP extent across Kirby Lane in the central area of the northern boundary, with depths of 0.4m. This may impede access/egress into the site if proposed at the gateway here leading into the field. Additionally, the EA's Flood Zones 2 and 3 for Great Dalby Brook cross Kirby Lane at the north-west boundary of the site, which may also impede access/egress in this direction. Fluvial risk from the unnamed watercourse and Edendale Brook also affects access/egress in the east and west, as picked up in the surface water mapping explained below. In the 3.3%, 1% and 0.1% AEP surface water events, extents associated with the watercourses Great Dalby Brook, the unnamed ordinary watercourse in the west and the Edendale Brook in the east are present where they cross Leicester Road, Kirby Lane, Dalby Road and Sandy Lane. In the design surface water event (1% AEP plus 40% climate change) Sandy Lane in the east of the site is affected by two minor flow paths (and one to the immediate south of the site) by shallow (less than 0.3m deep) but fast flowing (maximum velocity greater than 2.0 m/s) water which results in a maximum hazard rating on Sandy Lane of 'Danger for most'. Dalby Road is affected within the northern boundary by a major flow path across the road, which has depths up to 0.6m and a maximum hazard rating of 'Danger to All'. This could impede access from the north however access along Dalby Road from the south remains safe. Kirby Lane which crosses the western part of the site and runs along the northern boundary is affected by the three major flow paths which all

	have a maximum hazard rating of 'Danger to All' on the road. Leicester Road along the north-west boundary is also affected by one of these flow paths. Eye Kettleby Drive and a private farm road in the centre of the site are not affected in this scenario. Safe access from Burton Road to the east is unlikely due to significant ponding on the site here to a maximum depth in the design event between 0.9 and 1.2m and a maximum velocity between 0.25 and 0.5m/s. This ponding has a predominant hazard rating of 'Danger to Most'. Safe access and egress will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk in the wider catchment.
Dry Islands	The site is not located on a dry island.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling with climate uplift, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP event plus climate change flood extent. Flood Zone 2 shows fluvial flood risk within the west part of the site along Great Dalby Brook. • Based on the indicative climate change scenario, the site is only marginally sensitive to climate change, as there is only a slight increase in extent between Flood Zone 3a and 2, which is likely a result of the surrounding topography. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which means the event used in this assessment is the 1% AEP plus 40% climate change.

	• The extent of the design event exceeds the present day 1% AEP event, especially in the western part of the site with maximum depths out of channel of 2.5m. Additional flow paths develop in the east. • During the 3.3% AEP plus 35% climate change event, the extent increases further out of the channels of the watercourses and additional flow paths develop to the east of the western unnamed watercourse and to the west of Dalby Road. • This indicates that the site is likely to be at increased flood risk from surface water in the future due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock consists of mudstone, siltstone, limestone and sandstones that form the Lias Group.
	  ○ Superficial deposits consisting of clay, silt, and sand alluvium and diamicton till.
	• Soils at the site consist of:
	  ○ Lime rich loamy and clayey soils with impeded drainage.
	  ○ Slowly permeable, seasonally wet, slightly acidic but base rich loamy and clayey soil.
	  ○ Freely draining, slightly acidic loamy soils.
	
	Sustainable Drainage Systems (SuDS)
	• There is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. Actual risk to the site should be confirmed with site investigations.
	• BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff.

	• The site is not in a Groundwater Source Protection Zone and there is no historic landfill within the site. • The site is within the Soar R Nitrate Vulnerability Zone, and a Secondary B Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. • Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • The ordinary watercourses within the site should be integrated into the site drainage strategy as blue-green infrastructure. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered, however infiltration methods and strategies at the site should be subject to infiltration testing which should be conducted at the site to determine their suitability. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will clean improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.

	• Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. This site has a range of uses including residential, open space and educational; therefore, the vulnerability classification ranges from 'Less Vulnerable' to 'More Vulnerable'. The highest vulnerability classification ('More Vulnerable') should be considered when assessing flood risk. As parts of the site are identified to be in Flood Zone 3a, the exception test is required.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site has Flood Zone 2 and 3 extents within it, in addition to extents from the River Wreake in the 0.1% AEP event and surface water extents that bisect the site. **Guidance for site design and making development safe:** • Development should be steered outside of the 1% AEP plus climate change flood extents. • Detailed modelling of the upper Edendale Brook and the unnamed ordinary watercourse is likely to be required at the FRA stage to accurately represent the risk from the watercourses, any blockage modelling that may be needed, and the height of any mitigation measures. • The CIA identified this site to be within high-risk catchments for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and

	LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. The ordinary watercourses within the site should be integrated into the site drainage strategy as blue-green infrastructure. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe. • Flood resilience and resistance measures should be considered where appropriate during the construction phase, e.g. raising of floor levels and use of boundary walls. These measures should be assessed to make sure that flooding is not increased elsewhere.

Key messages

The site is affected by fluvial flooding of the Great Dalby Brook, and surface water extents in all AEP events including the surface water design event (1% AEP plus 40% climate change allowance), all of which bisect the site. The site faces significant access and egress issues within the 0.1% AEP surface water event and surface water design event, both within the site and wider area. The site has residual risk from reservoirs extents in the Wet Day scenario as well as residual risk from the culverts within the site. The following points should also be considered in development of this site:

- In the absence of high-resolution detailed modelling including climate change, all development should be steered away from the extent of Flood Zone 2. Hydraulic modelling should be carried out to determine the level of risk on the site and to set the height of any mitigation measures. Where detailed modelling is present, development should be steered away from flood extents.
- Modelling of the Great Dalby Brook, upper reach of Edendale Brook and the western ordinary watercourse with blockage scenarios should inform a site-specific FRA. The FRA

should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This should be informed by surface water modelling and investigation of any interaction with the watercourses within the site. This is to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest models are used where possible. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.

- Safe access and egress should be demonstrated in the 1% AEP plus central climate change fluvial and surface water events. If there are significant issues, a Flood Warning and Evacuation Plan should be prepared which considers the likely onset and duration of flooding during a breach scenario and demonstrates how residents can safely be evacuated and/or shelter safely in situ during the fluvial and surface water design events.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, with development to be steered away from the areas identified to be at risk of surface water flooding. This is in line with the sequential approach to site layout.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.

Melton Borough Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details

Site Code	**SSN400mBuffer**
Address	South Sustainable Neighbourhood plus 400m buffer
Area	392.14ha
Current land use	Greenfield
Proposed land use	Mixed

Sources of flood risk

Location of the site within the catchment	The site is located across three catchments: the Burton Brook catchment, the Eye/Wreake catchment, and the Great Dalby Brook catchment. The site is bounded by rural land to the north-east, south and west of the site, with urban extents along the northern boundary of the site. Within the predominantly rural Burton Brook catchment, which drains 20.43km^2, the site is in the downstream reach. The Burton Brook is approximately 1.2km east of the site and flows northwards into the River Eye. Within the Eye/Wreake catchment, the site is in an upstream reach in a predominantly rural area, with the urban extent of Melton Mowbray to the immediate north of the site. The catchment drains approximately 98.1km^2 and the River Eye flows westwards approximately 1.2km north of the site. The River Eye becomes the River Wreake which continues flowing westwards approximately 250m north of the north-west boundary of site. Within the Great Dalby Brook catchment, the site is in the downstream reach of the rural catchment which drains approximately 14km^2. The Great Dalby Brook flows through the site northwards where it joins the River Wreake approximately 250m from the site.
Topography	The Environment Agency's (EA) 1m resolution LiDAR indicates that the site has a varied topography with the majority of the site's topography sloping towards the three watercourses that pass through the site. The

	highest elevation is 121.4m AOD along the south-eastern boundary of the site, and the lowest elevation is 67m AOD along the north-western boundary of the site. Additionally, there is an elevated rail track crossing the north-west boundary of the site.
Existing drainage features	Within the site, there are three watercourses flowing northwards including the Great Dalby Brook, an unnamed ordinary watercourse in the western area and Edendale Brook in the eastern part of the site. All three watercourses bisect the site. Additionally, there are a series of ponds and lakes for a fishery in the western area close to the unnamed ordinary watercourse. It is expected that the site would drain into the watercourses, ponds, and eventually drain into the River Eye and the River Wreake.
Fluvial	**The proportion of site at risk:** Indicative Flood Zone 3b covers 3% of the site. Flood Zone 3a covers 3% of the site. Flood Zone 2 covers 4% of the site. Flood Zone 1 covers 96% of the site. *The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).* **Available data:** The 2011 detailed hydraulic model 'River Wreake and Tribs' was used in this assessment (only extent and depth outputs available). This model covers part of the Edendale Brook however does not cover its upper reach, the unnamed ordinary watercourse in the western area, or Great Dalby Brook. The EA's Flood Map for Planning has been used to assess risk from Great Dalby Brook, while fluvial flooding from the ordinary watercourses within the site is represented in the EA's Risk of Flooding from Surface Water (RoFSW) map. **Flood characteristics:** The River Wreake (2011) outputs for the 0.1% AEP event encroach the site at the central northern boundary, at the upstream end of Edendale Brook. Maximum depths within the site at this location are 0.4m in the 0.1% AEP event. The 1% AEP event extent does not enter the site. The 0.1% AEP event extent also encroaches on the site along the north-western boundary. Maximum depths at this location are 0.5m. The 1% AEP event extent does not enter the site here.

	The EA's Flood Map for Planning flood zones show Flood Zones 2 and 3 for Great Dalby Brook are similar to each other in extent within the western area of the site, and the floodplain is predominantly along the west bank. There is also fluvial flood risk from Edendale Brook and the unnamed watercourse in the site, however these are picked up in the EA's Risk of Flooding from Surface Water (RoFSW) map therefore the depth, hazard and velocity flood risk associated with these watercourses are described below.
Surface water	**Proportion of site at risk:** **3.3% AEP** covers 5% of the site. Max depth is greater than 1.2m Max velocity is between 1.0 and 2.0m/s **1% AEP** covers 7% of the site. Max depth is greater than 1.2m Max velocity is between 1.0 and 2.0m/s **0.1% AEP** covers 12% of the site. Max depth is greater than 1.2m Max velocity is greater than 2.0m/s *The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).* **Available data:** The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** The site is affected by surface water in all AEP events, with three major flow paths bisecting the site, flowing from south to north, plus additional smaller flow paths and some ponding in other areas. Some flow paths can be attributed to the water in channel in the three watercourses (Great Dalby Brook, Edendale Brook and the unnamed watercourse) or ponds within the site. In the 3.3% AEP event, there is a significant flow path that follows Great Dalby Brook. The greatest depths of more than 1.2m are confined to the channel, however there is an additional flow path to the west of the channel which has maximum depths between 0.3 and 0.6m, and

	maximum velocities of between 1 and 2m/s with a hazard rating of 'Danger for Most'. There is also a smaller flow path which flows parallel to the Great Dalby Brook, approximately 400m east, following the unnamed watercourse. This flow path is confined to the channel until it reaches Kirby Lane where it pools significantly to a wider extent on both sides of the channel, to depths exceeding 1.2m, velocities up to 0.5m/s and a maximum hazard rating of 'Danger for Most'. The extents of the 3.3% AEP flow path for the Edendale Brook, exceed the width of the channel along most of the watercourse. Depths out of the channel are generally low at a maximum of between 0.15 and 0.3m/s, however the velocities reach between 1 and 2m/s giving a hazard rating of 'Danger for Most'. The depth and extent to both sides of the channel increase significantly in the field to the east of Dalby Road and where the start of Edendale Brook ponds at the northern boundary, although the maximum hazard rating remains at 'Danger for Most'. Additionally, there is some ponding in the 3.3% AEP event in the eastern corner of the site next to Burton Road (A606), with a maximum depth between 0.9 and 1.2m and hazard rating of 'Danger for Some' In the 1% AEP event, the flow paths and ponding are similar to the 3.3% AEP event but slightly greater in extent and depth. In the 0.1% AEP event, the flow paths increase further in extent, depth and velocity and additional small flow paths develop which flow towards each of the watercourses through the site. Along the three major flow paths, the maximum hazard rating outside of the channel is 'Danger for All'.
Reservoir	Reservoir flood mapping shows that the site is affected in the Dry Day and the Wet Day scenarios by the Brentingby Flood Storage Reservoir. Extents in both scenarios are found in the upper north-western area of the site, extending onto the site towards Leicester Road.
Groundwater	The JBA Groundwater Emergence Risk Mapping (5m resolution) shows that the majority of the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits. There are some large areas in the north-west of the site which show groundwater levels are between 0.5m and 5m below the ground surface. This indicates a risk of flooding to subsurface assets, but it is

	unlikely groundwater will manifest at the surface. In these areas there are three small instances of groundwater levels between 0.025m and 0.5m below the ground surface, suggesting there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map (1km resolution) shows that the western area of the site has less than 50% susceptibility to groundwater flooding, while the central and eastern areas have a less than 25% susceptibility to groundwater flooding. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.
Sewers	The site is located in three postcode areas, LE13 0, LE13 1, and LE14 2, with 11, 19 and 5 recorded historic sewer flooding incidents respectively. This is in accordance with Severn Trent Water's available incident records (for the period from January 1990 to April 2024).
Flood history	Historic flooding records provided by Leicestershire County Council identify no instances of historic flooding in the vicinity or within the site. The EA's historic flooding and recorded flood outline datasets show there are two instances of historic flood outlines at the site from 1998 and 1977 in the upper north-western area. Within the site's vicinity there is an additional outline that is from 2000.

Flood risk management infrastructure

Defences	The EA's AIMS dataset shows that there are no formal flood defences in the site or its vicinity.
Residual risk	The site has residual risk from reservoir breaching in the Wet Day and Dry Day scenarios, and from culverts along the northern boundary of the site where: • Great Dalby Brook flows under Kirby Lane and Leicester Road, • the unnamed ordinary watercourse in the west part of the site flows under Leicester Road,

	• Edendale Brook flows under Dalby Road and Kirby Lane. These culverts could pose a residual risk to the site in the event of a blockage, which could cause water to back up and encroach on the site.

Emergency planning

Flood warning	The EA's River Wreake in Leicestershire (034WAF404) Flood Alert Area covers the western bank of the Great Dalby Brook through the west of the site, the north-western boundary, and a small area at the central northern boundary where Edendale Brook begins. The site is not located in an EA Flood Warning area.
Access and egress	Existing access and egress to the site are mainly via the roads which pass through the site including Sandy Lane and Burton Road in the east of the site, Dalby Road and a private farm road in the centre, and Kirby Lane, Eye Kettleby Drive, Leicester Road and Kirby Road in the west of the site. There are limited access points to the farmers' fields throughout the site. In the fluvial events, the River Wreake model of Edendale Brook shows the 0.1% AEP extent across Kirby Lane in the central area of the northern boundary, with depths of 0.4m. This may impede access/egress into the site if proposed at the gateway here leading into the field. Additionally, the EA's Flood Zones 2 and 3 for Great Dalby Brook cross Kirby Lane and Leicester Road in the north-west of the site, which may also impede access/egress in this direction. Fluvial risk from the unnamed watercourse and Edendale Brook also affects access/egress in the east and west, as picked up in the surface water mapping explained below. In the 3.3%, 1% and 0.1% AEP surface water events, extents associated with the watercourses Great Dalby Brook, the unnamed ordinary watercourse in the west and Edendale Brook are present where they cross Leicester Road, Kirby Lane, Dalby Road and Sandy Lane. In the design surface water event (1% AEP plus 40% climate change) Sandy Lane in the east of the site is affected by four minor flow by shallow (less than 0.3m deep) but fast flowing (maximum velocity greater than 2.0 m/s) water which results in a maximum hazard rating on Sandy Lane of 'Danger for most'. Dalby Road is affected within the northern boundary by a major flow path across the road, which has depths up to 0.6m and a maximum hazard rating of 'Danger to All'. This

	could impede access from the north however access along Dalby Road from the south remains safe. Kirby Lane which crosses the western part of the site and runs along the northern boundary is affected by the three major flow paths which all have a maximum hazard rating of 'Danger to all' on the road. Leicester Road across the north-west corner and Kirby Road in the south-west corner are also affected by one of these flow paths. Eye Kettleby Drive and a private farm road in the centre of the site are not affected in this scenario. Sawgate Road may allow safe access to the eastern most area as minor flow paths on the road here mainly have a hazard rating of 'Caution'. Safe access from the adjoining Burton Road would only be possible from the south due to significant ponding by the road in the north-east area to a maximum depth in the design event between 0.9 and 1.2m and a maximum velocity between 0.25 and 0.5m/s. This ponding has a predominant hazard rating of 'Danger to most'. Safe access and egress will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk in the wider catchment.
Dry Islands	The site is not located on a dry island.

Climate change

Implications for the site	Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial** • In the absence of detailed modelling with climate uplift, the Flood Map for Planning Flood Zone 2 can be used as an indicative 1% AEP event plus climate change flood extent. Flood Zone 2 shows fluvial flood risk within the west part of the site along Great Dalby Brook. • Based on the indicative climate change scenario, the site is only marginally sensitive to climate change in the Great Dalby Brook area, as there is only a slight increase in extent between Flood

	Zone 3a and 2, which is likely a result of the surrounding topography. **Surface Water** • The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk. • The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, as such the event used in this assessment is the 1% AEP plus 40% climate change. • The extent of the design event exceeds the present day 1% AEP event, especially in the western part of the site with maximum depths out of channel of 2.5m. Additional flow paths develop in the east. • During the 3.3% AEP plus 35% climate change event, the extent increases further out of the channels of the watercourses and additional flow paths develop to the east of the western unnamed watercourse and to the west of Dalby Road. • This indicates that the site is sensitive to increased flood risk from surface water due to climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock consists of mudstone, siltstone, limestone and sandstones that form the Lias Group.
	  ○ Superficial deposits consisting of clay, silt, and sand alluvium and diamicton till.
	• Soils at the site consist of:
	  ○ Lime rich loamy and clayey soils with impeded drainage.
	  ○ Slowly permeable, seasonally wet, slightly acidic but base rich loamy and clayey soil.
	  ○ Freely draining, slightly acidic loamy soils.
	
	Sustainable Drainage Systems (SuDS)

	• There is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. Actual risk to the site should be confirmed with site investigations. • BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff. • The site is not in a Groundwater Source Protection Zone. • The site is within the Soar R Nitrate Vulnerability Zone, and a Secondary B Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality. • The site has a small area in the north-west, off Leicester Road, designated by the Environment Agency as being a historic landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA; to determine potential mitigation for contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and Environment Agency) at an early stage to understand possible constraints.

	• The ordinary watercourses within the site should be integrated into the site drainage strategy as blue-green infrastructure. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered, however infiltration methods and strategies at the site should be subject to infiltration testing which should be conducted at the site to determine their suitability. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will clean improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

NPPF and planning implications

Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied. This site has a range of uses including residential, open space and educational; therefore, the vulnerability classification ranges from 'Less Vulnerable' to 'More Vulnerable'. The highest vulnerability classification ('More Vulnerable') should be considered when assessing flood risk. As parts of the site are identified to be in Flood Zone 3a, the exception test is required.

Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific FRA will be required as the proposed development site has Flood Zone 2 and 3 extents within it, in addition to extents from the River Wreake in the 0.1% AEP event and surface water extents that bisect the site. **Guidance for site design and making development safe:** • Development should be steered outside of the 1% AEP plus climate change flood extents. • Detailed modelling of the upper Edendale Brook and the unnamed ordinary watercourse is likely to be required at the FRA stage to accurately represent the risk from the watercourses, any blockage modelling that may be needed, and the height of any mitigation measures. • The CIA identified this site to be within high-risk catchments for the cumulative impacts of development. As such, developers should provide a construction surface water management plan to support the Construction Drainage Phasing Plan, the LLFA and LPA should consult with local non-profit organisations, and the LPA should work with the EA and LLFA to identify areas of land that should be safeguarded for future flood alleviation schemes and NFM features. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates. The ordinary watercourses within the site should be integrated into the site drainage strategy as blue-green infrastructure. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and pluvial events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe. • Flood resilience and resistance measures should be implemented where appropriate during the construction phase, e.g. raising of floor levels and use of boundary walls. These

	measures should be assessed to make sure that flooding is not increased elsewhere.

Key message

The site is affected by fluvial flooding of the Great Dalby Brook, surface water extents in all AEP events, and the surface water design event (1% AEP plus 40% climate change allowance), all of which bisect the site. The site faces significant access and egress issues within the 0.1% AEP surface water event and surface water design event, both within the site and wider area. The site has residual risk from reservoirs extents in the Wet Day and Dry Day scenario as well as residual risk from the culverts within the site. The following points should also be considered in development of this site:

- In the absence of high-resolution detailed modelling including climate change, all development should be steered away from the extent of Flood Zone 2. Hydraulic modelling should be carried out to determine the level of risk on the site and to set the height of any mitigation measures. Where detailed modelling is present, development should be steered away from flood extents.
- Modelling of the Great Dalby Brook, upper reach of Edendale Brook and the western ordinary watercourse with blockage scenarios should inform a site-specific FRA. The FRA should demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This should be informed by surface water modelling and investigation of any interaction with the watercourses within the site. This is to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk off site. Developers should consult the Environment Agency to ensure latest models are used where possible. Additionally, a site investigation should confirm the risk posed by groundwater emergence at the site.
- Safe access and egress should be demonstrated in the 1% AEP plus central climate change fluvial and surface water events. If there are significant issues, a Flood Warning and Evacuation Plan should be prepared which considers the likely onset and duration of flooding during a breach scenario and demonstrates how residents can safely be evacuated and/or shelter safely in situ during the fluvial and surface water design events.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, with development to be steered away from the areas identified to be at risk of surface water. This is in line with the sequential approach to site layout.
- There should be early engagement with the LLFA and EA on proposed SuDS measures to discuss requirements on the site meeting relevant conditions due to the location of the site within a Nitrate Vulnerable Zone.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.