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Ashfield New Settlements Study

Technical Proforma
Site 2 - Cauldwell Road/Derby Road, Sutton in Ashfield

March 2021

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1. Summary

Site 2 Key Opportunities and Constraints

Strategic Planning	The site contains and in close proximity to a number of designations in the Adopted Local Plan (2002) including Policy EV2 Countryside, Policy EV4: Mature Landscape Areas, EV6 Nature Conservation Site and Policy EM1 Employment Land Allocations (including South West Oakham Business Park which provides 23.5 ha of employment land).
Economics	The Site benefits from its proximity to Sutton In Ashfield and Mansfield as well as its position on the A617, known as the Mansfield-Ashfield Regeneration Route, which has received continual extensions since its delivery in 2000. The A617 connects the site to nearby centres such as Chesterfield and Newark as well as to the M1 and the A614/A6097. The M1 accessibility is vital for many businesses in Ashfield, whilst the D2N2 SEP states that there are multiple planned improvements to the A614/A6097 corridor to relieve congestion and support economic growth[1]. The assessment site is judged to be suitable for future economic development. The proximity to some existing assets is likely to create employment opportunities for future residents and business connections for future companies.
Access and Movement	No facilities are currently accessible within the recommended 1km walking isochrone of the site. Footways (and supportive infrastructure) would need to be constructed to account for desire lines towards Mansfield, Sutton in Ashfield, Berry Hill (and potentially Kirkby-in-Ashfield). Mansfield, Sutton in Ashfield and Kirkby-in-Ashfield town centres are accessible within the recommended 5km cycling threshold. No buses currently operate along any of the routes bounding the site, and therefore it may be challenging to divert services into the site. The site is however located within 5km of Sutton in Ashfield Railway Station, although infrastructure connecting the site to the station would need upgrading / extending. At least two access points would be required to serve the 994 dwellings. Opportunities for access is available from the A617, Hamilton Road, A611 and the existing Cauldwell Road / Coxmoor Road junction. Given the potential access points, trips would be dispersed onto the A38, A617 and A611. The A38 is a known congestion corridor between the M1 (Junction 28) and Mansfield, whilst the A611 is flagged in the Nottinghamshire LTP as suffering from journey time variability. It is likely that trips would disperse along multiple routes from this point however, diluting the overall impact.
Ground Conditions / Geotechnical	There is considered to be a very low (in the south of the site) to moderate (in the north of the site associated with an area of landfill) potential for contamination to exist at the site, based on the information sources reviewed, and given the nature of the current and historical land uses identified at the site. Potential on-site sources are limited but there may be made ground present which may not have originated from the site, as well as localised point sources associated with the site's agricultural use, potentially infilled sand pit and historical landfill use (in the north of the site). Historical/authorised landfills and made ground (on-site and off-site) may pose a potential ground gas risk. The bedrock geology is a Principal aquifer. Therefore, it is possible for shallow groundwater to be present. If shallow groundwater is encountered, it should be considered as part of any foundation solution. Site-specific groundwater levels would need to be confirmed during future ground investigations.
Services / utilities location and capacity	There is an existing 9" Cast Iron potable water main in the southern verge / footway of Cauldwell Road, 450 mm dia Ductile Iron main runs along the north side of the A611, a main is identified in Hamilton Road, two 12" mains (one Cast Iron, the other unconfirmed) are identified in Coxmoor Road. Protection or diversion work would be required. The size, number and location of existing potable water mains in the area means there are likely to be a number of options for the new connections. However, an assessment of the capacity of the existing network will be required by Severn Trent Water to confirm the extent of off-site reinforcement of the network. Any works to form a new junction at the A611 and / or Hamilton Road will require diversion or protection of the existing 11kV lines, and possible protection of the 33kV lines. The layout of the site will dictate whether there are diversions required to the existing supply to the properties on Cauldwell Road. The presence of a significant number of existing power lines means there will be options for the supply to the site and the locations of substations. There is an existing substation on the corner of Hamilton Road and Coxmoor Road which may be a suitable point for supply to the new site.
Drainage	The site is in a Flood Zone 1 from river flooding however, there is a risk of localised surface water flooding at the Coxmoor Dam and a low spot opposite the access to Summit Park. The former may place additional constraints or considerations for any access direct from the A617 and development in this area. In addition, preliminary levels from lidar shows Cauldwell Dam and brook to be the lowest section of the site, however there could be areas of the site that cannot be drained by gravity into Cauldwell pond, which would require separate drainage systems.
Historic Environment	There are no designated heritage assets within the Site boundary however, there are a number of non-designated archaeological assets listed on the Nottingham HER that fall within the Site boundary. In

[1] D2N2 LEP, (2019); Strategic Economic Plan

	addition, Stonehills Farm, a locally listed farm, is located just outside the Site boundary, to the south-east. There is a single Scheduled Monument which lies 200m north-west of the Site boundary. Development of the Site will introduce a change to the setting of the scheduled monument at Hamilton Hill and to the setting of Stonehills Farm. These changes are likely to have an adverse impact on the significance of these assets.
Landscape	Visually, the sloping and undulating nature of the site means that there are views available across and from it, including views to the surrounding landscape from the ridgelines on Coxmoor Road and Derby Road and from the undulating land on Cauldwell Road. The tree belts along Cauldwell Road and along Cauldwell Brook form green corridors in the site, the former linking to Stonehills Plantation in the site's north-eastern corner. The heathy character of the area offers planting opportunities to strengthen this character, and the local coal-mining heritage also give potential for design cues in the new development. The site is potentially suitable on landscape grounds however, two landscape buffers are recommended within the site boundary, one in the north, and the second on the eastern edge. The northern buffer is recommended in order to prevent perceptions of sprawl at the ridgeline on Coxmoor Road, as well as preventing perceived sprawl of Mansfield south of the ring road. The eastern buffer would contain sprawl into the rural land to the east, as well as retaining the heathy character of this area.
Social Infrastructure	Beyond normal costs for the site relating to social infrastructure include: On-site provision costs: • One 50-place nursery Off-site Contribution costs: • 1FE Primary School • 2FE Secondary School provision • Acute healthcare provision • Indoor sports provision • Outdoor sports provision To be confirmed on-site/off-site: • 2GP Primary Healthcare Facility • 40 unit extra care accommodation • 300 sqm multi use community facility • 3.4ha outdoor sports
Light Assessment	The Site has a more mixed character, having a more natural setting to the south and an increasingly suburban setting to the north. This typically describes a location that is consistent with a lighting environmental zone E1 / E2.There is a higher potential for light sensitive species to be found within local woods or surrounding fields. Sherwood Observatory is a unique receptor which is expected to need additional consideration. Optical telescopes are sensitive to light and work best without artificial light. New or changed lighting should target limiting effects as much as possible to lower brightness characteristics consistent with environmental zones E0 / E1.
Site capacity	The site capacity has been estimated at 994 dwellings.
Deliverability and implementation	Much of the potentially developable area being in single land ownership. Site 2 is generally unviable. Site 2 is shown as viable when: using the BCIS lower quartile constructions costs, with abnormal costs, assuming 0-5% affordable housing level and zero planning obligations. When discounting abnormal costs site 2 is shown as viable when: assuming up to 25% affordable housing level (and zero planning obligations); or up to 10% affordable housing level (and £5,000/unit planning obligations).

2. Detailed site and locality descriptions

2.1 Site location and setting

The site is strategically located in close proximity to the A60 linking it with Mansfield to the north and Nottingham to the south. The site is in an unparished area and is close to two local centres, Kirkby-in-Ashfield and Sutton in Ashfield and in close proximity to Oakham Business Park. The outer surroundings of the site are largely urban however, the more immediate surroundings to the site are mostly agricultural fields, outdoor recreation and woodland.

Figure 2.1: View from Cauldwell Road north towards Hamilton Hill (left) and Summit Park (right)

Figure 2.2: View from north side of Cauldwell Road towards the south

Figure 2.3: View of the south east of the site from Derby Road

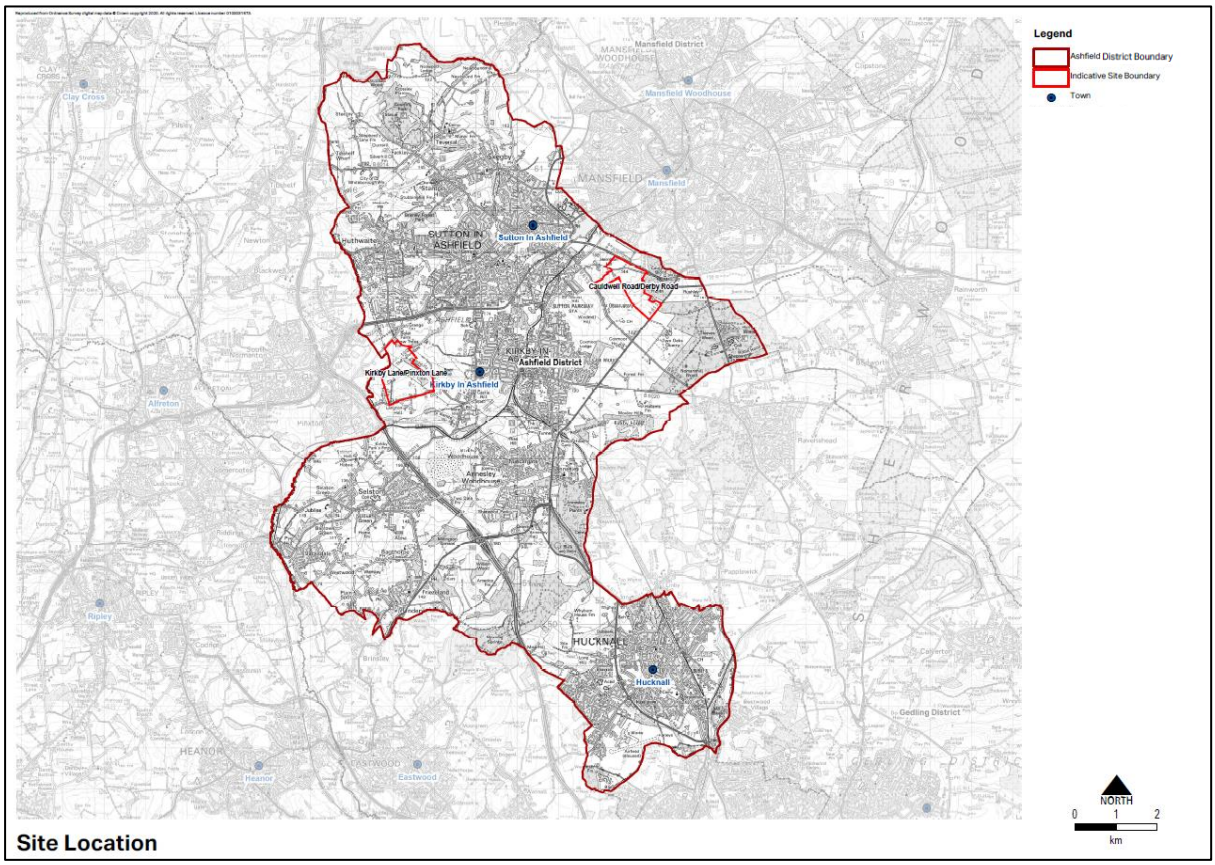

Figure 2.4: Location of the two new settlement options in Ashfield District

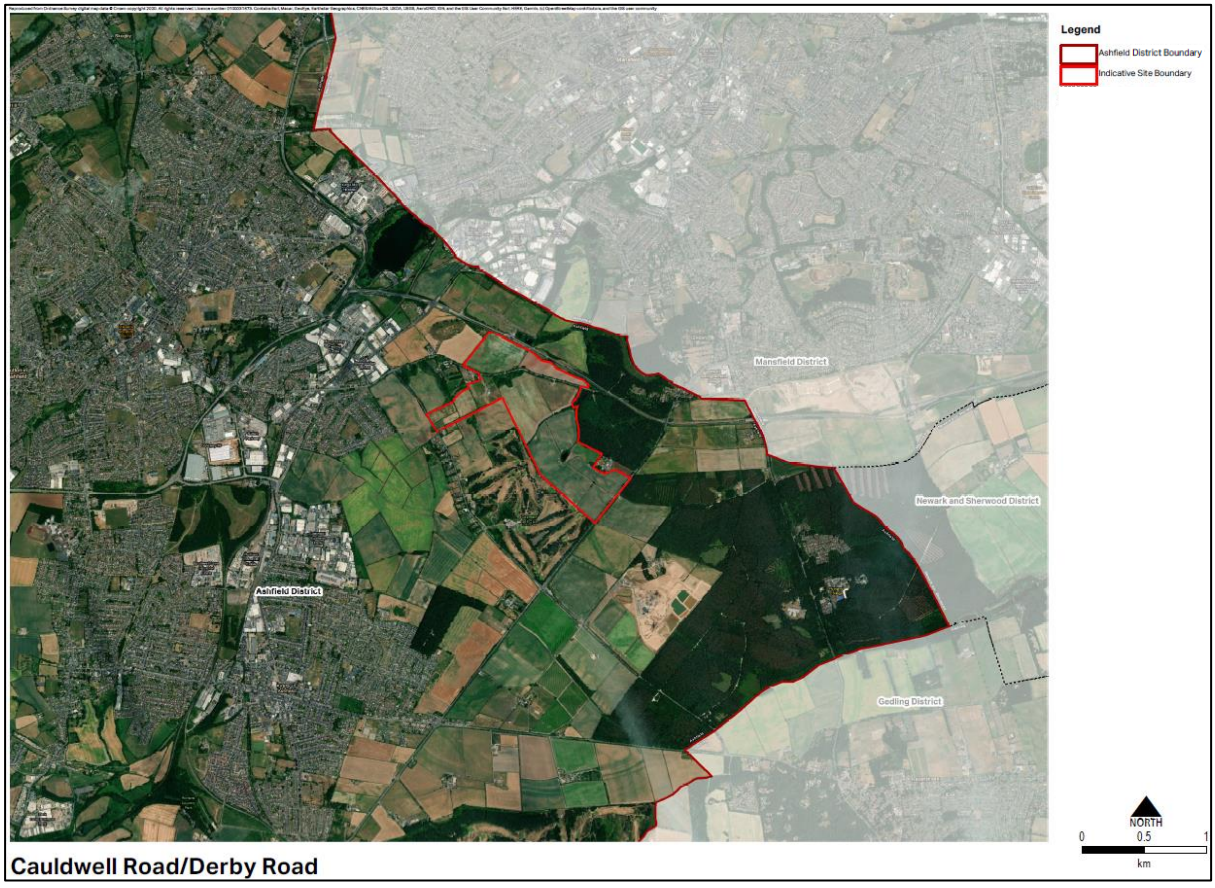

Figure 2.5: Location of Site 2 - Cauldwell Road / Derby Road, Sutton in Ashfield

Cauldwell Road/Derby Road, Sutton in Ashfield (Site 2) is located to the east of Sutton in Ashfield towards the border with Mansfield District. It covers approximately 85 hectares in total and has an initial estimated capacity of 994 dwellings (subject to further testing through this study). The approximate centre of the site is at reference 452830, 358194.

2.2 Site ownership

The site is currently split into three parcels of land with two landowners both of which consent to development of the site. A field in the west part of the site is tenanted with a grazing licence. There are two parcels of land that for which availability is yet to be established.

The site is currently split into 5 parcels of land with 4 different landowners, as shown in **Figure 2.6**. Of these 5 parcels of land a total of 3 SHELAA Call for Sites forms have been submitted, covering the land immediately north and south of Cauldwell Road, and the former Sutton Quarry inert landfill. The two largest parcels (SA076 and SA077) are in the same landownership. All parcels of land which have come forward through the Call for Sites submissions are promoted for a mix of housing and employment.

Figure 2.6: Site 1 Land ownership and availability

2.3 Existing boundaries

The north western boundary follows the first line of hedgerow heading east from Coxmoor Road which then skirts the southern boundary of the dwellings located on Cauldwell Road. The boundary then follows Cauldwell Road north and then moves towards the north east before reaching the A617 Sherwood Way South (Mansfield-Ashfield Regeneration Route). The north eastern boundary follows the A617 south before reaching an area of woodland, it then follows the inside line of the woodland to reach Derby Road. The southern boundary follows Derby Road until it reaches the edge of the Coxmoor Golf Club. It then follows the eastern boundary of the golf course and the adjoining field before heading west back to Coxmoor Road. There is no existing access to the site, however it is assumed that access could be provided along Cauldwell Road.

2.4 Topography

The site is undulating but all still cultivatable for agriculture. The highest point of the site is immediately north of the northern boundary of the golf course, whilst the land falls away into a dip along the minor watercourses towards Cauldwell Dam. The parcel of land north west of Cauldwell Road is in a dip and highly visible from Hamilton Hill.

2.5 Site Uses

The existing development present within the site includes a cluster of agricultural buildings, known as Cauldwell Livery, in the north west of the site. The majority of the site is made up of a patchwork of agricultural fields, for arable and livestock grazing, which are well defined by hedgerows and treelines.

2.6 Surrounding land uses

There are a number of land uses adjacent to the site. To the north west of the site along Cauldwell Road there is a small cluster of dwellings containing six dwellings and their curtilage.

To the east, the site boundary is adjacent to the A617 and beyond this is Oakham Business Park (with over 20 different companies operating out of it which mainly consists of light industrial uses) and new large logistics buildings at Summit Park.

Cauldwell Dam and Stonehill Plantation are located directly adjacent to the eastern boundary of the site, parts of Stonehill Plantation are potential areas of designation for Special Area of Conservation.

Bright Sparks Nursery School is adjacent to the south east corner of the site.

Immediately to the south east of the site across the A611 Derby Road is the permitted Two Oaks Quarry operated by Mansfield Sand that extracts silica sand and gravel. Permission for the quarry was granted in 2013 (reference: 4/2010/0178) to extract approximately 14.31 million tonnes of mineral over 40-50 years in four phases. The first phase starts at the east of the site adjacent to Thieves Wood.

Coxmoor Golf Course is directly south of the site and contains a varied and valued habitats, including Deciduous Woodland, Low Land Heathland, Woodland and Low Fens.

The Sherwood Observatory is located approximately 500m from the site to the south west along Coxmoor Road. The Observatory building was built by the founders of the society on a purely voluntary basis so that the society could have a place to meet and view the stars together. The building work was started in 1972 and was opened to the public in 1986.

Land uses which are not directly adjacent to the site largely consist of agricultural fields, with the nearest residential areas of Berry Hill approximately 2km (as the crow flies from the centre of the site) to the east and Sutton in Ashfield built up area and centre are approximately 1-3km to the north west. Sutton in Ashfield is one of Ashfield's main urban areas and has a large quantity of services and facilities. Similarly, Mansfield town centre is located approximately 3km north east from the site (as the crow flies), however, this falls outside Ashfield District Council's boundary.

2.7 Roads and access arrangements

The site is bounded by the A617 (Sherwood Way South) to the north, A611 (Derby Road) to the east, Coxmoor Golf Club and B6139 (Coxmoor Road) to the south and west. Cauldwell Lane runs through the proposed site

area and connects with the B6139 (Coxmoor Road) to the west. No through route is currently available towards the east, with Cauldwell Road terminating at the A617 approximately 1.8km from its junction with the B6139.

The A617 (Sherwood Way South) connects the A38 (in south Mansfield) with the A60, A614 and eventually the A46 (near Newark). The A617 (Sherwood Way South) is a two-way single carriageway route (although in some places the route widens to provide two lanes, or more on the approach to junctions). The A38 provides a route to M1 Junction 28.

The A611 (Derby Road) runs along the eastern boundary of the proposed site. On the proposed site boundary the A611 is a two-way single carriageway route. The A611 provides connection between the A60 in the north (to the south of Mansfield) and Bulwell to the south. The A611 also provides a route to M1 Junction 27. The A611 is currently subject to an optioneering assessment by NCC regarding improvements to junction capacity at key junctions along the route between its junction with the A60 and the A608.

The site is not currently located in an area well served by public transport. The nearest bus stop from the centre of the site is located on the A60 (Nottingham Road), this is located approximately 1.5km to the northeast of the site. An additional bus stop is located on the B6139 (Coxmoor Road) approximately 1.6km from the centre of the site.

The nearest railway station to the site is Sutton Parkway, which lies 2.4km to the west of the centre of the site as the crow flies. Sutton Parkway lies on the Robin Hood Line, which connects Nottingham to Worksop. The towns and villages served by the route are Nottingham, Bulwell, Hucknall, Newstead, Kirkby-in-Ashfield, Sutton in Ashfield, Mansfield, Mansfield Woodhouse, Shirebrook, Langwith, Nether Langwith and Whaley Thorns, Cresswell, Whitwell and Worksop.

3. Planning overview

3.1 Existing reports / information referred to

- National Planning Policy Framework (2019);
- Planning Practice Guidance (2020); and
- Ashfield Local Plan Review (2002) and adopted Policies Map.

3.2 National planning policy summary

The new National Planning Policy Framework (NPPF) was published in February 2019. It sets out the Government's economic, environmental and social planning policies for England and how these should be applied. Given the lack and outdated nature of local planning policy in the Ashfield context, the guidance set out in the NPPF will be the primary consideration.

At the heart of the NPPF is a presumption in favour of sustainable development that should run through both place-making and decision-taking. NPPF Paragraph 11 states that, for plan-making, this means that:

a. plans should positively seek opportunities to meet the development needs of their area, and be sufficiently flexible to adapt to rapid change;

b. strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas, unless:

   i. the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type or distribution of development in the plan area[6]; or

   ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.

Footnote 6 to paragraph 11 a) i. states "*the policies referred to are those in this Framework (rather than those in development plans) relating to: habitats sites (and those sites listed in paragraph 176) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets (and other heritage assets of archaeological interest referred to in footnote 63); and areas at risk of flooding or coastal change*". It should be noted that "irreplaceable habitats" refers to Ancient Woodland and ancient or veteran trees. The constraints listed in Footnote 6 are significant constraints to development under the NPPF.

For proposals affecting heritage assets the NPPF at Paragraph 189 requires applicants to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

NPPF 193 states that when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.

Paragraph 194 states that any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of grade II listed buildings, or grade II registered parks or gardens, should be

exceptional; whilst assets of the highest significance (notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites) should be wholly exceptional.

With regards to minerals the NPPF states that since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation. Planning policies should safeguard mineral resources through Minerals Safeguarding Areas and authorities should adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development. Policies should be set out to encourage the prior extraction of minerals where practical and environment; however, in respect of coal NPPF paragraph 211 states that planning permission should not be granted for the extraction of coal unless:

a. the proposal is environmentally acceptable, or can be made so by planning conditions or obligations; or

b. if it is not environmentally acceptable, then it provides national, local or community benefits which clearly outweigh its likely impacts (taking all relevant matters into account, including any residual environmental impacts).

With respect to ground conditions and pollution NPPF Paragraph 180 states that planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c. limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

3.3 Local planning policy summary

The Ashfield Local Plan Review (2002)[2] sets out a framework of policies to guide and encourage development in Ashfield up to 2011, whilst safeguarding and enhancing the environment. In 2007 a series of these policies were 'saved', the ones relevant to the site and surroundings are outlined below. An extract of the Proposals Map[3] is presented at **Figure 3.1** with the Site 2 boundary annotated to show the relevant policies that apply to the site.

There are two designations on the adopted policies map which are within the site boundary, the first is **Policy EV2: Countryside,** the whole site area is covered by this policy. This policy states that permission will only be given for appropriate development. Development must be located and designated so as not to adversely affect the character of the countryside, in particular its openness. The policy lists what 'appropriate development' would comprise including rural uses, outdoor sport or recreation, cemeteries and utility installations, buildings which are essential for uses appropriate to the countryside, re-use of existing buildings, replacement, alternation or extension of existing buildings, infill development and within named villages.

The second designation is **Policy EV4: Mature Landscape Areas,** which states that development which does not adversely affect the character and quality of mature landscape areas will be permitted. EV4RI 'Coxmoor/ Kings Mill' is Located in the north west section of the site which sticks out at an angle towards the west.

The second is **Policy EV6: Nature Conservation Site,** for which the policy states that development which adversely impacts local nature reserves will only be permitted where provision is made within the development for the protection of features of nature conservation or geological significance or where the development cannot be located elsewhere. There is one nature conservation site, EV6/83 Cauldwell Dam and Drain which is a pond, marsh and drain with a noteworthy community. This is a narrow stretch which reaches through the centre of the site.

[2] Available at: https://www.ashfield.gov.uk/media/2358/full-document-_text_.pdf
[3] Available at: https://www.ashfield.gov.uk/media/2359/lplan-proposals-map-north.pdf

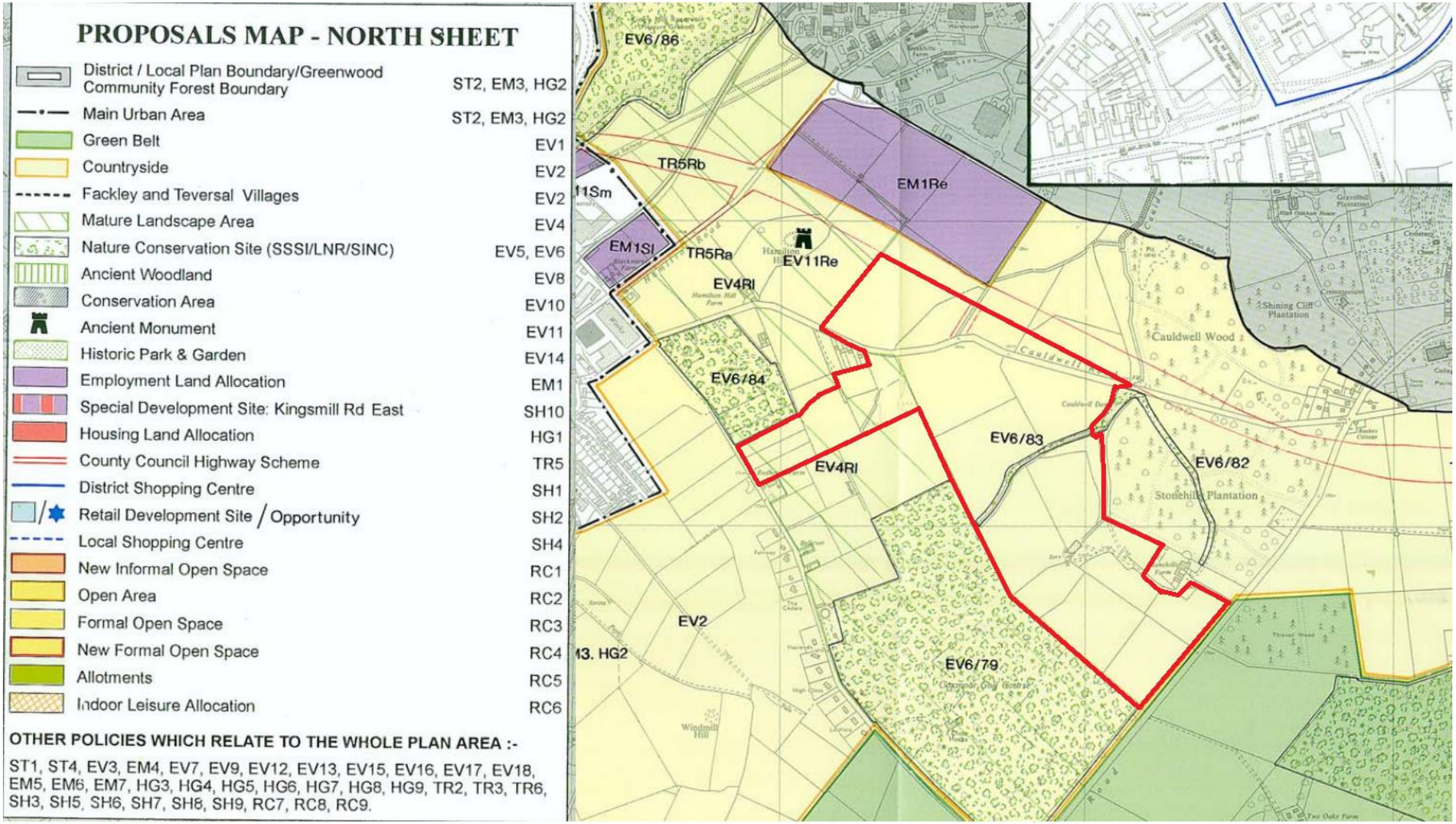

Figure 3.1: Local Plan 2002 Proposals Map Extract (Site 2 boundary annotated in red)

The site is directly adjacent to **EM1 Employment Land Allocations** allocation EM1Re South West Oakham Business Park which provides 23.5 ha of land. The policy wording states "*Site EM1Re on land to the south west of Oakham Business Park will provide an area of expansion to the adjacent business park and will benefit from the existing infrastructure. This site will be contained to the south by the proposed Mansfield-Ashfield Regeneration Route. The site is suitable for development as a prestige employment site in accordance with Structure Plan Review Policy 2/6*". The site, now consented and called Summit Park, is located north of the A617 Mansfield-Ashfield Regeneration Route, which itself at the time the Proposals Map was adopted was not yet constructed. Land was safeguarded for the delivery of Phases 2 and 3 of the Mansfield-Ashfield Regeneration Route on the Proposals Map under Policy **RT5Rb County Council Highway Schemes**, the strategic purpose of which was to improve east-west road links to increase accessibility within the County to the A1 and M1 to assist with regeneration following coalfield closures and to improve access across Mansfield.

The other main policy document that applies to the site is the Minerals Local Plan. The emerging Minerals Local Plan is currently undergoing Examination in Public and is at an advanced stage. P**olicy MP8: Silica Sand Provision** states that the extraction of remaining reserves at the Two Oaks Farm permitted site will be utilised to contribute towards the provision of an adequate and steady supply of silica sand sufficient for at least ten years.

The Policies Map for the Publication Version of the Minerals Local Plan[4], shown at **Figure 3.2**, identifies the area around Two Oaks Farm as a Minerals Consultation Area and Minerals Safeguarding Area under **Policy SP7 Minerals Safeguarding, Consultation Areas and Associated Minerals Infrastructure**. Non-minerals development within minerals safeguarding areas will have to demonstrate that mineral resources of economic importance will not be needlessly sterilised as a result of the development the development and that the development would not pose a serious hindrance to future extraction in the vicinity. Where this cannot be demonstrated, and where there is a clear and demonstrable need for the non-minerals development, prior extraction will be sought where practicable.

[4] Available at: https://www.nottinghamshire.gov.uk/media/2327747/sd1-mlp-publication-version.pdf

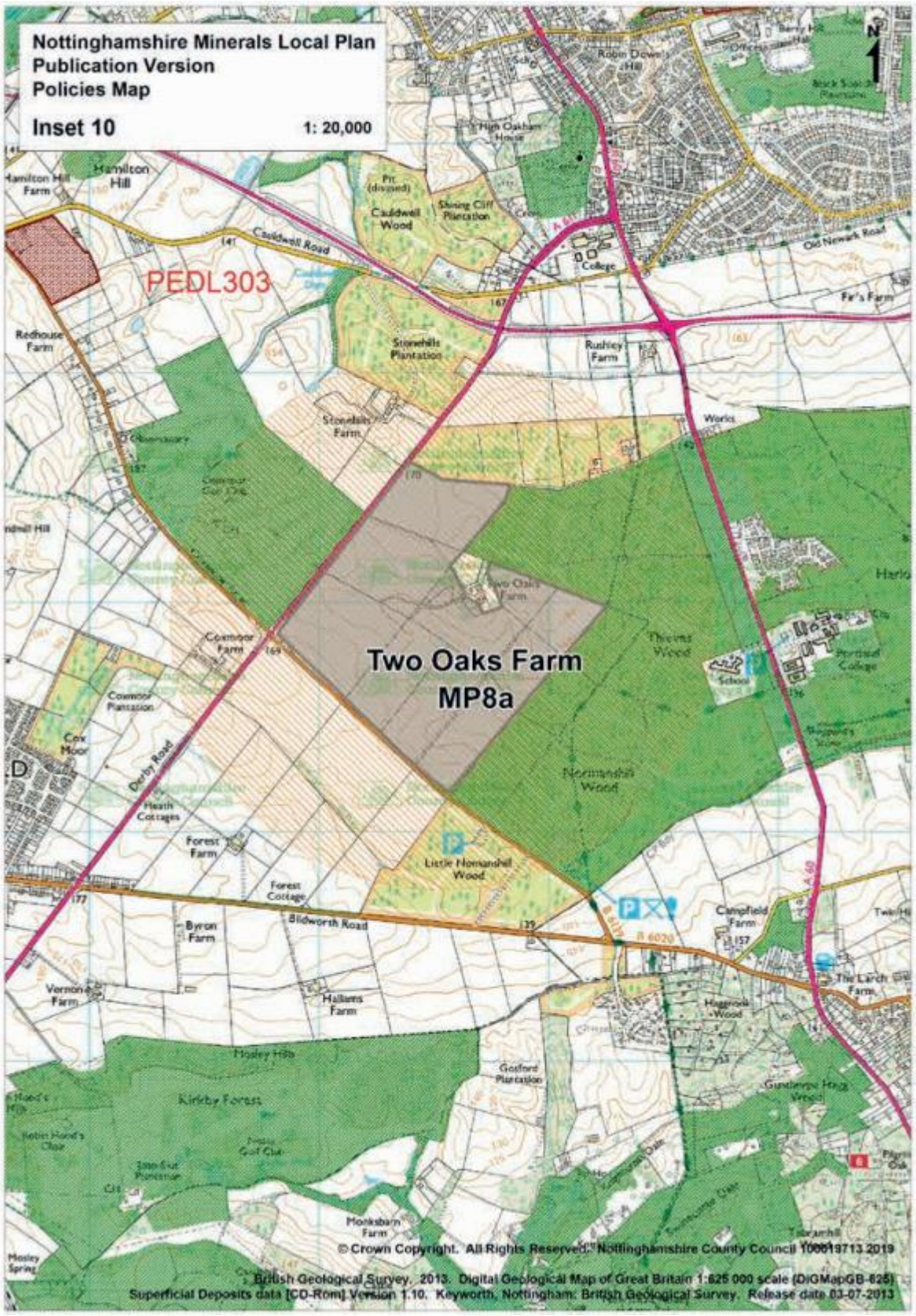

Figure 3.2: Nottinghamshire Minerals Local Plan Publication Version Policies Map Inset 10

3.4 Planning history summary

Planning Application Ref V/2000/0098 at Cauldwell Road, Sutton in Ashfield for an 'Outline Application (Design, External Appearance and Landscaping Reserved for future consideration) for Ashfield Technology Park (High Technology Office and Light Industry); 120 bed hotel with conference facilities; Championship 18 hole golf course

with club house site , corporate lodges and associated facilities; construction of the proposed Mansfield/Ashfield Regeneration Route; local service area (petrol filling station, shop, restaurant and public house); High quality housing with IT communication links to the Ashfield Technology Park' was refused in 2001 as it was a departure from the development plan and conflicted with Policies ST1 (Development)l ST2 (Main urban areas); ST4 (Remainder of the District); EV2 (the countryside); HG3 (Housing density) and HG5 (New Residential Developments of the Ashfield Local Plan Review; and Policies 1/2 (Distribution of Development); 3/1 (Control of Development in the Countryside) and 13/9 (Prevention of Coalescence) in the Nottingham Structure Plan Review. Furthermore, the construction of the dwellings, in the location and at the density proposed, would be contrary to the advice contained within Planning Policy Guidance Note 3 – Housing.

Planning Application Ref V/2002/0048 at Cauldwell Road, Sutton in Ashfield for an 'Outline Application For Ashfield Technology Park (High Tech Office and Light Industry, 120 Bed Hotel with Conference Facility; Championship 18 Hole Golf Course, Club House, Corporate Lodges and Associated Facilities, Roads, Local Service Area and Housing)' was refused in 2002 for the same reasons as the above application V/2000/0098.

The site lies immediately North-West of the permitted Two Oaks Quarry operated by Mansfield Sand that extracts silica sand and gravel. Permission for the quarry was granted by the County Council in 2013 (reference: 4/2010/0178[5]) to extract approximately 14.31 million tonnes of mineral over 40-50 years in four phases. The site also processes and bags the mineral ready for the market on site at is processing plant.

[5] Further information available at: https://www.nottinghamshire.gov.uk/planningsearch/plandisp.aspx?AppNo=ES/1898

4. Economics

4.1 Existing reports / information referred to

This analysis has identified the baseline conditions surrounding each assessment site, the main drivers for economic growth in the area and any planned schemes that may unlock growth; in order to robustly assess the attractiveness of the site for employers and its suitability for development. This assessment has been established following a comprehensive review of publicly available data sources and strategic local documents including:

- Office of National Statistics (ONS) Population Estimates and Projections;
- ONS Business Register and Survey (BRES);
- ONS Annual Population Survey;
- ONS Census 2011 Workplace and Origin-Destination data;
- Ministry of Housing, Communities and Local Government's Index of Multiple Deprivation (IMD);
- The Strategic Economic Plan for the Derby, Derbyshire, Nottingham and Nottinghamshire (D2N2) Local Enterprise Partnership (LEP);
- D2N2's Evidence Base for the Local Industrial Strategy; and
- D2N2's Science and Innovation Audit.

Based on this review, the three Science and Innovation Core priority sectors for the LEP were recognised as: transport equipment manufacturing, food and drink manufacturing and life sciences. These sectors present a major opportunity for future growth due to the existing competitive advantages the area has against the rest of the country. In addition to this, Opportunity priority sectors within the LEP include creative and digital, visitor economy, logistics and e-commerce, construction, extractive industries, and professional and business services. Retail and healthcare are also included due to their high-volume of employment.

Nearby employment sites in the priority sectors present economic development opportunities for the assessment sites due to their potential agglomeration benefits and business connectivity advantages thus, increase the attractiveness of the site.

4.2 Detailed overview

The Cauldwell Road/Derby Road assessment site benefits from its proximity to Sutton In Ashfield and Mansfield as well as its position on the A617, known as the Mansfield-Ashfield Regeneration Route, which has received continual extensions since its delivery in 2000. The A617 connects the site to nearby centres such as Chesterfield and Newark as well as to the M1 and the A614/A6097. The M1 accessibility is vital for many businesses in Ashfield, whilst the D2N2 SEP states that there are multiple planned improvements to the A614/A6097 corridor to relieve congestion and support economic growth[6]. The site is located just over one-kilometre east of the Sutton Parkway train station and therefore, benefits from rail connectivity as well as road.

A series of residential care homes and multiple industrial parks around road junctions have meant means the immediate area surrounding the site as an employment density (1.31) considerably above the borough and LEP averages (both 0.7)[7] [8]. However, this figure is slightly distorted as the residential care homes and complex needs care homes by the A38. They create considerable job opportunities for the site's Lower Super Output Areas (LSOAs) but result in an elderly population, with 23.1% of the local population aged over 65 and not accounted for in employment density calculations. Kingfisher Court, Lawn Park Care Home and the three complex needs care homes mean the health sectors accounts for 45.3% of employment in the site's LSOAs compared to 20.1% across Ashfield, which is the most of any sector in the borough. These facilities are critical for the community and would provide residents occupying any new settlement with potential opportunities in the care sector.

The D2N2 LEP has identified transport manufacturing as a priority due to its high-value and the area's competitive advantage against the country[9]. Therefore, it is crucial to consider that high-tech manufacturing (including transport manufacturing) generates 17.0% of total employment in the immediate locality, considerably above the borough (9.0%) and LEP (5.3%) averages. Glenair's large facility, located to the north of the site in

[6] D2N2 LEP, (2019); Strategic Economic Plan
[7] Office of National Statistics (ONS), (2019); Population Estimates 2018 (16-64)
[8] ONS, (2019); Business Register and Employment Survey
[9] D2N2 LEP, (2019); Strategic Economic Plan

Oakham Business Park, is identified in the LEP's Science and Innovation Audit as a major asset in this sector[10]. This cluster combines with Hermitage Lane Industrial Estate to contain further transport manufacturers such as PB Auto Electrics and Jaivel Aerospace. The industrial estate on Hamilton Road, adjacent to the site, also contains a cluster of electronic, metal and transport manufacturers. Therefore, housing on the assessment site would result in additional residents being located close to substantial employment opportunities, whilst future economic development could benefit from possible agglomeration benefits in the LEP's priority sector.

Other nearby economic assets present further opportunities for future development on the assessment site. Mansfield i-Centre is identified in the Science and Innovation Audit as one of the main innovation centres in the area, providing research capabilities to businesses in all sectors. This renowned facility is located amongst Oakham Business Park to the north of the site and could help generate business activity on the site. Linney, located to the east of Mansfield, is one of the top performing companies in the LEP's creative and digital opportunity sector[11]. The LEP identifies this sector as an opportunity due to its clustering and connections to national markets therefore, business activity on the site could aim to help create a hub of activity. These assets increase the attractiveness of the site for small and medium businesses who could benefit from their capabilities.

The businesses in the area however, according to Census 2011 workplace data, did not typically create high-level occupations. Only 27.7% of workers occupied high-level occupations (Level 1-3) in 2011, substantially below the averages for Ashfield (33.5%) and the LEP (36.2%)[12]. The lack of high-level occupations in the locality appear to have led to a less qualified workforce being attracted than typical for the borough, with 18.8% of workers in the site's LSOAs qualified to NVQ Level 4+ compared to 25.6% across Ashfield and 30.4% across D2N2 LEP. However, this type of workforce could be due to the skills shortages challenge in the area. Around 37.1% of workers live within 5km of their place of work, which is around average for Ashfield (37.4%). Many of these are likely to be within the centres of Mansfield and Sutton in Ashfield.

The D2N2 SEP recognises Vision West Nottinghamshire College as a vital educational asset, supporting around 26,000 students. The college's main site is located directly to the east of the assessment site providing a wide range of courses including higher education. Its smaller facilities in Sutton in Ashfield and Kirkby-in-Ashfield specialise in engineering and construction respectively. These facilities will hopefully develop a better qualified workforce for any employment opportunities on the site. In addition, housing within a new settlement could have the additional benefitting of bringing students closer to their educational opportunities.

The Index of Multiple Deprivation[13] ranks the site's LSOA to be in the 8th deprivation decile (1st is most deprivation), considering it to be in the 30% least deprived parts of the country. This analysis suggests limited regeneration potential for the immediate surrounds however, many of the neighbouring areas across both Kirkby-in-Ashfield, Sutton in Ashfield and Mansfield are judged to be in the 1st to 3rd deprivation deciles. Therefore, a new settlement does have wider regeneration potential by delivering new employment and community opportunities reduce deprivation in the surrounding areas.

The above analysis suggests there are economic assets in the neighbouring areas that can help support future employers on the site. These assets have focusses in the LEP's priority sectors therefore, there is an opportunity for future businesses to connect with leading transport manufacturing, digital and innovation centres. One concern is the lack of high-level occupations and skills shortage in the area to drive future growth. Collaboration with the nearby Vision West Nottinghamshire College, a major education asset, can help overcome this challenge and make the site more appealing to businesses.

4.3 Risks

The lack of housing in immediate vicinity reduces the local labour force for any future employment opportunities. There is also an elderly population in the area, with 23.1% aged over 65 compared to the borough average of 19.2%[14]. The combination of these effects reduces the number of available workers in the area and consequently may reduce the attractiveness of the site for businesses.

As mentioned, the current workforce attracted to the local area tends to be fairly unskilled and hold lower level occupations. Ashfield as a whole suffers from a skills gap against regional and national levels[15]. Future businesses may require specific skills for their economic performance and there is not currently evidence that

[10] D2N2 LEP (produced by SQW), (2018); A Science and Innovation Audit for the D2N2 Local Enterprise Partnership
[11] D2N2 LEP, (2019); D2N2 Local Industrial Strategy Evidence Base v1.7 (including consultation feedback)
[12] ONS, (2015); Census 2011 Workplace Population Statistics
[13] Ministry of Housing, Communities and Local Government, (2019); English Indices of deprivation 2019
[14] ONS, (2019); Population Estimates 2018
[15] ONS, (2019); Annual Population Survey

qualified workers are drawn into the area. It should be noted that this is more likely to be related to the current opportunities and business profile in the site's LSOAs than an underlying reason for skilled workers being deterred.

As mentioned, the site benefits from being located just over one kilometre from the Sutton Parkway Station as the crow flies. This connectivity could help future businesses. However, for businesses to be able to choose from a larger labour pool, there needs to be active travel routes connecting the site to the station or further public transport opportunities than are currently available. The site's location relative to Sutton Parkway rail station makes train travel a viable transport method for future residents and workers.

4.4 Proposed mitigation solution

The elderly population and current lack of housing in the immediate vicinity has not deterred multiple important businesses in the LEP's identified sectors from positioning themselves in the locality. Assets such as Glenair and Mansfield i-Centre in Oakham Business Park are growing in this location, likely benefitting from clustering effects and the road accessibility. In addition, a future settlement on the site would deliver a new resident base within the varied housing on the site and therefore, mitigate any risk over workforce. These residents would be able to occupy employment opportunities on the site as well as supporting the major assets in the area.

As discussed, existing business locations in the wider area have not been constrained by its workforce. Therefore, the workforce appears suitable to the employment opportunities generated, spread across the LEP's identified sectors such as transport manufacturing, creative and digital, and life sciences. If the development produces high-quality employment space, employers are likely to find the site attractive due to its connectivity, proximity to assets and ability to draw on two centres (Mansfield and Sutton in Ashfield) for goods, services and labour. In addition, the proximity to the Vision West Nottinghamshire College should help raise the qualifications profile of future workers and the settlement should look to stimulate this through active collaboration.

The site should ensure there are sufficient linkages to the nearby Sutton Parkway station, as well as into Sutton in Ashfield and Mansfield, to ensure these are considered strengths for a future settlement. These connections would allow businesses to draw upon a larger labour pool and utilise strong road and rail connectivity for their operations. Future residents and workers are also likely to see these connections as real strengths for the site.

The assessment site is judged to be suitable for future economic development. The proximity to some existing assets is likely to create employment opportunities for future residents and business connections for future companies.

5. Access and movement

5.1 Existing reports / information referred to

This section has been prepared using the following documents:

- National Planning Policy Framework (Paragraphs 108 – 111);
- Manual for Streets;
- Manual for Streets 2;
- 6Cs Design Guide;
- Guidance on Transport Assessment;
- Guidelines for Providing for Journeys on Foot;
- Guidelines for the Environmental Assessment of Road Traffic;
- Ashfield Transport Study;
- Ashfield District Council – Residential Parking Standards Supplementary Planning Document (SPD);
- A611 Corridor Study; and
- Nottinghamshire Local Transport Plan.

5.2 Detailed overview

The *Manual for Streets* (MfS) identified a user hierarchy that emphasised the importance of considering the needs of pedestrians first, followed by cyclists and then public transport. This is described in **Figure 5.1**.

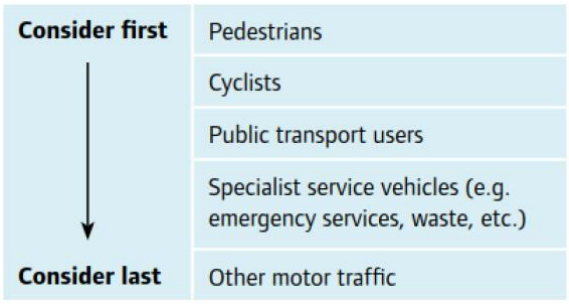

Figure 5.1: User Hierarchy from Manual for Streets

The guidance contained within *MfS* is directly reflected in NPPF. The *MfS* stresses, however, that "the hierarchy is not meant to be rigidly applied and does not necessarily mean that it is always more important to provide for pedestrians than it is for the other modes. However, they should at least be considered first, followed by consideration for the others in the order given. This helps ensure that the street will serve its range of users in a balanced way. There may be situations where some upper-tier modes are not provided for – for example, buses might not need to be accommodated in a short, narrow section of street where access for cars is required."

Given the guidance contained in the NPPF and *MfS*, as well as the principles contained in the Nottinghamshire LTP, this section has considered access by sustainable modes of transport first before moving on to consider private cars.

5.2.1 Accessibility

The site is bounded by the A617 (Sherwood Way South) to the north, A611 (Derby Road) to the east, Coxmoor Golf Club and B6139 (Coxmoor Road) to the south and west. Cauldwell Lane runs through the proposed site footprint and connects with the B6139 (Coxmoor Road) to the west. No through route is currently available towards the east, with Cauldwell Road terminating approximately 1.8km from its junction with the B6139. The location of the site within its local highway context is shown in **Figure 5.2**.

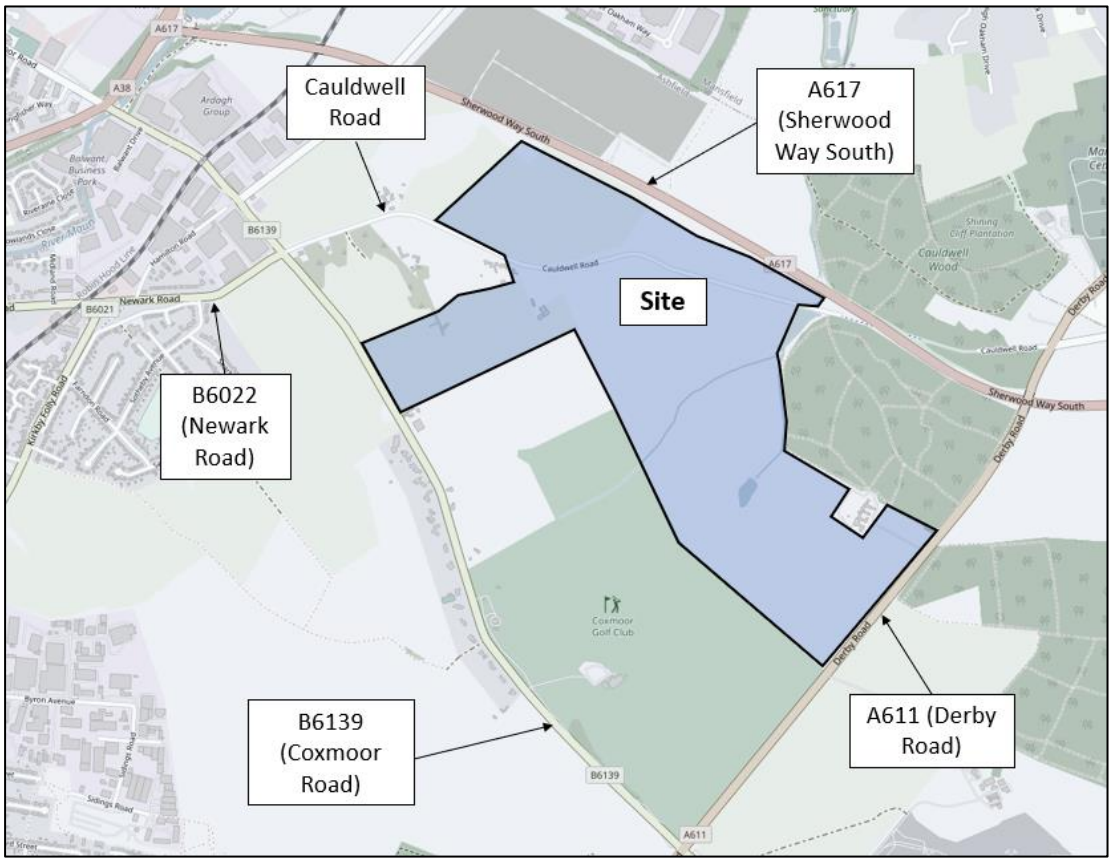

Figure 5.2: Site 2 - local highway context

The site is located approximately 3km to the southwest of Mansfield town centre (as the crow flies from the centre of the site), ~3km to the east of Sutton in Ashfield town centre and 3km northeast of Kirkby-in-Ashfield town centre as the crow flies. To the immediate south is the Coxmoor Golf Club and Sherwood Observatory, whilst to the north (approximately 1.25km) is Oakham Business Park. To the west, several industrial estates (lying on the outskirts of Sutton in Ashfield) are accessible, including Balwant Business Park and Oddicroft Lane Industrial Estate. The residential settlement of Berry Hill is the closest residential area (located 1.5km to the northeast of the site).

Section 5.2.2. discusses access to these nearby facilities on foot and cycling, Section 5.2.3 considers accessibility by public transport and Section 5.2.4 considers how to access the site by private vehicle.

In terms of the immediate highway structure, the A617 (Sherwood Way South) connects the A38 (in south Mansfield) with the A60, A614 and eventually the A46 (near Newark). The A617 (Sherwood Way South) is a two-way single carriageway route (although in some places the route widens to provide two lanes, or more on the approach to junctions). The A38 provides a route to M1 Junction 28.

The A611 (Derby Road) runs along the eastern boundary of the proposed site. On the proposed site boundary the A611 is a two-way single carriageway route. The A611 provides connection between the A60 in the north (to the south of Mansfield) and Bulwell to the south. The A611 also provides a route to M1 Junction 27. The A611 is currently subject to an optioneering assessment by NCC regarding improvements to junction capacity at key junctions along the route between its junction with the A60 and the A608.

To the west, the B6139 (Coxmoor Road) is a two-way single carriageway route. On the immediate boundary of the site the speed limit is 40mph (owing to existing residential properties), which increases to national speed limit to the north.

Cauldwell Road currently runs through the proposed site and connects with the B6139 at the B6139 / B6022 / Cauldwell signalised junction. The route is a two-way single carriageway route that follows the national speed limit. The route reaches a dead-end approximately 1.8km to the east of the B6139 / B6022 / Cauldwell signalised junction and is therefore used predominantly for access to residential property and walking routes. Cauldwell Road would either need to be incorporated into the masterplan or stopped up via a Traffic Regulation Order (TRO).

The wider transport context is shown in **Figure 5.3**.

Figure 5.3: Site 2 - Wider highway context

5.2.2 Site access – walking and cycling

The *Guidelines for Providing for Journeys on Foot* (Chartered Institute of Highways and Transportation, CIHT, 2000) describes a 'maximum', 'acceptable' and 'desirable' walking distances. The CIHT suggests that walking distances up to 2,000m can be considered the 'preferred maximum' for commuting journeys, walking to school and recreational journeys. 'Desirable' and 'acceptable' distances are 500m and 1,000m, respectively. This advice is summarised in **Table 5.1**.

Table 5.1: CIHT walking distance and time thresholds

CIHT Standard	Distance (metres)		Walk time (minutes)	
	Commuting, Walking to school and Recreation	Other non-commuter journeys	Commuting, Walking to School and Recreation	Other non-commuting journeys
Desirable	500	400	6.25	5
Acceptable	1,000	800	12.5	10
Maximum	2,000	1,200	25	15

Local Transport Note 2/08 – Cycle Infrastructure Design (DfT, October 2008)) states that "many utility cycle journeys are under 3 miles (5km), although for commuter journeys, a trip distance of five miles (8km) or more is not uncommon". Indeed, as the ownership of e-bikes increases it's likely that more people will be willing to cycle up to 8km for commuting journeys. As such, it is generally accepted that cycling has the potential to substitute for short car trips, particularly for those of 5km or less.

Based on the above thresholds, **Figure 5.4** shows 1km and 5km isochrones overlaid over the site. An 8km isochrone has also been included, given the extending range and emerging popularity of e-bikes. The centre point of the isochrone mapping is at the centre point of the proposed site.

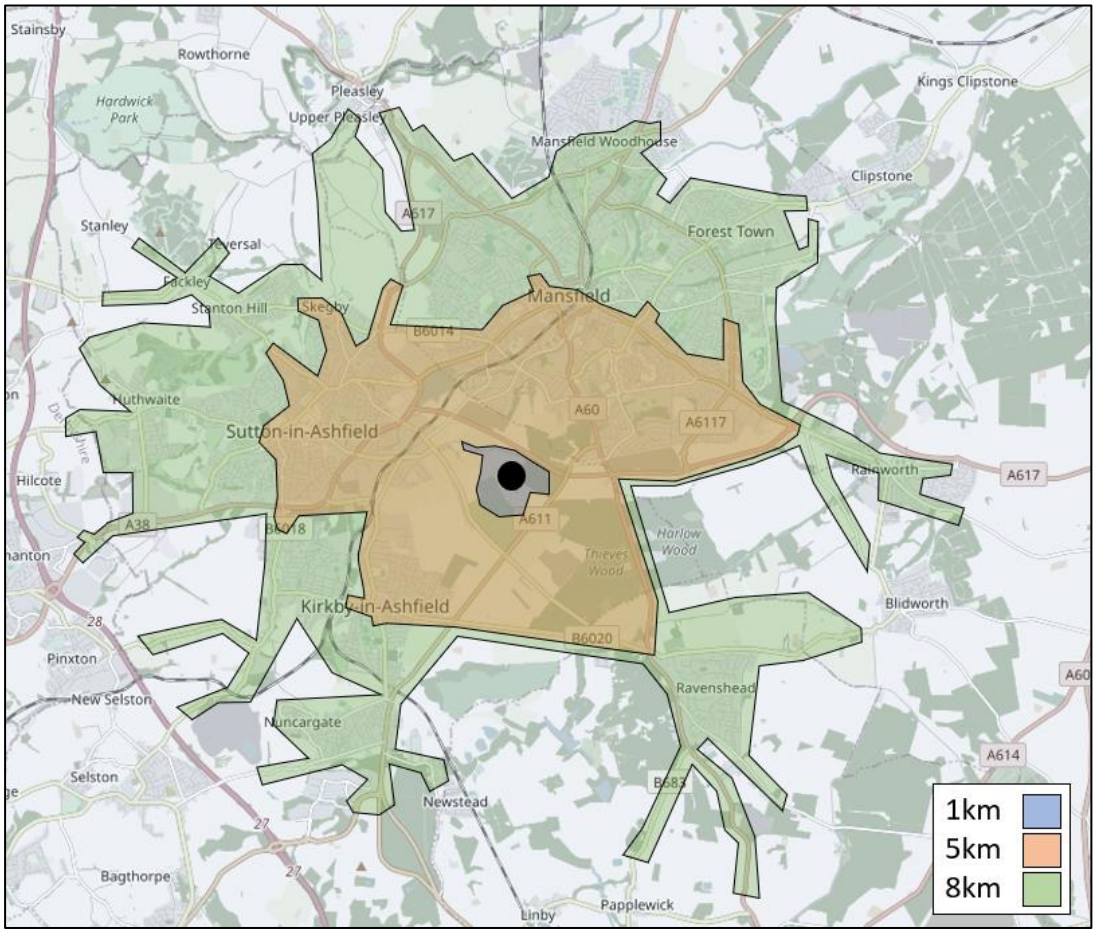

Figure 5.4: 1km, 5km and 8km isochrone

No facilities are accessible from the centre point of the site within the 1km walking threshold (owing to the site's location and overall size, as previously stated). Cauldwell Road is within the 1km walking isochrone, this road currently has a footway on the eastbound side of the carriageway (albeit narrow).

Figure 5.5 shows the Public Rights of Way (PRoW) available near to the site. As can be seen from this, no PRoW run through the site and therefore footpaths connecting the site to residential areas to the west (Sutton in Ashfield) and east (Berry Hill) are necessary. Appropriate crossing points would also likely be needed.

Figure 5.5: Public Rights of Way Map

The majority of Sutton in Ashfield to the west and Mansfield to the north are accessible within the 5km cycling isochrone, including residential areas, retail areas and employment zones (e.g. Oakham Business Park, Balwant Business Park and Oddicroft Lane Industrial Estate). Parts of Kirkby-in-Ashfield are accessible within the 5km cycling isochrone.

Within the 8km e-cycling isochrone sits the whole of Sutton in Ashfield, Mansfield, Kirkby-in-Ashfield, Rainworth, Mansfield Woodhouse, Huthwaite, Ravenshead and parts of Pleasley. Considering employment zones, the Castlewood Business Park and East Midlands Designer Outlet are accessible within the 8km threshold (to the west of the site). As such, the masterplan for the site should be designed to allow permeability towards these compass points.

Figure 5.6 identifies all existing formal cycle infrastructure within the vicinity of the site. Shared cycleway / footways are available in the immediate vicinity to the site on A617 (Sherwood Way South) and A611 (Derby Road). Additional shared footways / cycleways are available on Kirkby Folly Road and Low Moor Road providing routes towards Sutton Parkway Railway Station. Within the wider area, a local off-road cycleway is available to the northwest of the site, whilst the National Cycle Network Route 6 lies approximately 4.5km to the southeast as the crow flies.

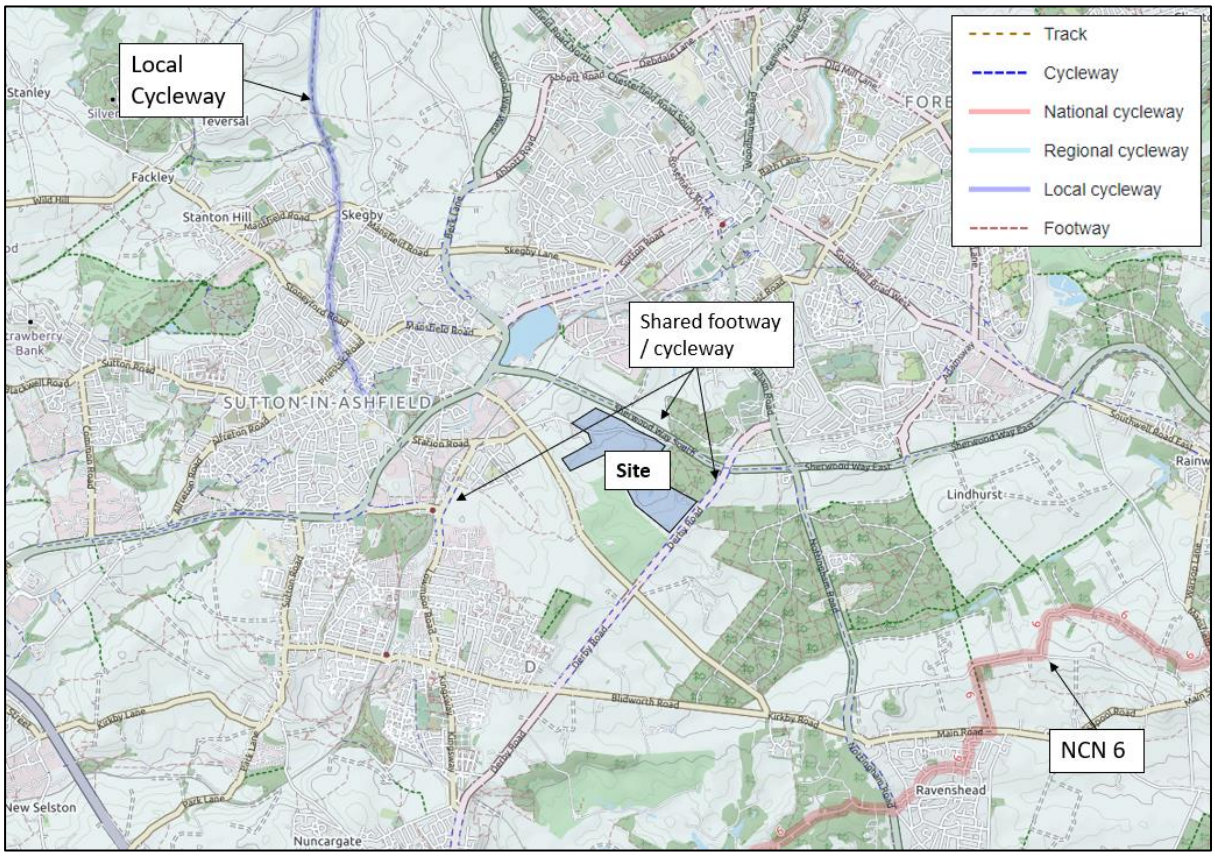

Figure 5.6: Cycle infrastructure within proximity of Site 2

5.2.3 Site access – public transport

The *Guidelines for Planning for Public Transport in Developments* (CIHT, 1999) states that "generally walking distances to bus stops in urban areas should be a maximum of 400m and preferably no more than 300m". In rural areas the walking distance should be no more than 800m.

The site is not currently located in an area well served by public transport. The nearest bus stop from the centre of the site is located on the A60 (Nottingham Road), this is located approximately 1.5km to the northeast of the site. An additional bus stop is located on the B6139 (Coxmoor Road) approximately 1.6km from the centre of the site.

Figure 5.7 identifies all bus stops located within the vicinity of the site.

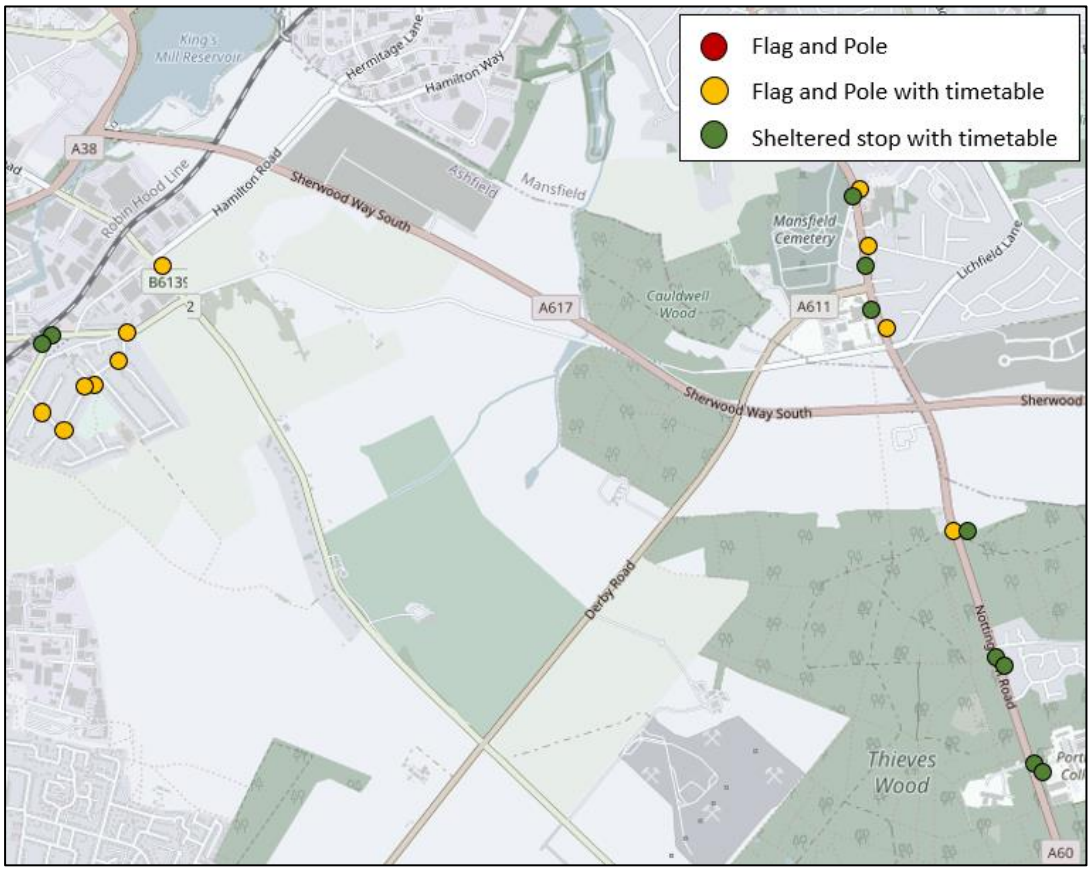

Figure 5.7: Bus stops located within the vicinity of the site

Figure 5.8 provides a summary of the buses serving the area, whilst **Table 5.2** provides a summary of their frequencies. Only services available to the public (i.e. no school services) are shown. It's important to note that the service frequency discussed in Table 5.x are the services running in the climate of the current COVID-19 pandemic, and therefore are likely to be reduced services compared to normal service operation.

Figure 5.8: Buses serving the surrounding area

Table 5.2: Summary table of bus services (N.B. this shows reduced COVID-19 services)

Service	Operator	Route	Weekday	Saturday	Sunday
The Threes (C)	Trent Barton	Mansfield – Sutton – Kirkby – Hucknall – Nottingham	Every 30 minutes	Every 30 minutes	Every hour
Ninety	Trent Barton	Sutton – Kirkby – Selston – Ripley	Every hour	Every hour	No service
Pronto	Stagecoach	Chesterfield – Mansfield – Nottingham	Every hour	Every hour	Every hour
Berry Hill Flyer	Nottsbus Connect	Mansfield- Berry Hill - Mansfield	Every 30 minutes	Every 30 minutes	No service

There may be potential to divert existing services into the site to serve residents. This would require consultation with existing operators and may be limited by the length of diversion. Of those services above, this would unlikely be the Pronto, since this is a limited stop service. For a site of this size, however, a bespoke service is likely to be required.

The nearest railway station to the site is Sutton Parkway, which lies 2.4km to the west of the centre of the site as the crow flies. Sutton Parkway lies on the Robin Hood Line, which connects Nottingham to Worksop. The towns and villages served by the route are Nottingham, Bulwell, Hucknall, Newstead, Kirkby-in-Ashfield, Sutton in Ashfield, Mansfield, Mansfield Woodhouse, Shirebrook, Langwith, Nether Langwith and Whaley Thorns, Cresswell, Whitwell and Worksop.

During the daytime (between Monday and Saturday) there is a half-hourly service between Mansfield Woodhouse and Nottingham, with services between Mansfield Woodhouse and Worksop operating hourly. There is a reduced service on Sundays, with services operating every 2 hours between Nottingham and Worksop.

Sutton Parkway lies within the suggested 5km cycle isochrone, although there is not currently a continuous route connecting the site with the station. Information contained on the National Rail website states that there are 20 bicycle storage spaces at the station; however, it was not possible to confirm this owing to the ongoing COVID-19 pandemic.

5.2.4 Site access - vehicular access

Access Junction: The site has been assessed based on the officed identified capacity of 1,270 dwellings. The *6Cs Design Guide* (which is the local highway design guide maintained on behalf of several authorities by Nottinghamshire County Council) indicates a maximum of 400 dwellings from a single point of access (assuming a Major Residential Access Road is provided). As such, at least two points of access would be required; however, it should be noted that, for a site of this size, the more access points that can be created allows for greater dispersion of trips which can assist mitigate impacts in areas of high congestion.

Opportunities for access to the site exist at the following locations:

- A617 – a signalised junction is proposed on the A617 to access Summit Park (which will be constructed north of the A617). There is therefore potential to either construct a signalised crossroads or signalised staggered crossroads at this location.
- Hamilton Road – to the west, Hamilton Road is relatively straight (providing good visibility) and therefore a junction could be provided. Hamilton Road has a signalised junction with the A617 and therefore this could be either complementary or in addition to a primary A617 access.
- Existing Cauldwell Road / Coxmoor Road junction – this is an existing signalised junction, with Cauldwell Road running into the site area. Importantly, Cauldwell Road was bisected at the time of constructing the A617 and therefore is a very quiet route.
- A611 (Derby Road) -this route has a relatively straight alignment at the point of the proposed site and therefore visibility is good. A site access to the east should therefore be feasible.

All of the above options would be subject to design work being undertaken; however, Site 2 benefits from several potential points of access from all compass points.

Trip Generation: The number of trips that could be generated by a development can be estimated using information from the *Trip Rate Information Computer System* (TRICS). This is an industry-standard database of traffic counts across the United Kingdom, categorised into different types of land-use class. By examining counts of known developments, the likely trips associated with new development can be inferred. TRICS is recommended for this purpose by the DfT.

TRICS allows comparable sites to be selected using a number of criteria. In this case, the most pertinent criteria is located with respect to existing settlements. All sites from London have been removed (owing to the dense public transport networks). Of the available locational classifications, the following have been selected:

- town centre ×
- edge of town centre ×
- suburban area ✓
- edge of town ✓
- neighbourhood centre ✓
- free standing ✓

In addition, it is common practice to provide trip generation estimates as 85%ile rates for both the AM and PM peak hours. An 85%ile rate is used for junction capacity testing as only 15% of the TRICS sample lies above this rate and therefore these rates provide a robust test of nearby junctions. Notwithstanding this, it is important to understand that trip rates tend to reduce as developments increase in size. This is because, for a small site, trips are required to leave the site for a variety of trip purposes that can be contained within a larger site (with more on-site facilities). As such, the trip generation estimates provided in **Table 5.3** are average trip rates (i.e. 50% of the TRICS sample produced more trips than indicated in the table, and 50% of the TRICS sample produced

fewer than those indicated in the table). Peak hours have been used since outside of these hours a residential development would create less traffic, and the wider network would also be less busy.

Table 5.3: Trip Generation Estimate of Site 2 (Weighted Average Trip Rates)

Rate Basis	AM (0800 – 0900hrs		PM (1700 -1800hrs)	
	Arrivals	Departures	Arrivals	Departures
Per Dwelling	0.122	0.347	0.322	0.148
1,270 Dwellings	155	441	409	188

At this stage, the above trip generation estimates are indicative, since the range of on-site facilities is unknown.

5.2.5 Offsite highway capacity and safety

Policy Tests: The NPPF states that, in assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:

- appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;
- safe and suitable access to the site can be achieved for all users; and
- any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.

The NPPF also provides the key policy test (at paragraph 109) where it states that “development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.”

Highway Capacity: Figure 5.9 shows the likely main routes of trips away from the development site, which is based on an initial manual estimate of trip ends. The routes cover roads and junctions that are managed and maintained by Nottinghamshire County Council. In addition, it is likely that impacts would need to be assessed at both M1 Junction 28 and M1 Junction 27, which are managed by Highways England.

Given the potential access points, trips would be dispersed onto the A38, A617 and A611. For a site of this size, however, it is likely that a full assessment using a dynamic highway re-assignment model would be needed, which would more fully inform the area of influence of the proposed scheme. It is understood that the site falls within several existing model areas, and therefore some work would be required to understand which model would be the most appropriate (or if a bespoke model would be the best approach). Under such circumstances, the DfT recommends the production of an Appraisal Specification Report (ASR) to identify the traffic modelling methodology, and this would be the first step in producing a robust Transport Assessment supporting the scheme. The modelling approach would need to be agreed with both Nottinghamshire County Council and Highways England.

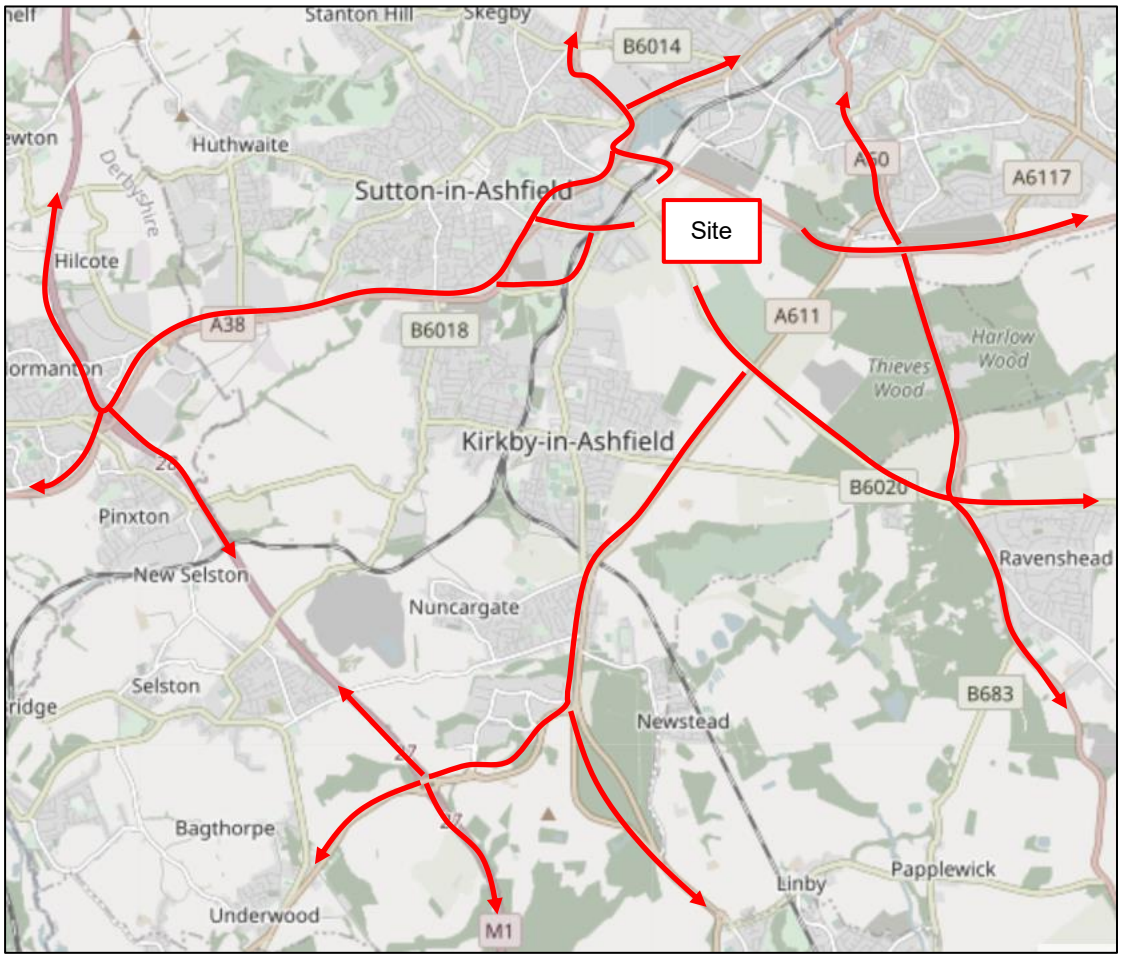

Figure 5.9: Routeing of Trips from Settlement

The *Guidance on Transport Assessment* (GTA) provides a starting point for detailed junction capacity assessment where there is a change in traffic flow of 30 two-way trips per hour. For environmental impacts (such as noise and air quality impacts), a change in traffic flow of 30% is the normal trigger (as identified in the *Guidelines for the Environmental Assessment of Road Traffic*) or 10% in a sensitive area. The modelling work would therefore identify a study area for both the highway capacity impacts, and also the environmental impacts of traffic.

Given the trip generation provided in **Table 5.3**, however, it is likely that those routes in **Figure 5.9** would experience a change in traffic flow of greater than 30 two-way trips per hour. The following considerations therefore are material:

- The site will draw trips towards the A38, A611 and M1 (Jct 28 & Jct 27).
  - The A38 is a known corridor of congestion between the M1 (Junction 28) and Mansfield.
    - Within the Nottinghamshire LTP, it states that “stress maps have been produced by organisations on behalf of Ashfield, Bassetlaw and Newark & Sherwood district councils during the development of their local development frameworks. This work has only identified two locations on the County Council’s road network that currently operates over capacity – the B6026 Huthwaite Road, and a section of the A38 in Ashfield district.”
    - Previous work undertaken by consultants Systra (in support of the withdrawn Ashfield Local Plan) concluded that “the removal of the predicted congestion along the A38 corridor is not achievable without significant investment in road infrastructure in the form of additional lanes, grade separation of junctions or the development of alternative bypasses. This level of improvement is unlikely to be feasible both regarding cost and in deliverability terms for the Local Plan and other available funding sources.”

- The M1 (Junction 28) is a known location of congestion, with queues typically extending onto the M1 mainline both northbound and southbound in the peak hours, and from the directions of Mansfield and Derby.
- The M1 (Junction 27) is less congested than Junction 28, albeit it is understood that Highways England are pursuing a capacity enhancement scheme at the junction.
- Trip are likely to be added to the A611 corridor. This corridor is also flagged in the Nottinghamshire LTP as suffering from high journey variability and a separate study prepared by AECOM identified a series of potential schemes to mitigate (to a greater or lesser extent) the impact of future growth.

As a minimum, detailed assessment would therefore be required at the M1 Junction 28, M1 Junction 27, and at junctions along the A38 and A611. Given that congestion in these areas are existing conditions, it is likely that any mitigation would relate to the contribution to a larger scheme, rather than a scheme specific to the proposed development site.

We would also anticipate the study area junction capacity tests to include assessment and potential mitigation at:

- A617 / Hamilton Road;
- Coxmoor Road / Hamilton Road;
- A611 / Coxmoor Road; and
- A60 / A617.

Road Safety: Road safety collision statistics have been obtained from the DfT (via the Crashmap database) from 01/01/2014 to 30/06/2019. The data obtained relates to those collisions that resulted in a personal injury and which were reported to the police. This data (known as STATS19 statistics) is generally recognised to be the most complete record of road collisions occurring on the local highway network. For the avoidance of doubt, and as is normal practice, they do not include statistics from collisions resulting in "damage-only" to vehicles, or which were not reported to the police.

Each collision resulting in a personal injury is classed as either 'Slight', 'Serious' or 'Fatal' by the police depending on the most serious injury resulting from the collision (i.e. a collision resulting in two 'Slight' injuries and one 'Serious' injury would be classified as a 'Serious' collision). Definitions given in Road Accidents Great Britain (published by the DfT) are as follows:

- Slight: An injury of a minor character such as a sprain (including neck whiplash injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.
- Serious: An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident. An injured casualty is recorded as seriously or slightly injured by the police on the basis of information available within a short time of the accident. This generally will not reflect the results of a medical examination but may be influenced according to whether the casualty is hospitalised or not. Hospitalisation procedures will vary regionally.
- Fatal: Human casualties who sustained injuries which caused death less than 30 days (before 1954, about two months) after the accident. Confirmed suicides are excluded.

The analysis of road safety data focuses on collisions occurring on the roads in the immediate vicinity of the site, with particular focus upon:

- Hamilton Road;
- A617 Sherwood Way South (between its junction with Hamilton Road and the A60);
- A611 Derby Road (between its junction with the A60 and B6139 Coxmoor Road);
- B6139 (Coxmoor Road); and
- Cauldwell Road

Figure 5.10 identifies all collisions recorded within the past 5 full years of collision data within the study area identified above.

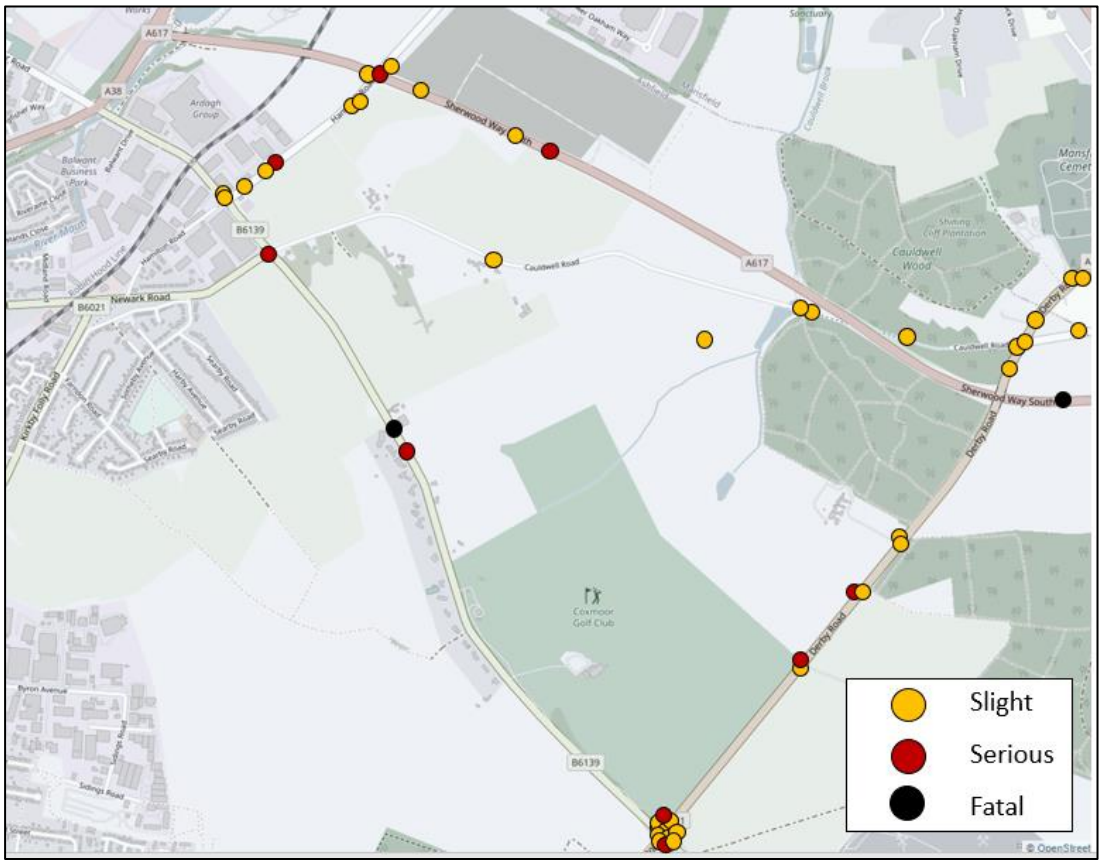

Figure 5.10: Collisions within the study area

The data shows that there is a concentration of collisions at the B6139 (Coxmoor Road) / A611 junction. 7 collisions recorded as 'slight' and two collisions recorded as 'serious were recorded at this junction. Mitigation would likely be required to address road safety at this junction.

5.2.6 Parking requirements

Ashfield District Council have a Supplementary Planning Document (SPD) covering residential car parking standards. This SPD was prepared by ADC to provide guidance and advice for applicants/developers. The SPD sets out the Council's requirement for parking provision to serve new residential developments within the District and was developed in liaison with the local highway authority, Nottinghamshire County Council. **Table 5.4**.

Table 5.4: Ashfield Parking Standards

Dwelling Size / Type	Parking provision
1 bed dwellings and Aged Persons Residence	1 space per unit plus 1 space off plot per 2 units for visitors
2/3 bed dwellings	2 spaces per unit
4+ bed dwellings	3 spaces per unit

Source: Ashfield Parking Standards Supplementary Planning Document

The SPD goes onto state that: "*car parking should be provided within the development site and within the curtilage of the property. Where car parking is located within the development site but beyond the new properties 'residential curtilage, at least one space should be allocated for use by each property. The allocated car parking space(s) need to be retained in perpetuity and be identified in the deeds of the dwelling*."

5.3 Access and movement summary

Table 5.5 presents a summary of the site assessment findings described in **Sections 5.1 and 5.2**. Each element has been assigned a Red-Amber-Green (RAG) rating.

Table 5.5: Site Assessment summary

Consideration	Discussion	RAG Rating
Accessibility – Walking & Cycling	The site is located to the south of Mansfield and to the east of Sutton in Ashfield. No existing PRoW run through the site, and no facilities are currently accessible within the recommended 1km walking isochrone. Footways (and supportive infrastructure) would need to be constructed to account for desire lines towards Mansfield, Sutton in Ashfield, Berry Hill (and potentially Kirkby-in-Ashfield). Mansfield, Sutton in Ashfield and Kirkby-in-Ashfield town centres are accessible within the recommended 5km cycling threshold. Existing cycle infrastructure is available on the A617 (to the north), the A611 (to the east) and on Kirkby Folly Road / Low Moor Road. With some upgrades (and extension to existing routes in places) these routes could provide good cycle access to key residential, retail and employment zones within the vicinity.	
Accessibility – Public Transport	No buses currently operate along any of the routes bounding the site, and therefore it may be challenging to divert services into the site. No existing bus stops are within the recommended 800m walking distance. The site is however located within 5km of Sutton in Ashfield Railway Station, although infrastructure connecting the site to the station would need upgrading / extending.	
Site Access – Private Vehicles	At least two access points would be required to serve the 1,270 dwellings. Opportunities for access is available from the A617, Hamilton Road, A611 and the existing Cauldwell Road / Coxmoor Road junction. The site therefore benefits from several potential points of access (subject to design work). An additional road, Cauldwell Road, currently runs through the site's footprint. This would either need incorporating into the masterplan or stopping up via a TRO.	
Offsite Highway Capacity and Safety	Given the potential access points, trips would be dispersed onto the A38, A617 and A611. The A38 is a known congestion corridor between the M1 (Junction 28) and Mansfield, whilst the A611 is flagged in the Nottinghamshire LTP as suffering from journey time variability. It is likely that trips would disperse along multiple routes from this point however, diluting the overall impact. Data shows a concentration of collisions at the B6139 (Coxmoor Road) / A611 (Derby Road) junction	

5.4 Estimated abnormal costs for proposed mitigation solution

There are no on site abnormal costs as all covered in base costs. However, there are a number of off-site costs including two site access points, the existing Cauldwell Rd / Coxmoor Rd Junction signalised junction at £1,250,000 and A611 (Derby Road) signalised junction at £1,250,000.

Other abnormal costs include A617 / Hamilton Road signalised junction at £1,250,000 and Coxmoor Road / Hamilton Road signalised junction at £1,250,000. In addition, £610,000 has been allowed for off-site pedestrian/cycle works.

In addition, there are a number of abnormal costs which have been excluded as contribution. These are the M1 junction 27, M1 junction 28 and A38 dualling. As well as A611 / Coxmoor Road A611 and A60/A617 which are not to be included.

This results in a total cost of ~£9-10m for transport including adoption fees (£686,000) commuted sums (£686,000), professional fees (£686,000) and design development and construction contingency (£1,337,700).

6. Ground conditions

6.1 Existing reports / information referred to

The following sources of information have been referred to in the Ground Conditions section;

- AECOM Ground Engineering and Mining webGIS portal. Accessed 26th May 2020;
- BGS Geological Map: Solid and Drift (1:50,000): 'Chesterfield' (Sheet 112). 2012;
- BGS Geoindex[16];
- Environment Agency's catchment data search[17];
- Environment Agency's water resources map[18];
- Google Earth Pro. Accessed 26th May 2020;
- Magic Maps[19];
- National Library of Scotland for Historical Maps[20];
- Nottinghamshire Minerals Local Plan, Publication Version 30th August 2019 - 11th October 2019. Was submitted to the Secretary of State for Housing, Communities and Local Government on 6th February 2020, however, has not been formerly adopted;
- Radon maps[21]; and
- Zetica's online Unexploded Ordnance (UXO) risk maps[22].

6.2 Detailed overview

6.2.1 Geology, hydrogeology and hydrology

The superficial and solid geology at the site has been established by reference to BGS mapping. There is one BGS historical borehole record located on the site. This is referenced SK55NW20 and was drilled to a depth of 708m in 1966; for the purposes of this review, this borehole log has only been reviewed to a depth of 40m.

Descriptions of the bedrock geology have been obtained from the BGS geological map.

A generalised ground profile utilising the available geological mapping is summarised in **Table 6.1**.

Table 6.1: Generalised ground conditions from available sources

Geological unit	Thickness	Composition	Occurrence
Made ground	Where present likely to be variable No made ground is indicated on the historical (on-site) borehole log (only 0.6m topsoil)	Varied composition	Infilled ground mapped adjacent to the north-west of the site (none mapped on the site itself)
Bedrock – Chester Formation (outcropping across approximately 40% of the site) – part of the Sherwood Sandstone Group	Up to 30m On-site borehole log indicates thickness of 14.6m	Sandstone, pink, brown and yellow, mainly coarse-grained and pebbly	Underlying topsoil or made ground (where/if present)
Bedrock – Lenton Sandstone Formation (Sandstone)	20 – 35m	Sandstone, red-brown, medium to fine-grained with	Underlying topsoil or made ground (where/if present) in outcropping areas; or

[16] Available at: https://www.bgs.ac.uk/geoindex/. Accessed 26th May 2020
[17] Available at: https://environment.data.gov.uk/catchment-planning/ Accessed 26th May 2020
[18] Available at: https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=c9176c299b734cff9a6deffcf7f40a4e. Accessed 26th May 2020
[19] Available at: https://magic.defra.gov.uk/magicmap.aspx. Accessed 26th May 2020
[20] Available at: https://maps.nls.uk/geo/find/#zoom=5&lat=56.00000&lon=-4.00000&layers=102&b=1&z=1&point=0,0. Accessed 26th May 2020
[21] Available at: https://www.ukradon.org/information/ukmaps. Accessed 26th May 2020
[22] Available at: https://zeticauxo.com/downloads-and-resources/risk-maps/. Accessed 26th May 2020

Geological unit	Thickness	Composition	Occurrence
(outcropping across approximately 60% of the site)	Interpreted to be 18.3m thickness from on-site borehole log	beds of red mudstone towards the base	underlying the Chester Formation
Bedrock – Edlington Formation – part of the Zechstein Group	0 – 30m Historical (on-site) borehole log indicates thickness of 6.1m	Mudstone, red to green, with thin beds of sandstone and dolomitic limestone	Underlying the Lenton Sandstone Formation
Faults (inferred)	-	-	One mapped centrally across the site in north-west to south-east direction

m = metres

Superficial deposits – not mapped on the site

Source: BGS Geoindex and BGS geological map (Sheet 112, Chesterfield)

Hydrogeological and hydrological information is summarised in **Table 6.2** and **Table 6.3** respectively.

Table 6.2: Hydrogeological information

Data type	Detailed description
Underlying geology aquifer classes	Solid Geology: Principal Aquifer (Chester Formation and Lenton Sandstone Formation): defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers. The bedrock is classified as high vulnerability. These are areas able to easily transmit pollution to groundwater. They are characterised by high leaching soils and the absence of low permeability superficial deposits.
Groundwater quality	No information available.
Groundwater Source Protection Zone (SPZ)	The site is located within a Zone 3 (total catchment) groundwater SPZ. This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.
Groundwater abstractions	The Environment Agency's water resources map lists two groundwater abstraction licences within 1km of the site. The details are as follows; • Mansfield Sand Company Limited – groundwater abstraction for 'mineral washing'. Located 850m south of the site. • Mansfield Sand Company Limited – groundwater abstraction for 'transfer between sources'. Located 1km south-east of the site.

Source: Magic Maps and the Environment Agency's water resources map

Table 6.3: Hydrological information

Data type	Detailed description
Surface water receptors	Cauldwell Brook is located on the site in the central area, flowing approximately south-west to north-east. There is also a large pond/small lake in the centre of the site and three similar features adjacent to the west and east of the site. Cauldwell Brook is a tributary of the River Maun, which is located, together with King's Mill Reservoir, approximately 670m north of the site at its closest point.
Surface water quality	The General Quality Assessment (GQA) was the Environment Agency's national indicator for water quality in rivers and canals, from 1990 until 2009. These assessments were made for Biological, Chemical and Nutrients and undertaken at sample points for discrete river stretches. The GQA was replaced by the Water Framework Directive in 2009. The Water Framework Directive (WFD) waterbody for the site is 'Maun from Source to Vicar Water'. The overall classification for 2016 was 'moderate' for this waterbody.
Surface water abstractions	The Environment Agency's water resources map does list three surface water abstraction licences within 1km of the site. The details are as follows; • Campfield Farms Ltd – surface water abstraction for 'spray irrigation – direct'. Located on-site. • Summit Real Estate Ltd – surface water abstraction for 'spray irrigation – storage'. Located adjacent to the north-east of the site. • Coxmoor Golf Club – surface water abstraction for 'spray irrigation – storage'. Located 60m west of the site.
Discharge consents to surface water	Unknown.

Source: Environment Agency's water resources map and catchment data search

6.2.2 Current and historical land use of the site and surroundings

Current mapping indicates that the majority of the site is occupied by farmland/open land. Adjacent to the site are occasional farms and farmland, a golf course (adjacent to the west) and Stonehills Plantation (adjacent to the east). There are some apparent earthworks adjacent to the north of the site.

Table 6.4 is a record of the change in land uses at the site and surrounding area (using Ordnance Survey historical maps). The off-site changes have been tracked within 250m of the site (unless specified otherwise) and all distances quoted are approximate.

Table 6.4: Summary of historical land use

Map details	On Site	Off Site
Nottinghamshire (includes Kirkby-in-Ashfield; Mansfield; Sutton in Ashfield) Surveyed: 1877 to 1878 Published: 1886	Mostly open land/potential farmland	Farms and farmland Sand pits adjacent to the west and approximately 100m north-west
Nottinghamshire (includes Kirkby-in-Ashfield; Mansfield; Sutton in Ashfield) Revised: 1898 Published: 1900	No changes	Sand pit no longer located adjacent to the west
Nottinghamshire (includes Kirkby-in-Ashfield; Mansfield; Sutton in Ashfield) Revised: 1913 to 1914 Published: 1920	Sand pit located in the north of the site which may have then been infilled	Sand pit to the west labelled as 'Old Sand Pit'
Derbyshire (includes Kirkby-in-Ashfield; Sutton in Ashfield) Revised: 1913 to 1914 Published: 1921	No changes	No changes
Nottinghamshire (includes Kirkby-in-Ashfield; Mansfield; Sutton in Ashfield) Revised: 1913 to 1914 Published: ca. 1930	No changes	No changes
Nottinghamshire (includes Kirkby-in-Ashfield; Mansfield; Sutton in Ashfield) Revised: 1938 Published: ca. 1947	No changes	No changes
Google Earth Pro historical aerial imagery. 2001	No changes	Potential earthworks adjacent to the north-west of the site.
Google Earth Pro historical aerial imagery. 2007	No changes	Potential earthworks adjacent to the north-west no longer apparent. Potential earthworks or deforestation to the east of the site within the 'Stonehills Plantation' area.
Google Earth Pro historical aerial imagery. 2019	No changes	Potential earthworks adjacent to the north of the site.

Source: National Library of Scotland and Google Earth Pro

6.2.3 Landfills

The AECOM Ground Engineering and Mining webGIS portal indicates that there is one landfill located within the site boundary. In addition, there are three historical landfills and one authorised landfill within 250m of the site. The details are as follows:

- Sutton Tip historical landfill, Cauldwell Road, Sutton in Ashfield, located in the northern area of the site. Dates active: December 1980 – December 1984. Waste type: Inert;
- Midland Land Reclamation historical landfill, Sutton in Ashfield, located approximately 30m north-west of the site. Dates active: unknown. Waste type: unknown;

- Sutton Quarry/Midland Land historical landfill, Sutton in Ashfield, located approximately 100m north-west of the site. Dates active: 1990 – unknown. Waste type: Inert, Commercial, Household. Gas control required;
- Sutton Quarry authorised landfill site, Sutton in Ashfield, located approximately 100m north-west of the site. Dates active: 1996 – unknown. Waste type: Commercial, Household and Industrial; and
- Disused Sand Quarry historical landfill, Coxmoor Road, Sutton in Ashfield, located approximately 110m north-west of the site. Dates active: March 1980 – November 1983. Waste type: Inert.

6.2.4 Potential contaminated land

In summary, the following potential on-site and off-site sources of contamination have been identified:

- On-site sources:
  - Made ground: potential for made ground based on current and historical land uses including;
    - Current farmland;
    - Potentially infilled sand pit (in the northern area); and
    - Historical landfill (in the northern area).
- Off-site sources:
  - Made ground: potential for made ground based on current and historical land uses including;
    - Mapped made ground adjacent to the north-west of the site;
    - Current farms and farmland: adjacent and up to 250m from the site; and
    - Historical and authorised landfills: 30m, 100m and 110m north-west of the site.

6.2.5 Unexploded ordnance

A review of Zetica's publicly available online unexploded ordnance (UXO) risk maps indicates that the site is within a 'low' area for the presence of sub-surface UXO. This is an area indicated as having 15 bombs per 1000 acre or less.

6.2.6 Radon potential

All except for the north-western most extent of the site is not in an area affected by radon (<1% of homes are above the action level). The north-western extent of the site is located in an area where 1%-3% of homes are above the action level for radon. Protection measures may be required within new buildings across this north-western area.

6.2.7 Mining (coal and other)

According to the BGS Geoindex and the AECOM Ground Engineering and Mining webGIS portal, the site is not located in an area at risk from coal mining.

Risks from other mining (none coal related) is not anticipated, according to publicly available online sources.

6.2.8 Minerals

The Nottinghamshire Minerals Local Plan indicates that the southern area of the site and the surrounding area to the south is located in a Mineral Safeguarding Area (MSA) related to the Sherwood Sandstone (for sand resource) , as shown in **Figure 6.1**.

The MSA is defined by minerals and waste planning authorities. They include viable resources of minerals and are defined so that inferred resources of minerals are not sterilised by non-mineral development. The MSA does not provide a presumption for these resources to be worked. The Sherwood Sandstone MSA may be a potential constraint for future development.

Figure 6.1: Minerals Consultation Area and Minerals Safeguarding Area designation at Site 1

6.3 Risks

6.3.1 Geo-environmental

The review of the potential geo-environmental risk is based on the review of publicly available on-line resources only.

The Conceptual Site Model (CSM) presented here identifies potential source-pathway-receptor pollutant linkages that require further assessment. This is consistent with the staged approach advocated by the Environment Agency's recently published revised online guidance for the management of land contamination ('Land contamination: risk management (LCRM)23) and the soon to be withdrawn CLR1124 'Model Procedures for the Management of Land Contamination' (2004). The Conceptual Site Model is set out in Table 6.5 (overleaf).

[23] Environment Agency (2019). Land Contamination: Risk Management (https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks - accessed 6th February 2020)
[24] Environment Agency, (2004). CLR11: Model Procedures for the Management of Land Contamination.

Table 6.5: Conceptual Site Model

Source	Pathways	Receptors
Potential contaminants in the soil and groundwater at the site from: On-site sources: • Made ground: potential for made ground based on current and historical land uses including; – Current farmland; – Potentially infilled sand pit (in the northern area); and – Historical landfill (in the northern area). Off-site sources: • Made ground: potential for made ground based on current and historical land uses including; – Mapped made ground adjacent to the north-west of the site; – Current farms and farmland: adjacent and up to 250m from the site; and – Historical and authorised landfills: 30m, 100m and 110m north-west of the site.	• Dermal contact, inhalation or ingestion of the contaminants present in topsoil or underlying strata, during works and post-development; • Migration, accumulation and inhalation of ground gas, during works and post-development; • Migration of airborne contaminants (e.g. dust particulates) during the development work; • Vertical and lateral soil leachate migration to groundwater and/or surface water; • Migration of contaminants through groundwater; • Migration of contaminants through lateral migration/surface run off; and • Direct contact/plant uptake.	• Future site users (human health); • Current site users (agricultural/members of the public) (human health); • Future construction and maintenance workers (human health); • Groundwater within the Principal aquifer, groundwater SPZ and groundwater abstractions (none identified to be for potable uses); • Surface water (Cauldwell Brook located on-site, ponds/small lakes on-site and adjacent) and surface water abstractions (none identified to be for potable uses); • Future landscaping; and • Development infrastructure.

There is considered to be a very low (in the south of the site) to moderate (in the north of the site associated with an area of landfill) potential for contamination to exist at the site, based on the information sources reviewed, and given the nature of the current and historical land uses identified at the site. Potential on-site sources are limited but there may be made ground present which may not have originated from the site, as well as localised point sources associated with the site's agricultural use, potentially infilled sand pit and historical landfill use (in the north of the site).

Historical/authorised landfills and made ground (on-site and off-site) may pose a potential ground gas risk.

Contamination risks would require further consideration as part of future redevelopment of the site.

6.3.2 Geotechnical

There is the potential for made ground associated with the current and historical land use at the site, particularly in the north (associated with an infilled sand pit and historical landfill). The extent of the made ground would need to be confirmed through further ground investigation.

Based on geological mapping and available BGS borehole logs, it is anticipated that superficial deposits are absent at the site and that the bedrock geology (Chester Formation and Lenton Sandstone Formation) is located directly beneath topsoil/made ground (where present).

If made ground is confirmed to be present, and given its general vertical and lateral variability, it would be considered unsuitable as a founding stratum unless re-engineered. The viability of shallow foundations for typical low-rise housing is therefore dependent on the depth to competent solid geology. This needs to be proven through ground investigation.

Assuming the presence of near-surface (from <1 to 3 m depth) competent natural deposits, a shallow foundation solution is viable for typical low-rise development, provided there is a pattern of increasing consistency/density with depth. Alternatively, and dependent on specific thicknesses and material types, ground improvement could be considered especially in areas of (unexpected) thick and variable made ground. Consideration of the lateral variation between geological units and the potential for differential settlement will need to be accounted for in any future design. Although not indicated, in the event that significant thicknesses of made ground are encountered, deeper foundation solutions may be required, e.g. piling.

The bedrock geology is a Principal aquifer. Therefore, it is possible for shallow groundwater to be present. If shallow groundwater is encountered, it should be considered as part of any foundation solution. Site-specific groundwater levels would need to be confirmed during future ground investigations. Whilst it is ideal to design to avoid impact from groundwater, depending on the proposed development and should a shallow groundwater regime be present, this may not be possible and temporary support and/or suitable dewatering control may be required.

Where new structures are planned, the nature of the near surface soils should be clarified by further intrusive investigation. In particular, any investigation should take into consideration the NHBC Standards Chapter 4.2 and 4.4 (and/or published BRE guidance) relating to the design of foundations on shrinkable soils, the proximity of trees and the potential lateral and vertical variability of the near surface soils and potential for differential settlement should buildings be founded over variable materials.

Concrete foundations and service ducts may need to be designed against natural chemical attack from aggressive ground conditions.

The on-site and off-site historical and authorised landfills are considered to be a potential ground gas source. Further monitoring and assessment may be required. Should ground gas be proven to a level that requires mitigation, this mitigation can be included for as part of the future detailed design.

6.4 Proposed mitigation solution

In order to enable further characterisation of the potential geo-environmental and geotechnical risks identified and allow for the refinement of the preliminary CSM, an intrusive ground investigation should be carried out and the composition, extent and depth of potential made ground and the ground conditions across the site confirmed.

During the intrusive investigation, it is recommended that representative soil samples are taken to determine the chemical status of made ground and natural soils. The ground investigation should also provide information on the physical properties of the materials through in-situ geotechnical testing and laboratory analysis. A period of groundwater monitoring and sampling and localised ground gas monitoring should also be undertaken at the site.

The site investigation should be designed with due consideration of the requirements of BS 5930 (2015) Code of Practice for Ground Investigation; Environment Agency (2005), BS10175: 2011+A2:2017 Investigation of potentially contaminated sites – Code of Practice and the UK Specification for Ground Investigation (2nd Edition) published by ICE Publishing in 2012 and Eurocode - BS EN 1997-1:2004, BS EN 1997-2:2007 ‘Eurocode 7 - Geotechnical design - Ground investigation and testing’.

After completion of intrusive works and monitoring, the geo-environmental and engineering properties of the ground conditions should be assessed. The soil and groundwater samples and ground gas readings should be analysed for the purpose of risk assessment to human health, controlled waters and assessment of the chemical properties with respect to buried structures and plant uptake.

A ground investigation report should be produced for geo-environmental and geotechnical risk identification and interpretation. Following intrusive investigation and interpretation, proposed mitigation solutions can then be recommended.

6.5 Estimated abnormal costs for proposed mitigation solution

Abnormal costs can only really be revealed after having undertaken ground investigation. Ground investigation would define the level of mitigation and the likely foundation solutions required to facilitate development.

To provide an indication of potential abnormal cost, the high-level desk study information presented in this section has been used to derive potential abnormal costs associated with the potential for contamination (Section 6.3). This has been undertaken in accordance with the Homes and Communities Agency (now Homes England) Guidance on Dereliction, Demolition, and Remediation Costs (March 2015). This methodology was developed by

the then Homes and Communities Agency to assess costs of preparing previously developed land affected by contamination. The remediation cost aspects of the method have been used to derive the abnormal costs; demolition costs are not included.

As quite large proportion of the 85 hectares site has a rural/agricultural setting with limited evidence of previous development, therefore the methodology has only focused on determining potential remediation costs for the areas of potential sources of contamination identified in this preliminary study. This therefore assumes open space and agricultural land with no apparent history of development or without a clear potential contaminant source are not likely to represent a significant contamination source requiring remediation.

The approximate area of the historical landfill and potentially infilled sand pit is 4 hectares. On this basis, the range of potential remediation cost associated with these areas were assessed to be within the range of £1,508,800 to £3,864,000. Using professional judgement, the likely position within the range has been estimated to be more towards the low end of the range (£1,508,800) but may extend up to the mid-point of the range. It is considered that this should be based on the mid-point of the lowest and middle cost, giving a cost of £2,097,600. The assessment of the range is based on a number of assumptions fixed by the methodology. This assumes that the end use across the 4 hectares will be entirely residential comprising housing with private garden space and that a moderate (level B) potential for contamination would be present across the entire 4 hectares area. The positioning within the range is based on professional judgement only and it is recommended that a range is considered until such time that intrusive investigations have been conducted to refine this assessment. The estimate could be refined further where precise details can be provided e.g. proportion of area to be considered for public open space and allowances for any other land uses e.g. commercial or community development.

Based on the available information at this preliminary stage it is not possible to attribute a potential abnormal cost for foundations (See Section 6.3.2).

The abnormal cost estimation above does not consider risks from radon or ground gas. This would need to be investigated further and if proven to be a potential risk, should be considered as part of any future re-development design. Radon and ground gas protection measures for a typical residential unit can be estimated on the basis of £80/square metre of ground floor area.

6.5.1 Recommended activities to de-risk site

Investigations/Surveys

It is recommended that a detailed desk study and preliminary intrusive ground investigation and monitoring is undertaken to confirm ground conditions and to identify the location of/prove the presence or absence of any potentially contaminated land. The investigation should be targeted to areas identified to have had a previous contaminative use, as well being sufficient to provide site wide coverage. The ground investigation should be designed with a view to enabling a robust ground model to be developed upon which a preliminary foundation assessment can be based, tailored to the intended development.

A 4 to 5 month programme is anticipated for detailed desk study and preliminary ground investigation with costs estimated to be in the order of £150,000 to £200,000 for a combined preliminary geotechnical and geo-environmental assessment.

A radon risk report should be obtained from UK Radon (Pubic Health England) which will serve to confirm and refine the extent of radon risk in areas identified with increased potential.

7. Services / utilities location and capacity

7.1 Existing reports / information referred to

Information on existing utilities has been provided by Envirocheck, the following was received on 05/06/2020.

7.2 Detailed overview

Table 7.1: Overview of services and utilities within the site

Utility	Present within Masterplan Site?	Development Impacts (Footprint / Supply)	Risk
Severn Trent Clean Water	There is an existing 9" Cast Iron potable water main in the southern verge / footway of Cauldwell Road. The records show that, as part of the construction of the A617 a section of this pipe was diverted and replaced with a 315 mm dia HDPE pipe. There is a connection to the Stonehills farm building from Cauldwell Road. A 450 mm dia Ductile Iron main runs along the north side of the A611. A main is identified in Hamilton Road, however details of the size and material are not provided. Two 12" mains (one Cast Iron, the other unconfirmed) are identified in Coxmoor Road. No details are provided in the area of the Cauldwell Road / Coxmoor Road junction, however given the presence of mains within Coxmoor Road and Cauldwell Road it is likely there will be a number of valves and junctions in this area.	The development is likely to require the diversion of the 9" main within Caldwell Road. This will substantially depend on the proposed layout and ground levels of the scheme. Protection and/or diversion of the mains within the A611 and Hamilton Road is likely to be required in order to form new junctions in either of these locations. Should modification of the Cauldwell Road / Coxmoor Road junction be required, there may be additional protection or diversion work required. The size, number and location of existing potable water mains in the area means there are likely to be a number of options for the new connections. However, an assessment of the capacity of the existing network will be required by Severn Trent Water to confirm the extent of off-site reinforcement of the network.	The diversion of water mains could be significant costs due to the size of the existing pipework and the length of the main within Cauldwell Road (the full extent of the site). Connections to the closest infrastructure will require additional design information to determine the capacity and additional infrastructure required to extend the network to the site. Off-site reinforcement of the network may be required. Additional infrastructure may be present in the Cauldwell Road / Coxmoor Road junction.
Severn Trent (Foul water)	No records for foul water have been provided. The nearest Severn Trent Water sewage treatment is approximately 1km to the north off Coxmoor Road.	There are a significant number of built up areas adjacent to the development around Hamilton Road (Maun Valley Industrial Park) and to the west at Round Hill, therefore it is likely that there are foul sewers serving these areas. If there is insufficient capacity in the existing network to accommodate the new development then a new rising main, or gravity sewer, may be required between the site and the treatment works to the north.	Additional information is required to confirm the requirement for a connection from the site to the existing sewage treatment site to the north.
Western Power Distribution	Within the A611, there is a an overhead 11kV line (north side) and below ground 33kV line (south side). Low voltage connections to Stonehills Farm are shown along access from the A611. There is an overhead 11kV line serving the properties on Cauldwell Road crossing from the north west of the site behind the properties. In Hamilton Road, there are 11kV lines (south and north side) and a 33kV line (north side). Within Coxmoor Road there are two below ground 33 kV lines (east side).	Any works to form a new junction at the A611 and / or Hamilton Road will require diversion or protection of the existing 11kV lines, and possible protection of the 33kV lines. The layout of the site will dictate whether there are diversions required to the existing supply to the properties on Cauldwell Road. The presence of a significant number of existing power lines means there will be options for the supply to the site and the locations of substations. There is an existing substation on the corner of Hamilton Road and Coxmoor Road which may be a suitable point for supply to the new site.	Connecting to closest infrastructure requires additional design information to determine the capacity and additional infrastructure required to extend the network to the site. The level of off-site reinforcement will need to be confirmed by Western Power Distribution.

Utility	Present within Masterplan Site?	Development Impacts (Footprint / Supply)	Risk
Low Pressure Gas Main	There is an existing 75mm low pressure gas main in the western verge of the B6139.	A new gas connection will be required to serve the development, this is likely to be from the B6139 to the north west of the site, and along Cauldwell Road. Based upon the information provided, there are unlikely to be any significant diversions of gas infrastructure as part of the development.	There is no gas currently shown serving the existing properties on Cauldwell Lane or the properties at Stone Hill Farm on the A611, and this should be confirmed prior to any further design. A connection to the closest infrastructure will require additional design information to determine the capacity and additional infrastructure required to extend the network to the site.
Medium Pressure Gas Main	Information provided by Cadent gas shows a 400 dia medium pressure gas main to the north of Hamilton Road.	May be affected by a new junction on Hamilton Road.	Additional information for the wider area around the site is required to determine the location, capacity and additional infrastructure required to extend the network to the site.
Openreach	Overhead lines are identified along the north side of the A611, west side of the B6139 (Coxmoor Road) and south side of Cauldwell Road. There are individual overhead lines to the Stonehills Farm buildings and properties on Cauldwell Road.	It is likely that diversions will be required in order to form a new junction on the A611.	Additional information for the wider area around the site is required to determine the location, capacity and additional infrastructure required to extend the network to the site. Additional lines may be present in Hamilton Road and Coxmoor Road, these areas are outside the extent of the survey.
Other	None recorded.	Additional companies have recorded no services within the boundaries of the site. The search area did not include Hamilton Road and therefore there is a risk additional utilities could be present in this area. There were no recorded FTTP (e.g. Virgin Media) operators in the area. This should be investigated further to determine the potential for future connection.	Additional information for the wider area around the site is required to determine the location, capacity and additional infrastructure required to extend the network to the site, and an additional survey should be undertaken on the footprint of any proposed junctions prior to further design in these locations.

7.3 Risks

As outlined in the table above, generally the risks are:

- costs associated with some diversions which will be likely to form access junctions,
- the presence of a water main within the main development footprint which may need protecting or diverting, and
- a lack of information on the foul water and the potential need for a new connection, or upgrade to existing sewers, between the site and the treatment works 1 km to the north.

7.4 Proposed mitigation solution

The current site shows no existing utilities crossing the site, as such diversions should be limited to the construction of highway accesses on to existing highways.

However, with the requirement for additional infrastructure from all utilities providers, it is recommended a budget quotation is requested from all providers to assess the likelihood and cost of any extra offsite reinforcement works to existing networks.

7.5 Estimated abnormal costs for proposed mitigation solution

There are no on-site abnormal costs however, there are a number of off-site costs. In terms of power there is a need for a new primary substation to serve 994 dwellings at cost of £3,300,000.

There is no specific detail as to whether gas reinforcements will be required therefore an allowance of £610,000 to this.

There are no specific details for water or waste therefore it is assumed that reinforcement costs will be paid by the Water Company with no charge to the scheme.

This results in a total cost of £4,946,150 for utilities including professional fees (£391,000) and design development and construction contingency (£645,150).

8. Drainage

8.1 Existing reports / information referred to

The assessment is made with specific reference to the following documents:

- National Planning Policy Framework (155 – 165)
- The SuDS Manual (CIRIA C753)
- Rainfall runoff management for developments (Environment Agency, Report – SC030219)
- Environment Agency flood risk mapping
- Ashfield District Council Strategic Flood Risk Assessment Level 1
- Mansfield SFRA

In addition, and in order to guide the assessment, AECOM engineers visited the site on 22 May 2020, and held a preliminary discussion with Deniz McAndrew, Principal Flood Risk Management Officer at Nottinghamshire County Council on 21 May 2020 to establish known issues and aspirations from NCC.

8.2 Detailed overview

8.2.1 Current drainage regime in the area

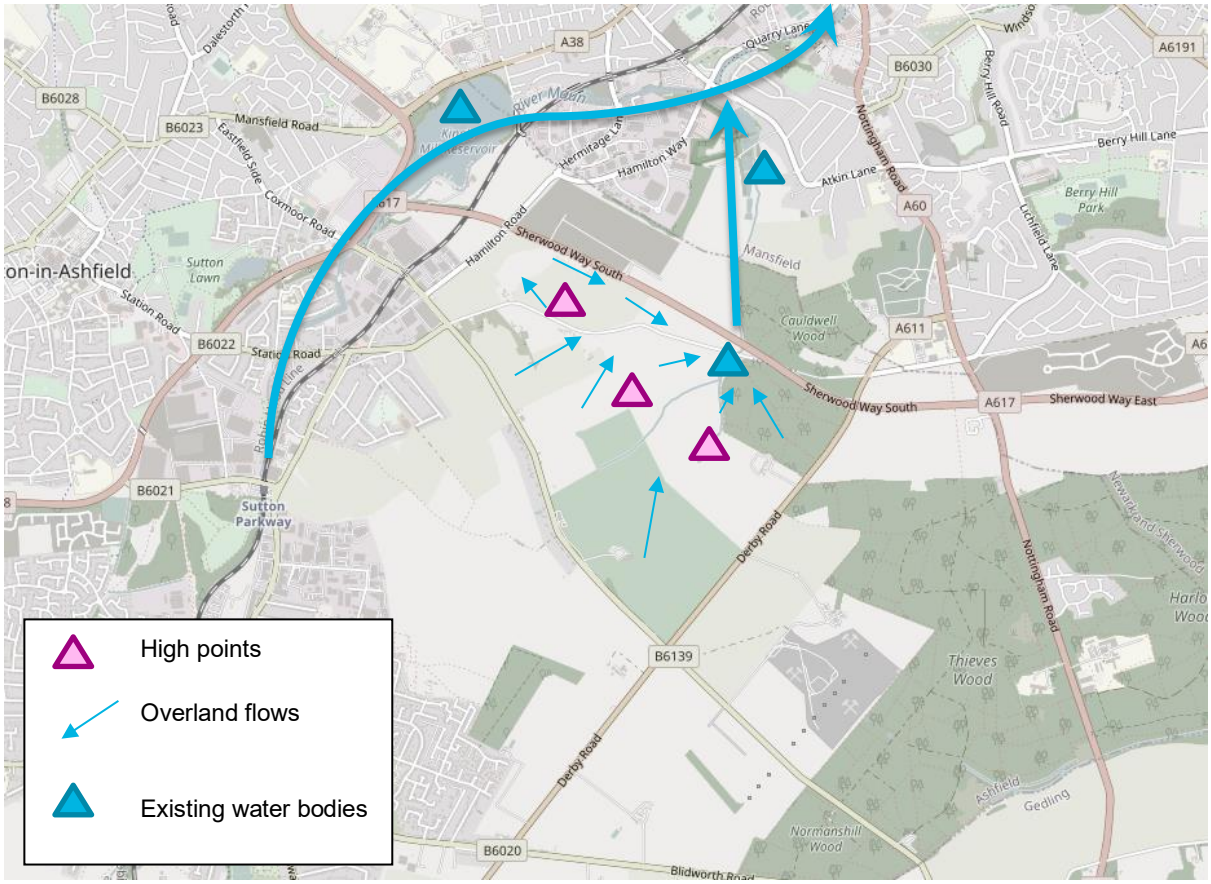

Figure 8.1: Key area-wide surface water drainage features

The land is undulating, ranging in level from approximately 140m AOD at the lowest point to approximately 175m AOD at the highest point. There are three localised high spots to the south, central and north (just outside the boundary of the site. There is an existing watercourse, the Cauldwell Brook crossing the site from the adjacent golf course in the southwest to the eastern boundary with the A617. The Cauldwell Brook extends through the Summit Park development on the A617 opposite the site and outfalls, through a series of ponds at Oakham Nature Reserve and a culverted section, into the River Maun. The River Maun then flows to the north east

through Mansfield. The Kingsmill reservoir is on the River Maun to the north of the site (upstream of confluence with Cauldwell Brook). There is an existing small reservoir formed by the Cauldwell Dam on the Caldwell Brook at the low point of the site.

There are a number of additional field drains and land drains around the site which follow the contours of the land and outfall into the watercourse discussed above.

The soil characteristics of the site are free draining and therefore it is anticipated that a significant volume of surface water from the site infiltrates straight to ground.

The Ashfield Strategic Flood Risk Assessment does not identify the Caldwell Brook as having a flood risk to development within Ashfield, however it specifically notes that development on the A617 in this area should take full cognisance of flood risk and provide appropriate attenuation.

The Mansfield SFRA identifies a significant biodiversity area at Oakham Nature Reserve, and also identifies potential flood risks and habitat constraints associated with the culverted section of the Cauldwell Brook to the north of the site. It identifies this area as a priority area for green SuDS. Any scheme will need to therefore demonstrate in particular the impact of the scheme on water quality and flow.

The flood mapping shows the whole site is in Flood Zone 1, therefore the proposed use of the site as residential is appropriate. Any flood risk assessment and drainage strategy developed for the site therefore needs to focus on reducing the impact of the development on flooding to areas downstream.

Information provided by Ashfield Council shows the A611, B6139 and Cauldwell Road to have highway surface water drainage within the highway boundary.

8.2.2 Proposed surface water drainage

Initial calculations for the greenfield runoff rate and estimated total storage volume required have been obtained from the uksuds.com website. In running the calculations the total area of 85ha has been used. It is assumed that approximately 25% of the site (20ha) will be retained as significant open space (parkland, woodland etc); these areas will not have positive drainage (i.e. no gullies, new ditches or surface water pipework) and therefore the area is excluded from the calculations. It is also assumed that the development will be only 70% impermeable (allowing for permeable areas such as back gardens and soft landscape areas within the residential parcels of land). These percentages have been taken from previous schemes of a similar size and nature, however they should be confirmed as part of any detailed assessment and developing master plan.

The calculations show that the total Q_{BAR} for the site is 14 l/s, this is very low and indicates the fact that it is assumed the majority of greenfield runoff will infiltrate to ground rather than runoff the site. For the total storage volume, the percentage of the site which can be drained through infiltration will have a significant impact on the volume of attenuation required. For the purposes of this initial assessment the extremes of infiltration have been used. Assuming all impermeable areas of the site will be able to be drained by infiltration, the volume of attenuation required will be 4,500 m³. For a scheme where no impermeable areas will be able to drain by infiltration, the total storage volume required is 44,500 m³.

Following SuDS guidance, the maximum depth of water in an attenuation storage structure should be 2 m in the most extreme cases, but typically it is better to design to between 1.2 m to 1.5 m depth. Therefore, the total area of land that should be allocated for storm water attenuation is between 0.3 ha and 3.8 ha. This should be split to provide areas for local source control, and extension of the existing pond at Coxmoor Dam to allow for regional attenuation. Early ground investigations to confirm the infiltration rates and locations which are suitable for infiltration should be undertaken to provide maximum clarity on the volume of storage required.

8.2.3 Localised details

Any existing overland flow through field / land drainage will need to be considered as part of the development, and the phasing of the site will need to be co-ordinated in order to maintain continuity of flow as the development progresses.

8.2.4 Flooding from rivers and other sources

Whilst the site is in a Flood Zone 1 from river flooding, mapping of surface water flooding (Flood Risk Maps for Surface Water in England - December 2019) shows a 1:30 year risk of localised surface water flooding at the Coxmoor Dam and a low spot opposite the access to Summit Park, with a wider extent of 1:100 year and 1:1000

year risk of flooding near these areas. The former may place additional constraints or considerations for any access direct from the A617 and development in this area.

8.3 Risks

The Greenfield runoff rate calculations are based on the assumption that the ground conditions on the site are free draining materials with a low run off rate, this is based on geographical information of the area as a whole and not directly related to the site. As such site run off rate and drainage strategies will require information from a ground investigation to determine the ground conditions of the site and the suitability of infiltration. If the ground is not as free draining as predicted, then a revised assessment of the greenfield runoff rate and the volume of storage required should be undertaken.

Preliminary levels from lidar shows Cauldwell Dam and brook to be the lowest section of the site, however there could be areas of the site that cannot be drained by gravity into Cauldwell pond, which would require separate drainage systems.

The site has drainage crossing it from the golf course, this could indicate the presence of private drainage systems that need to be maintained running though the site and will add additional incoming flow to the amount of storage on site.

8.4 Proposed mitigation solution

A topographical survey of the site to show levels of the site can highlight any areas in which drainage will be difficult. Ground Investigation to include soakaway tests to determine suitability for infiltration.

8.5 Estimated abnormal costs for proposed mitigation solution

- Large Capacity pipes if infiltration is not possible and insufficient land is available for attenuation.
- Construction of large volume pond if infiltration is not possible.
- Culverts of existing drainage channels or drainage from Coxmoor Golf Club if maintained.

9. Historic environment

9.1 Existing reports / information referred to

- National Heritage List for England[25];
- National Library of Scotland for historic Ordnance Survey maps[26];
- Ashfield District Council Interactive map[27];
- Nottinghamshire Historic Environment Record (HER) access through Heritage Gateway[28]; and
- The Coal Authority interactive map[29].

9.2 Detailed overview

There are no designated heritage assets within the Site boundary. There are, however, a number of non-designated archaeological assets listed on the Nottingham HER that fall within the Site boundary. In addition, Stonehills Farm, a locally listed farm, is located just outside the Site boundary, to the south-east.

There are no World Heritage Sites, Registered Parks and Gardens, Registered Battlefields or Conservation Areas within a 500m Study Area of the Site boundary.

There is a single Scheduled Monument which lies 200m north-west of the Site boundary. This comprises the Mound on Hamilton Hill (NHLE 1002921) of unknown, but possibly prehistoric date.

The prehistoric period is attested both within the northern section of the Site and in the surrounding study area. The scheduled remains of the Mound on Hamilton Hill, which lies just north of the Site, are recorded as undated multiangular enclosures that may represent a small settlement of prehistoric date. A number of prehistoric worked and heat altered flints have been recorded within the northern area of the Site, in close proximity to the Scheduled Monument, The HER also marks a separate area of multiangular enclosures within the Site, just south of Cauldwell Road, but it has the same HER number as the Scheduled Monument and may therefore be mislabelled or represent related features. Small finds dating to the Neolithic and later prehistoric periods are recorded throughout the study area, as are a number of further undated enclosures and earthworks of possible prehistoric date. These features are often located on hills much as those found throughout the Site boundary.

The field in the northern section of the Site is reported to contain Roman period pottery, suggesting some Roman activity within the Site. The presence of a further concentration of Roman finds in the field immediately north-west of the Site seems to confirm the presence of a possible Romano-British settlement in the area. A Roman coin hoard is recorded approximately 1km north of the Site boundary. Mansfield itself to the north-east of the Site is the location of a large Roman villa recorded by antiquarians as early as the 18th century.

The wider area is known to have been extensively occupied throughout the medieval period, as attested by the large number of settlements with medieval cores. This includes both Mansfield 3.5km north of the Site boundary, Kirkby-in-Ashfield 4km west of the Site boundary, Sutton in Ashfield 4km north-west of the Site boundary, and the Augustinian Priory of Newstead Abbey 3.5km south of the Site boundary. It is likely that the area in which the Site is located was largely agricultural throughout the medieval period.

Although the Site and study areas contain little evidence of coal mining as much of this activity was focused on the richer seams to the west, a few adits are recorded in the study area by the Coal Authority. The rapid industrialisation of the area in during the post-medieval period appears to have left the Site largely unaffected.

The First Edition Ordnance Survey map (1879) shows the Site to have been mainly agricultural at the time, apart from a number of farmsteads around it, Roundhill Farm and Stonehill Farm. Stonehills Plantation and Coldwell Wood extended to the east of the Site, in a similar arrangement to the existing. Coxmoor Lane, now Coxmoor Road, ran to the west of the Site. A golf course had been established, to the south-west, and a number of sand

[25] Available at: https://historicengland.org.uk/listing/the-list/
[26] Available at: https://maps.nls.uk/
[27] Available at: https://www.ashfield.gov.uk/residents/planning-building-control-and-land-charges/forward-planning/historic-environment/)
[28] Available at: https://www.heritagegateway.org.uk/
[29] Available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html

pits, to the north and north-west, by 1920. Just before the Second World War (by 1938) Redhouse Farm was established to the eastern side of Coxmoor Road, just south of the Site boundary.

There was no significant change in the Site and its surroundings until the post-war period when a number of buildings were constructed, to the south of Cauldwell Road.

9.2.1 Nationally listed and scheduled assets

There are no designated assets within the Site boundary. The scheduled Mound on Hamilton Hill (SM, NHLE 1002921) is located approx. 200m north-west of the Site and is the only designated heritage asset within 500m of the Site boundary.

The setting of the Mound has changed to some extent due to modern development, including the construction of the A617 Mansfield-Ashfield Regeneration Route and the construction of an industrial estate to its west and north. The scheduled monument sits on a hill overlooking its surroundings. Modern development has eroded its rural setting and it appears disconnected from its surroundings, despite its prominent position within the landscape. However, should the mound prove to be prehistoric, its setting would also include the prehistoric archaeological landscape and the associated prehistoric assets located within the northern portion of the Site.

Additional designated heritage assets of note in the area, include King's Mill Viaduct (SM, NHLE 1006374; Grade II, NHLE 1288554), designated as a scheduled monument and Grade II listed building located approx. 1km to the north of the Site, and Mansfield Cemetery (Grade II, NHLE 1001604), a Registered Park and Garden and associated listed buildings, approx. 800m to the east of the Site.

King's Mill Viaduct is a railway viaduct, constructed in early 19th century and restored c. 1990. The viaduct was constructed to carry the Mansfield to Pinxton railway and is of coursed squared stone with ashlar dressings. The viaduct extends over five round arches. Due to its height and the topography of the area, the viaduct is not prominent in long views and its setting does not include the Site.

The Mansfield Cemetery was opened in 1857. It was designed by C. J. Neale and its buildings by J P Pritchett and Sons. The cemetery sits on elevated and undulating ground that rises steeply to the south. It is not clear if there are views from the Mansfield Cemetery towards the Site. However, intervening woodland (Stonehills Plantation, Cauldwell Wood and Shining Cliff Plantation) provide screening and a physical barrier along with Sherwood Way South, between the asset and the Site.

9.2.2 Locally Listed assets

There is a locally listed asset, Stonehills Farm, located just outside the boundary of the site, to the south-east. The farm has a rural setting that includes part of the Site.

Additional locally listed assets are located more than 1km away from the Site boundary Due to their distance from the Site, their urban context or intervening infrastructure, the Site does not form part of their setting.

9.3 Risks

Development of the Site will introduce a change to the setting of the scheduled monument at Hamilton Hill and to the setting of Stonehills Farm. These changes are likely to have an adverse impact on the significance of these assets.

There is a risk of Historic England or the Conservation Officer objecting to the development of the Site if there is harm to the assets.

The preliminary overview has identified some potential for archaeological remains to be present within the Site dating from the prehistoric period onwards. Given that much of the Site lies within agricultural fields which have been subjected to minimal ground disturbance in the post-medieval and modern periods, any archaeological remains present are likely to be relatively well preserved. Nottinghamshire's Archaeological Advisor is likely to require an archaeological evaluation carried out ahead of construction to identify, characterise, and assess the significance of any non-designated archaeological assets present within the Site. Should investigations uncover significant archaeological remains, there is a further risk that the council may require these to be recorded through archaeological excavations to a level commensurate with their significance.

9.4 Proposed mitigation solution

The design of any proposed development on the site should take into consideration the rural setting of Stonehills Farm and aim to preserve the farmstead, retain some of the rural setting of the farmstead and provide some screening through landscaping and planting.

The design of any proposed development should also take into consideration views towards and from Hamilton Hill and aim to preserve or enhance any key views or historic connection between the Site and the scheduled monument.

It is proposed that a Heritage Statement be completed in support an application for development of the Site. This Heritage Statement will take special consideration of the potential effects of the proposed development on the setting of the historic buildings and the scheduled remains of the Mound on Hamilton Hill as well as its impacts on the potential archaeological resource. This would be replaced by EIA scoping, desk-based assessment and ES chapter if the development is determined to be an EIA development.

Should the Heritage Statement reveal that there is a high potential for archaeological remains to be impacted by the scheme, it is proposed that consultation with Nottinghamshire's Archaeological Advisory be carried out to establish any requirement for archaeological investigations. These works would be aimed at confirming the presence and assessing the significance of the resource within the proposed development through a programme of archaeological trial trenching or monitoring. Should these investigations uncover significant remains that would be adversely impacted by the scheme, an archaeological excavation may be required to record the remains prior to development.

9.5 Estimated abnormal costs for proposed mitigation solution

A Heritage Statement or Cultural Heritage Environment Statement Chapter should be prepared to support the development of the Site. This will include statements of significance of the heritage assets that are likely to be affected by the proposals, including any contribution made by their setting as well as a heritage impact assessment. This is expected to cost approx. £8,000.

Input from a built heritage specialist should be provided at the design and masterplanning stage. Such input can be provided either via email/phone or through design workshops. It is expected to cost approx. £1,000.

Consultation with Historic England and the Conservation Officer should be undertaken at early stages of the development.

Based on the size of the development and the potential archaeological resource present within the Site, estimated indicative costs to carry out an archaeological evaluation, including both geophysical survey and trial trenching, is approximately £100,000. Costs for any additional mitigation work cannot be provided until the presence, preservation, and significance of the archaeological resource within the Site is assessed by an archaeological evaluation.

10. Landscape

10.1 Existing reports / information referred to

- Site visit June 2020
- Greater Nottingham Landscape Character Assessment (2009)

10.2 Detailed overview

The Greater Nottingham Landscape Character Assessment 2009[30] provides a way of assessing the varied landscape within Greater Nottingham and contains information about the character and condition of the landscape to provide a greater understanding of what makes the landscape within Greater Nottingham special.

The study has recognised this through the identification of 79 Draft Policy Zones (called Landscape Character Types within Erewash Borough). The Draft Policy Zones identify how well the landscape character areas could adapt to change without severe detrimental effect on their character and integrity; and provide guidance on how to protect special landscapes and improve less special landscapes. The following Draft Policy Zones are relevant to Site 2: SH47 (Coxmoor Wooded Farmlands) and SH11 (Lindhurst Wooded Farmlands)

Table 10.1: Draft Policy Zone affecting Site 2

Caulfield Road	
SH47 Coxmoor Wooded Farmlands	
Characteristic features	Gently undulating topography. Golf course with intensively managed greens and fairways. Heath land roughs on golf course with heather, bracken broom, and gorse. Permanent unimproved and improved pasture to the centre of area. Arable farmland to the centre. Tall bushy mixed species hedgerows to centre. Isolated farms and residential settlements. Kingsmill Reservoir with fringe of riparian woodland. Busy roads - MARR route. Industrial and commercial development to north and west
Condition	The Landscape Condition is defined as **MODERATE**. There are some detracting features, these include industrial and commercial development to the west and north and the busy MARR route passing through the central pastoral area, overall this gives a visually coherent area
Landscape Strength	The Landscape Sensitivity is defined as **MODERATE**. The undulating landform is apparent with the bushy hedgerows to the central area giving a moderate visibility into and out of the area. Views are open to the industrial development to the north and west. The sense of place is moderate. The overall landscape strategy is **CONSERVE AND CREATE**.
Landscape Actions	• Conserve the ecological diversity of the mosaic of acid grassland, heath land and woodland within the golf course • Conserve remains of the intact historic field pattern with mature bushy hedgerows to the centre of the area. • Seek opportunities to convert arable land to permanent pasture to the west of the area. • Conserve riparian woodland to the reservoir area. • Promote measures for reinforcing the traditional character of isolated farm buildings using vernacular building styles. • Promote sensitive siting of new industrial and commercial buildings • Contain new development within historic field boundaries where possible • Create small scale woodland/tree planting to soften new development, preferably in advance of development.
SH11 Lindhurst Wooded Farmlands	
Characteristic features	Gently undulating topography. Coniferous forestry plantations with deciduous margins to road edges. Deciduous woodlands with Oak, Sweet Chestnut dominant. Intensive arable farming in large geometric fields. Mixed species hedgerows with mature trees to farm tracks. MARR route crosses the north of the area. Built edge of Mansfield and Kirkby-in-Ashfield to the north and west. Isolated farms and limited settlement. Heath land character, particularly to road verges, heath land species present on woodland rides.
Condition	The Landscape Condition is defined as **MODERATE**. The area has a coherent pattern of elements mainly large geometric arable fields and blocks of plantation woodland, there are some detracting features these include telecommunications masts on high points, busy roads including the A60 and MARR route and the built edge of nearby urban areas. Overall this gives a visually coherent area.
Landscape Strength	The Landscape Sensitivity is defined as **MODERATE**. The components of the landscape are characteristic of the Sherwood LCA. The time depth is historic (post 1600) giving a moderate sense of place overall. There is evidence of the pre enclosure heath land character in the presence of heath land species to road edges

[30] Available at: https://www.ashfield.gov.uk/media/4967/greater-nottingham-landscape-charater-assessment-ashfield-part-only.pdf

	and woodland rides. The undulating landform is apparent with intermittent areas of woodland giving a moderate visibility of features in and out of the PZ. There are dominant views of the urban edges of Mansfield and Kirkby-in-Ashfield. The overall landscape strategy is **CONSERVE AND CREATE.**
Landscape Actions	• Conserve the ecological diversity of small deciduous woodlands throughout the area • Conserve farm track hedgerows with mature trees including Holly • Create and reinforce field boundary and road hedgerows where these have become degraded or lost • Create opportunities for restoring areas of heath land where appropriate • Create small deciduous woodlands where appropriate • Conserve the sparsely settled character of the landscape by concentrating new developments around the existing urban fringe of Mansfield and Kirkby-in-Ashfield to the north and west. • Create small scale woodland/tree planting to soften new development, preferably in advance of development • Conserve the existing field pattern by locating new small scale development within the existing field boundaries • Promote measures for reinforcing the traditional character of farm buildings using vernacular building styles • Promote sensitive design and siting of new agricultural buildings

The site has an undulating topography, generally falling from the ridgeline to the south-west. The centre of the site contains a localised area of higher ground, and there is an area of higher ground in the far north-west. There are some steeper slopes at the western end of Cauldwell Road, and a localised undulation in the east of the site which is attributed to a minor watercourse.

Land use in the site comprises mostly arable farmland, although there is a band of scrubby woodland along the western end of Cauldwell Road with some residential properties adjacent to it. The character of the landscape in the east of the site is influenced by heathy vegetation, which is a distinctive characteristic in the local area. Sherwood Way and adjacent industrial buildings are detractors, particularly in the north of the site. There are no public rights of way within the site, although a fishing lake is located adjacent to its north-eastern boundary. The site contains no conservation interests, although there is a local wildlife site adjacent to its south-eastern corner resulting in low landscape sensitivity.

Visually, the sloping and undulating nature of the site means that there are views available across and from it, including views to the surrounding landscape from the ridgelines on Coxmoor Road and Derby Road and from the undulating land on Cauldwell Road, resulting in medium visual sensitivity. Some views into and across the site are interrupted by mature vegetation, such as views south from Cauldwell Road.

The tree belts along Cauldwell Road and along Cauldwell Brook form green corridors in the site, the former linking to Stonehills Plantation in the site's north-eastern corner. The heathy character of the area offers planting opportunities to strengthen this character, and the local coal-mining heritage also give potential for design cues in the new development.

10.3 Risks

The ridgelines and elevated land along Coxmoor Road and Derby Road (in particular the latter as it has a distinct rural character), give the risk that development up to these ridgelines could result in perceived sprawl of settlements. In addition, the presence of the south edge of Mansfield to the other side of Sherwood Way in the north of the site means that development of the northern edge of the site has the potential to result in perceived sprawl of Mansfield beyond its defined ring road boundary therefore there is medium level landscape planning issues.

10.4 Proposed mitigation solution

The site is potentially suitable on landscape grounds however, two landscape buffers are recommended within the site boundary, one in the north, and the second on the eastern edge. The northern buffer is recommended in order to prevent perceptions of sprawl at the ridgeline on Coxmoor Road, as well as preventing perceived sprawl of Mansfield south of the ring road. The eastern buffer would contain sprawl into the rural land to the east, as well as retaining the heathy character of this area.

10.5 Estimated abnormal costs for proposed mitigation

None identified.

11. Social infrastructure

11.1 Existing reports / information referred to

A number of reports and documents have been referred to and used to inform both the baseline analysis, mitigation recommendations and to understand the social infrastructure context within Ashfield District and the surrounding areas. The key reports referred are:

- Ashfield Local Plan (2002)
- Nottinghamshire County Council Pupil Place Planning and School Capacity (2017)
- Nottinghamshire Children and Young People's Departmental Strategy 2019-2021
- Ashfield District Council Infrastructure Delivery Plan (2016)
- Nottingham Outer Strategic Housing Market Assessment (2015)

Furthermore, public data sources drawn from social infrastructure providers was used to establish the baseline provision surrounding the Site.

11.2 Detailed overview

11.2.1 Nurseries

The following key findings can be seen from the baseline data available:

- There are 32 nursery/day-care settings within a 5 mile impact area of the site.
- Catchment requirements for nursery provision would put the majority of the identified capacity out of the reach of residents of the Site and would suggest therefore than on-site provision will be necessary to mitigate the development.

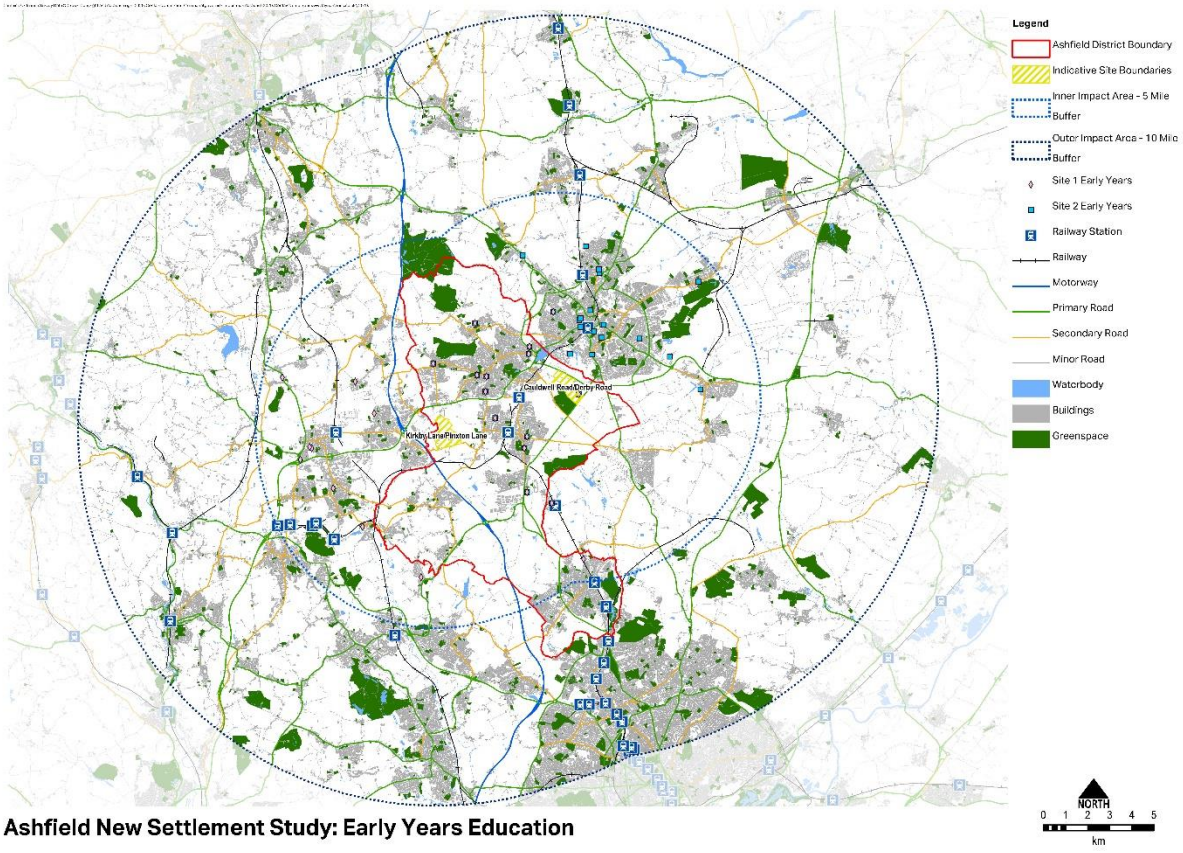

Figure 11.1: Baseline Provision and accessibility to Nursery Provision

Source: Day Nurseries, 2020

11.2.2 Primary education

The following key findings can be seen from the baseline data available:

- There are a total of 205 primary schools within a 10 mile impact area of the site
- Current roll numbers against capacity suggests a significant deficit in total place capacity across the existing schools. This is the case both for the inner and outer impact area.
- There are some individual exceptions however with some spare capacity in Oak Tree Primary School and Somerlea Park Primary School.
- Whilst baseline research indicates some localised capacity at certain primary schools, overall data suggests that on site provision will be required to mitigate the primary school impacts from the development.

Table 11.1: Baseline Provision of Primary Schools

	Primary Schools	Capacity 2019 data	Number on Roll 2019 data	Surplus / Deficit Places
Inner Impact Area	67	19,779	20,421	-642
Outer Impact Area	138	33,377	33,764	-387
Total	205	53,156	54,185	-1,029

Source: DFE – Edubase 2019

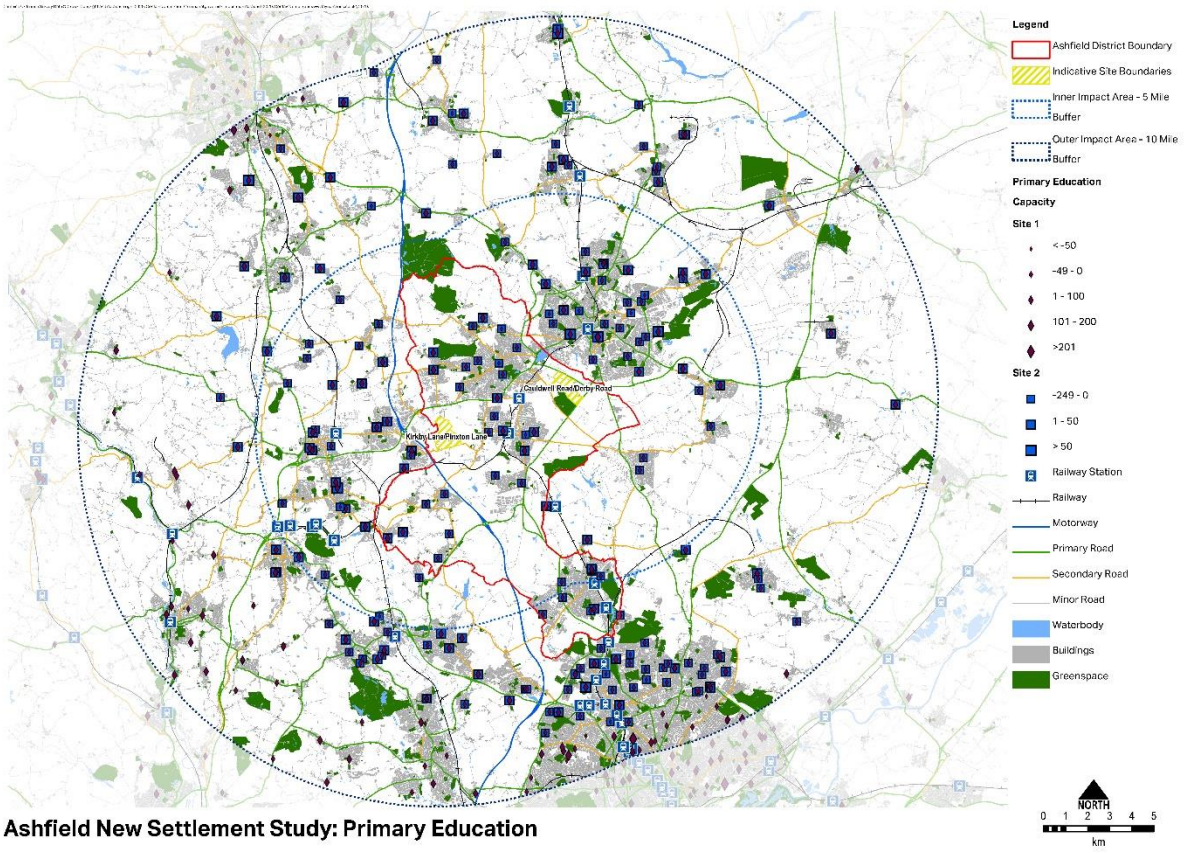

Figure 11.2: Baseline Provision and accessibility to Primary School Provision

Source: DFE – Edubase 2019

11.2.3 Secondary education

The following key findings can be seen from the baseline data available:

- Due to the larger catchment of secondary schools, an outer impact area is applicable to the analysis of baseline provision. There are 35 secondary schools identified within a 15 minute drive time of the Site.

- Across the outer impact area there is a spare provision of 6,200 places. It is important to note however that this does not take into account the statutory requirement to operate a 5% contingency in capacity. It should be noted that this spare capacity also represents the total for all years and does not necessarily represent that level of spare provision at pinch points such as year 7 intake.
- The following secondary schools are shown to be closest to the Site and show some spare capacity:
  - Sutton Community Academy
  - Quarrydale Academy
  - Kirkby College
- Baseline research suggests that off-site provision has the potential to mitigate the secondary school impacts from the development.

Table 11.2: Baseline Provision of Secondary Schools

	Secondary Schools	Capacity 2016 data	Number on Roll 2016 data	Surplus
Total	35	40,499	34,299	6,200

Source: Edubase, 2019

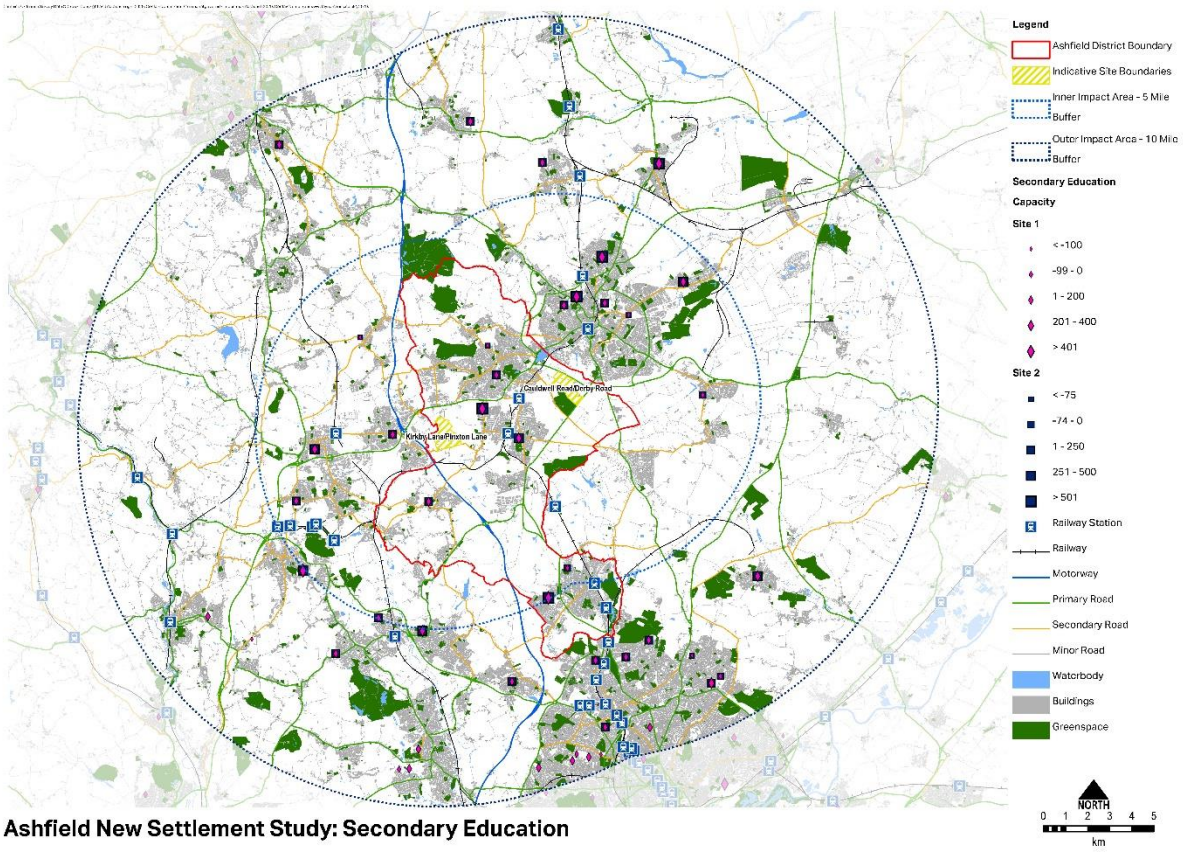

Figure 11.3: Baseline Provision and accessibility to Secondary School Provision

Source: Edubase, 2019

11.2.4 Primary healthcare

The following key findings can be seen from the baseline data available:

- Clinical Commissioning Groups (CCG) are responsible for primary care and the Site is covered by the NHS Mansfield and Ashfield CCG.
- The wider area around the site is shown to have 35 GPs providing services for 295,687 patients operating with a patient per GP ratio of 1: 2,025.

- There are localised capacity issues for individual GP practices, however at an area wide scale there is a deficit in capacity of 32,887 patients.
- Consultation with the NHS Mansfield and Ashfield CCG is required to confirm the Site and capacity data presented and the preferred strategy for mitigating healthcare requirements from the development.

Table 11.3: Baseline Provision of GPs

	Number of GP Locations	Patients on GP Lists	GPs	Patients per GP
10 mile Impact Area	35	295,687	146	2,025

Source: GP Workforce England, NHS, June 2019; Registered Patients, NHS, June 2019

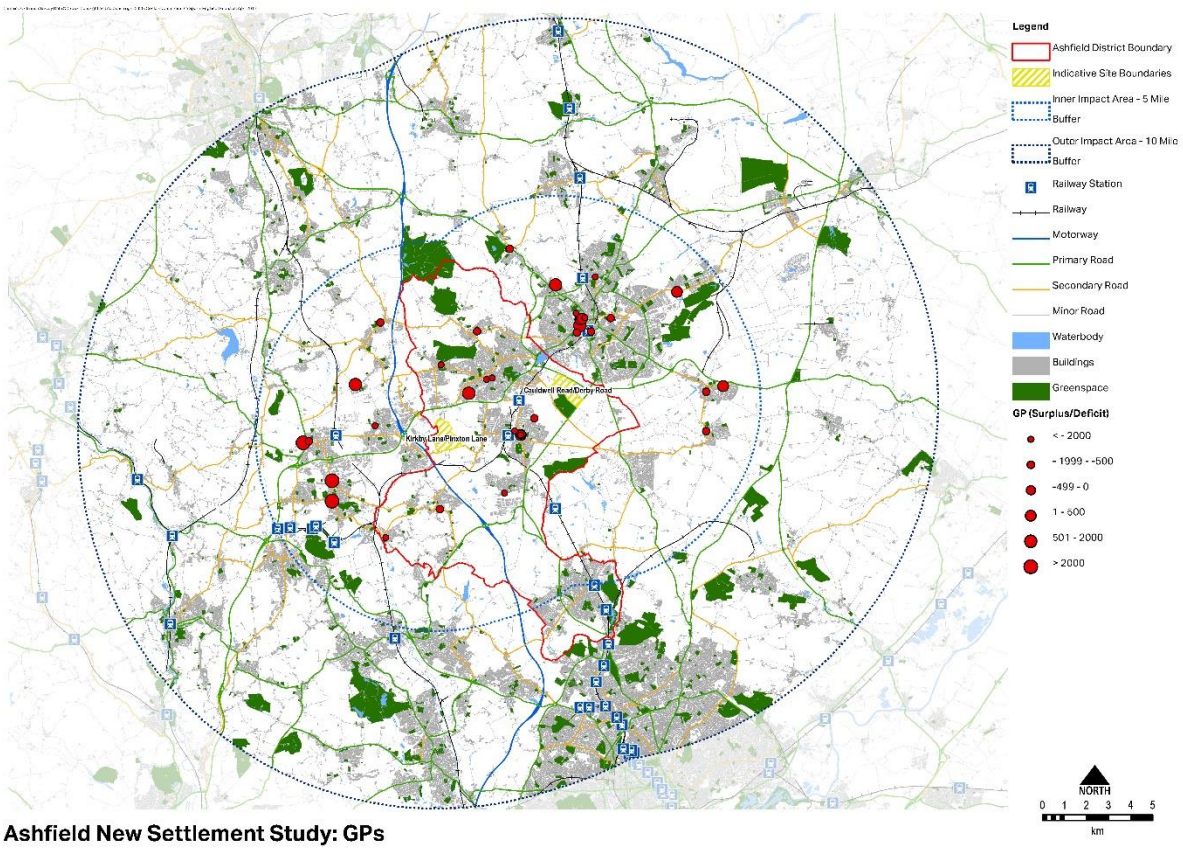

Figure 11.4: Baseline Provision and accessibility to GP Provision

11.2.5 Hospitals

The following key findings can be seen from the baseline data available:

- The closest acute hospitals with Accident and Emergency services are the Ashfield Community Hospital, King's Mill Hospital and Mansfield Community Hospital within 5 miles of the Site.
- The nearest NHS hospital to the Site is King's Mill Hospital. This hospital is home to a variety of walk in services and outpatient clinics.

Table 11.4: Baseline Provision of Hospitals

Hospital	Type	NHS Trust
Ashfield Community Hospital	Public	Sherwood Forest NHS Foundation Trust
Babington Hospital	Public	Derbyshire Community Health Services NHS Foundation Trust
BMI The Park Hospital	Private	-
Chesterfield Royal Hospital	Public	Chesterfield Royal Hospital NHS Foundation Trust

Nottingham City Hospital	Public	Nottingham University Hospitals NHS Trust
Clay Cross Hospital	Public	Derbyshire Community Health Services NHS Foundation Trust
Highbury Hospital	Public	Nottinghamshire Healthcare NHS Foundation Trust
Ilkeston Community Hospital	Public	Derbyshire Community Health Services NHS Foundation Trust
King's Mill Centre (Hospital)/King's Mill Hospital	Public	Sherwood Forest NHS Foundation Trust
Mansfield Community Hospital	Public	Sherwood Forest NHS Foundation Trust
Nottingham Woodthorpe Hospital	Private	-
Ripley Hospital	Public	Derbyshire Community Health Services NHS Foundation Trust
Walton Hospital	Public	Derbyshire Community Health Services NHS Foundation Trust

Source – AECOM Research, 2020

Table 11.5: Overnight and bed occupancy per NHS Trust

NHS Hospital Trust	General Acute Beds	Maternity Beds	Mental Illness & Learning Disability	Total Beds	% of General Acute Occupied	% of Maternity Occupied	% of Mental Illness & Learning Disability Occupied	% of all Beds Occupied
Nottinghamshire Healthcare NHS Foundation Trust	102	-	905	**1,007**	82.9%	-	88.2%	**87.6%**
Sherwood Hospitals NHS Foundation Trust	611	48	-	**659**	83.3%	56.4%	-	**81.4%**

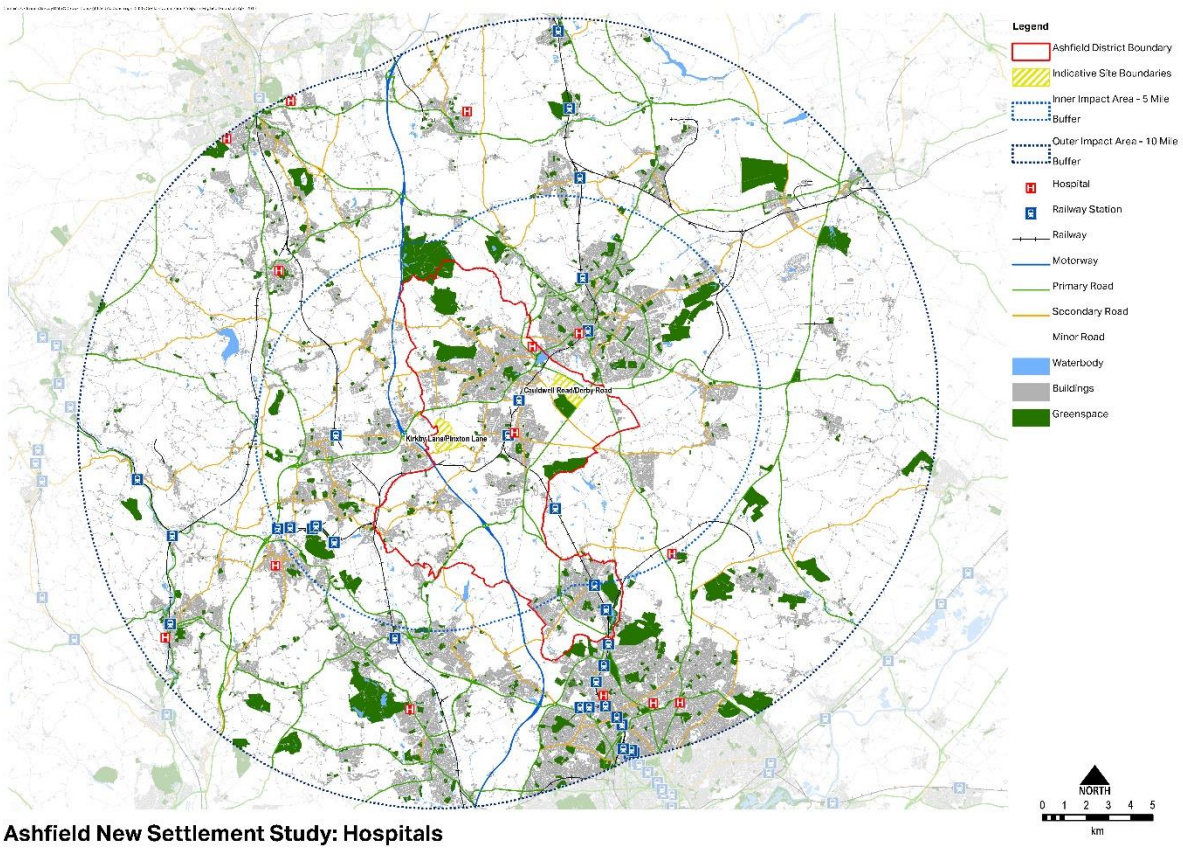

Figure 11.5: Baseline Provision and accessibility to Hospitals

- Within England, NHS Healthcare Trusts provide acute care services. As part of this analysis, existing hospital bed capacity is presented by NHS Trust rather than by Local Authority due to limitations in the available data.
- **Table 11.5** presents the acute healthcare provision near to the site in terms of number of hospital beds and the proportion of that capacity that is occupied (based on average overnight use).
- Occupancy data underpins a relatively significant capacity of spare beds albeit Sherwood Hospitals NHS Foundation Trust has significantly more overall capacity than Nottinghamshire Healthcare NHS Foundation Trust, particularly of general acute hospital beds.
- Nottinghamshire Healthcare NHS Foundation Trust has a high occupancy rate of its mental illness and learning disability provision which suggests less existing capacity to support additional demand.
- There is a low existing provision of maternity beds despite occupancy percentages indicating spare capacity.
- Sherwood Hospitals NHS Foundation Trust and Nottinghamshire Healthcare NHS Foundation Trust provide acute healthcare at several hospitals in Ashfield District and Nottinghamshire County and therefore would serve several growth locations and sub-areas. With an overall occupancy rate of all beds at 81.4% and 87.6% respectively it is likely that additional demand can be supported by existing provision. However, additional provision in particular sectors such as maternity care will need to be considered.

11.2.6 Social care

The following key findings can be seen from the baseline data available:

- There are 39 residential care homes providing care bed spaces within a 5 mile impact area of the Site.
- It would be likely that an onsite bespoke solution be explored to cater for additional elderly care needs from the development.

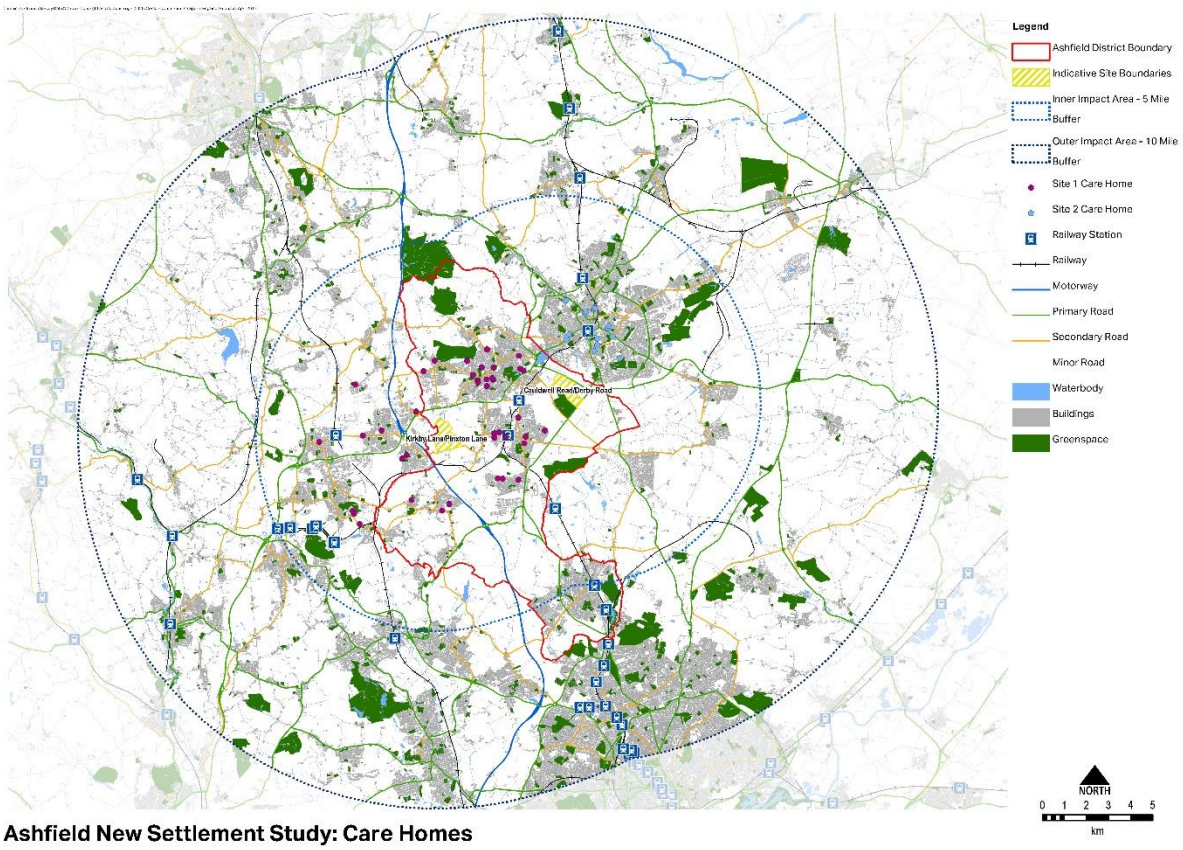

Figure 11.6: Baseline Provision and accessibility to Care Homes

11.2.7 Community facilities

The following key findings can be seen from the baseline data available:

- There are eight community facilities and nine libraries within the impact area of the Site.
- The closest library facilities are located in Sutton in Ashfield.
- The closest community facility to the Site is located in Kirkby-in-Ashfield.
- Given the close catchment standards for community and library facilities it would be expected that some form of multipurpose community facility including the ability to host library services be located on the development Site.

Table 11.6: Baseline Provision of Community Facilities

	Community Centres / Halls	Libraries
Total	8	9

Source – AECOM Research, June 2020

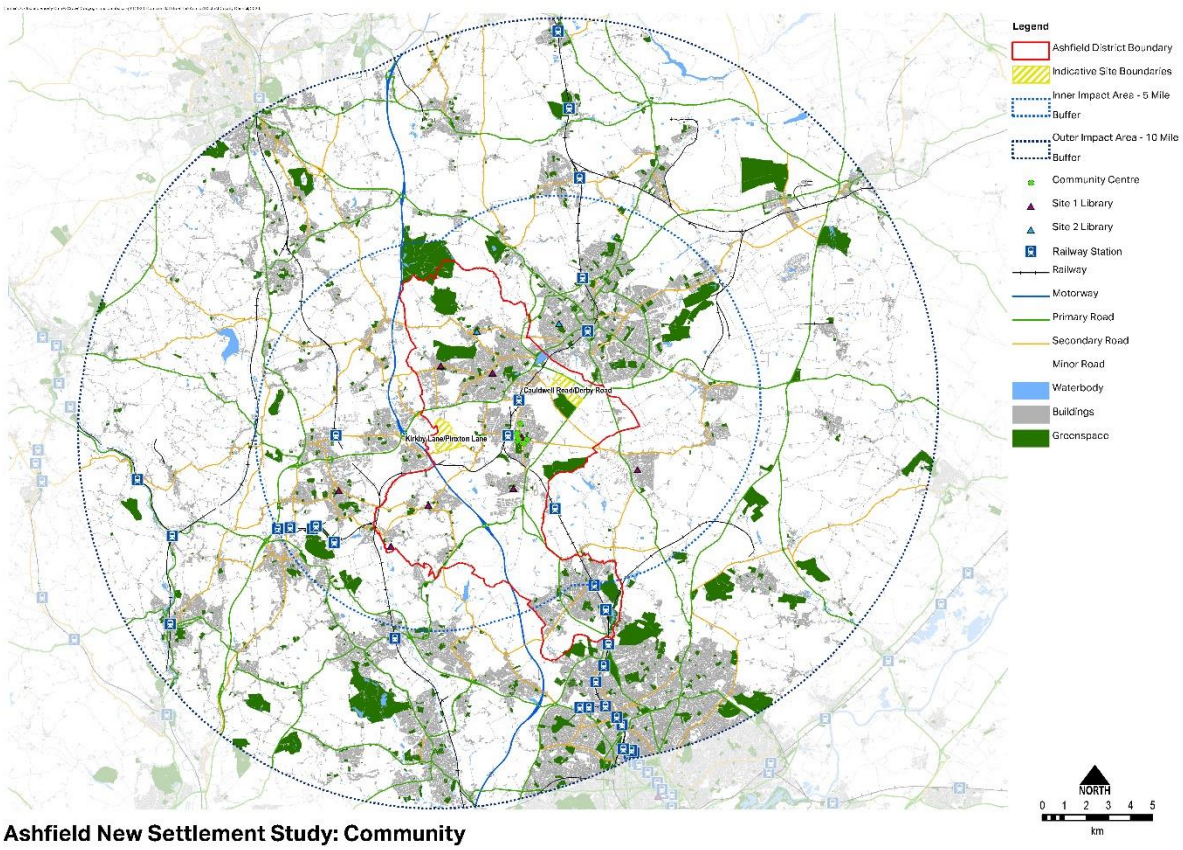

Figure 11.7: Baseline Provision and accessibility to community facilities

11.2.8 Indoor sport

The following key findings can be seen from the baseline data available:

- There are 17 sport halls within the impact area of the Site.
- There are 9 swimming pool facilities within the impact area of the Site.
- Across the wider outer impact area there are 9 studios.

Table 11.7: Baseline Provision of Indoor Sports

	Swimming Pools	Studios	Sports Halls
Total	5	9	17

Source – Sport England Active Places Data 2019

11.2.9 Outdoor sport

The following key findings can be seen from the baseline data available:

- There are 49 outdoor grass pitches within the inner impact area of the Site.
- There are 10 artificial pitches and MUGAs provision within the inner impact area.
- Across the impact area there are 3 outdoor tennis courts.

Table 11.8: Baseline Provision of Indoor Sports

	Outdoor Grass Pitches	Artificial Pitches/MUGA	Tennis Courts
Inner Impact Area (5 miles)	49	10	3

Source – Sport England Active Places Data 2019

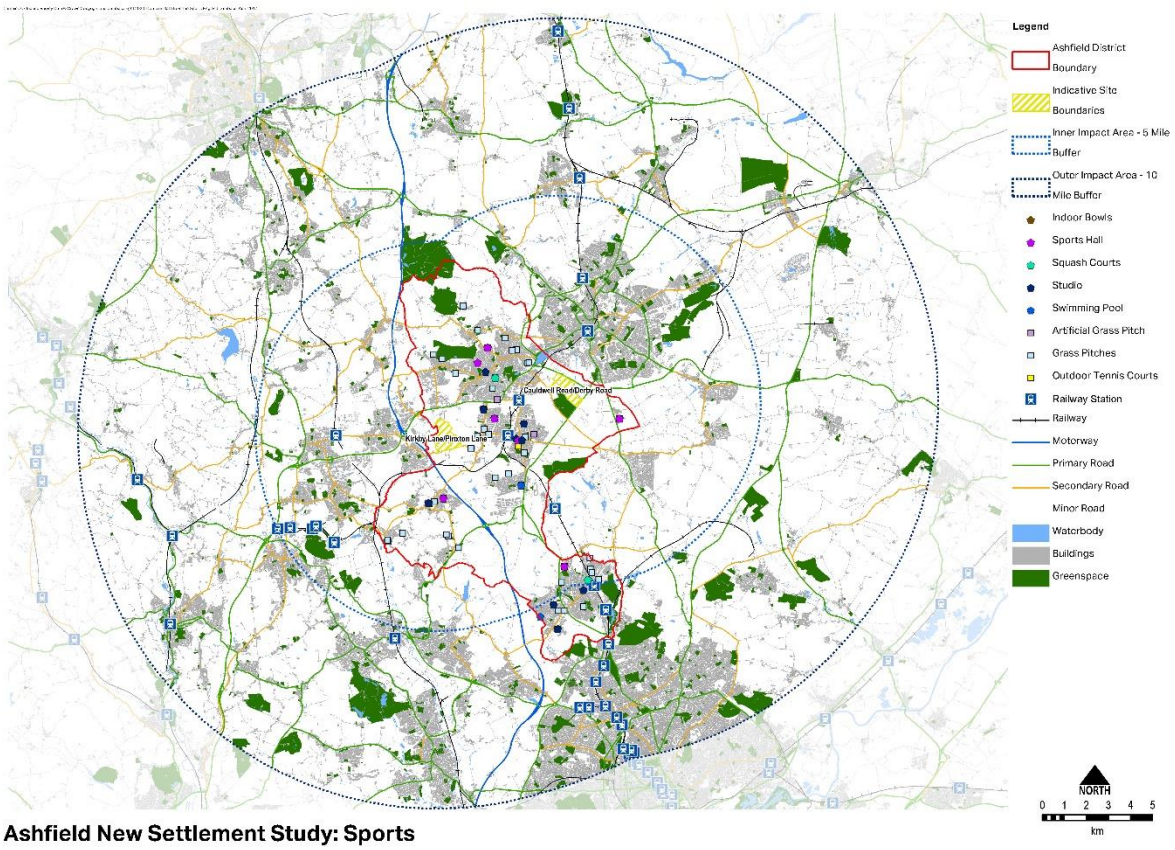

Figure 11.8: Baseline Provision and accessibility to Indoor and Outdoor Sport facilities

11.3 Community infrastructure modelling assumptions

In order to assess the potential infrastructure demand from the various masterplan options a set of modelling assumptions are required. For each infrastructure topic an assumption and associated planning metric has been identified. Where a local planning standard exists, this has been utilised. Where no local standard is apparent a compatible standard has been used.

These assumptions are set out in the table below with the associated source document or reference.

Table 11.9: Proposed Social Infrastructure Modelling Assumptions

Topic	Assumption	Metric	Reference
Early Year Facilities	0-1 year olds in formal Provision	9%	AECOM benchmark Standard based upon guidance from wider UK Councils
	1 year olds in formal Provision	18%	
	2 year olds in formal Provision	40%	
	3 year olds in formal Provision	77%	
	4 year olds in formal Provision	60%	
	Sq.m per 50 place nursery	150	
Primary Schools	Places per dwelling	0.21	Nottinghamshire CYPS 2019-2021
	% of yield to private schools	5%	AECOM benchmark Standard based upon guidance from wider UK Councils
	Primary School Pupils in 1 Form Entry	210	Department for Education
Secondary Schools	Places per dwelling	0.16	Nottinghamshire CYPS 2019-2021
	% of yield to private schools	5%	AECOM benchmark Standard based upon guidance from wider UK Councils

	Secondary School Pupils in 1 Form Entry	150	Department for Education
GP Surgeries	People per GP	1,800	Planning Benchmark Standard
	Sq.m per GP	165	NHS Healthy Urban Development Model
Dental Practices	People per Dentist	1,760	Existing ratio of Dentists to population across England 2015 (based on General Dental Council 2015 Data)
	Sq.m per Dentist	50	AECOM Standard from Comparable UK Infrastructure projects
Hospitals	People per Bed	510	Existing ratio of Hospital Beds to population across England 2015 (based on NHS England Data)
	Sq.m per Bed	160	AECOM Cost Consultant Benchmark data
Social Care - Nursing Homes	Beds per 1000 persons over 75	45	The Housing Learning and Improvement Network (LIN) SHOP TOOL - Demand levels based prevalence rates from "More Choice, Greater Voice".
	Bed Per Facilities	72	AECOM benchmark Standard based upon guidance from wider UK Councils
	Sq.m Per Bed	56	
Social Care - Residential Care Home	Beds per 1000 persons over 75	65	The Housing Learning and Improvement Network (LIN) SHOP TOOL - Demand levels based prevalence rates from "More Choice, Greater Voice".
	Bed Per Facilities	72	AECOM benchmark Standard based upon guidance from wider UK Councils
	Sq.m Per Bed	56	
Community Space	sq.m per 1,000 person	70	
Library Space	sq.m per 1,000 person	30	Arts Council (Previously Museums, Libraries and Archives Council (MLA))
Swimming Pools	People per pool lane	5,000	Sport England – Active Places – UK Average 2019
Sport Halls	People per sqm of sports hall	82.8	

Furthermore, an assumed tenure mix of 80% market housing and 20% affordable housing (broken down to 16% social rented and 4% intermediate) has been applied to the social infrastructure modelling. A housing mix breakdown highlighted below has been applied taking into account the tenure split. This is derived from the Nottingham Outer Strategic Housing Market Assessment (2015).

Table 11.10: Housing Mix (Nottingham Outer Strategic Housing Market Assessment 2015)

Housing Mix	1 Bed	2 Bed	3 bed	4 Bed+	Total
Market	5.0%	35.0%	50.0%	10.0%	**100.0%**
Affordable - Social Rented	35.0%	35.0%	25.0%	5.0%	**100.0%**
Affordable - Intermediate	35.0%	35.0%	25.0%	5.0%	**100.0%**

11.4 Mitigation requirements

The table below sets out the results of community infrastructure requirements associated with development of 1,270 units at the Site and the application of the infrastructure modelling assumptions set out earlier. This section reviews these outputs in more detail taking into account associated recommendations for mitigation of increased demand on infrastructure provision.

Table 11.11: Community Infrastructure Assessment Results

	Based upon Assumed Housing Delivery of 994 units
Affordable Housing % Scenario	20%
Total Population	***2,201***
Early Years Places (FTE)	45
Early Year Facilities (50 Place Nurseries)	0.9
Primary School Children (Pupils)	209
Primary School Form Entries	1.0
Secondary School Children (Pupils)	159
Secondary School Form Entries	1.1
General Practitioners (GP's)	1
Primary Care Centre Floorspace (sq.m)	202
Dental Surgeons	2
Dental Surgery Floorspace (sqm)	63
Hospital Beds	5
Hospital Space (sqm)	800
Nursing Home Beds	9
Residential Care Beds	13
Community Space (sqm)	154
Library Space (sqm)	66
Sports Halls (sqm)	0.2
Swimming Pools (sqm)	0.1
Outdoor Sports (ha)	2.6

11.5 Mitigation Strategy Recommendations

The following recommendations are based upon the worst case scenario in terms of demand. It is also important to also consider the timing of provision, not all recommendations will be delivered at once but rather phased with development and therefore the baseline of existing social infrastructure provision is key to allow for phasing in of additional homes where there is some existing capacity in infrastructure.

11.5.1 Early Years

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities, the requirement should be mitigated on Site.
- Nursery provision to cater for a maximum of 57 children (Full time equivalent) from the 'Optimum Capacity'.
- Assuming typical nursery settings of 50 places this equates to one setting.
- Potential for one or two settings to be provided within an on-site primary school. Potential for a further setting to be located within community hub facilities.

11.5.2 Primary education

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities, the requirement should be mitigated off site.
- Primary school provision to cater for a maximum of 209-267 children aged 4-11 years.
- Assuming typical primary school form entry (FE) size of 159-210 places (7 years of 30 places) this equates to one form of entry. This range assumes a development of between 994 - 1,270 dwellings.
- The Nottinghamshire Pupil Places Planning and School Capacity Plan states that new primary schools should endeavour to create two forms of entry and therefore it is recommended that a single FE extension is provided for at an existing primary school off-site.
- A bespoke approach for the Site is required and will need to be developed in partnership with the education authority to understand approach towards potential for use of existing infrastructure capacity.

11.5.3 Secondary education

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for off-site through use of existing facilities within a reasonable area of influence.
- Secondary school provision to cater for a maximum of 203 children aged 11-15 years (from the 'Optimum Capacity').
- Assuming typical secondary school form entry size of 150 places (5 years of 30 places) this equates to almost one and a half form entries of provision.
- The Nottinghamshire Pupil Places Planning and School Capacity Plan states that new secondary schools should endeavour to create seven forms of entry (or 1 ,050 places) wherever possible.
- Therefore, taking into account the approach set out by Nottinghamshire County Council and the sufficient surplus provision in existing secondary schools, it is recommended that additional demand is met through existing capacity.
- A bespoke approach for the Site is required and will need to be developed in partnership with the education authority to understand approach towards potential use of existing capacity within the area of influence.

11.5.4 Primary healthcare

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for on-site or off-site through use of existing facilities within the area of influence.
- Primary healthcare provision to cater for a maximum potential patient list size of 2,812 people.
- Assuming typical benchmark standards this equates to a need for 2 additional GPs and 2 additional dentists which would require a facility scaled to approximately 258 sq.m
- It is recommended that any on site solution is delivered as a single facility built with the ability to expand according to demand.
- A bespoke approach for the Site is required and will need to be developed in partnership with the Clinical Commissioning Group (CCG) to understand approach towards potential use of existing capacity within the area of influence and whether an onsite healthcare facility is preferred and viable.

11.5.5 Hospitals

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement will be provided for off-site through use of existing facilities within the area of influence.
- Hospital provision to cater for a maximum potential patient list size of 2,812 people equates to approximately 7 additional hospital beds.
- A bespoke approach for the Site is required and will need to be developed in partnership with the Clinical Commissioning Group (CCG) to understand approach towards potential use of existing hospital capacity within the area of influence.

11.5.6 Social care

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for on-site or off-site through use of existing facilities within the area of influence.
- Nursing and care bed requirements equivalent to a maximum of 35 bed spaces.
- There is a range of facilities in the area of influence that could potentially cater for this demand although the assessment of demand is based upon the likely on site population over the age of 75 and could therefore be assumed as an onsite requirement.
- On site provision could take the form of Extra Care housing to the scale of 40 units which would need to form part of the proposed housing mix for delivery, potentially as part of the affordable housing provision.

11.5.7 Community facilities

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for on-site or off-site through use of existing facilities within the area of influence.
- Requirements equivalent to a maximum of 197 sq.m of community space and 84 sq.m of library space.
- This provision could be delivered on site through a community hub facility delivering a range of services including shared community space, library services and other services including community policing touch down points, indoor sport halls, art and cultural spaces.

11.5.8 Indoor sport

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for off-site through use of existing facilities within the area of influence.
- Requirements equivalent to 0.2 sport halls and 0.1 of swimming pools generated by development at the site.
- The level of demand for swimming pools would not justify the delivery of a swimming pool on site, so use of existing facilities in the area of influence is recommended with potential contributions from the development to those existing sites.
- The level of demand for sports halls would not justify the delivery of an on-site sports hall, however development could potentially to include a sport hall within a shared multi-purpose community facility. There is also the potential to utilise any onsite primary school sport hall out of hours through the use of a community access agreement.

11.5.9 Outdoor sport

Our assessment of demand taking into account the existing provision of social infrastructure suggests the following:

- Based on the location of the Site and catchment recommendations for these facilities the requirement can be provided for on site or off-site through use of existing facilities within the area of influence.

- Requirements equivalent to 3.4 hectares of outdoor sports space.
- The level of demand for outdoor sports could justify the delivery of an on-site facility, potentially within a shared multi-purpose community facility or a dedicated standalone facility. There is also the potential to utilise existing provision of off-site facilities.

11.6 Risks

The detailed assessment of existing social infrastructure and appropriate mitigation requirements set out above highlights a number of key risks regarding social infrastructure delivery at the Site. These risks are primarily focussed around education and healthcare provision, and as anchor infrastructure for potential development, these risks could have far reaching impacts to viability and other facets of development.

Firstly, as highlighted by the baseline analysis, the immediate impact area around the Site is constrained significantly in terms of spare primary education capacity. It was therefore recommended that, given the small catchment of primary schools, to mitigate additional demand generated by development an on-site facility is provided. As such an underlying risk will be securing the delivery/funding of the new facility, whether delivered as a free school, by the education authority with a contribution from the developer or direct delivery by the developer. There are potential programme risks if clear delivery routes are not secured early on in the planning process.

Similarly, if on-site primary healthcare provision was the preferred route for development then programme risks relating to securing delivery/funding apply. The additional demand generated by development is not as significant as primary education and there is greater flexibility in existing provision to service additional demand. However, identifying a clear preferred option for on-site/off-site provision and funding mechanisms with the CCG early in the planning process will reduce risk of delivery difficulties.

11.7 Proposed mitigation solution

The risks presented above can be mitigated through a comprehensive Section 106 Agreement and negotiation process. This however will require early engagement and working with both the local education authority regarding education provision and the CCG regarding healthcare provision. Engaging relevant authorities early in the planning process, potentially at masterplan inception stage, will ensure that a clear preferred route can be identified and built into any proposals as appropriate and flexibly. If a common working ground is agreed this will also ensure that Section 106 agreement negotiations are efficient and suitable agreements/contributions can be written into the legal agreement.

Having this clarity and security around funding and delivery will be fundamental to ensuring that vital pieces of core social infrastructure are delivered as part of a new community, mitigating any potential adverse impacts on the existing community.

11.8 Estimated abnormal costs for proposed mitigation solution

Beyond normal costs for the site relating to social infrastructure include:

- On-site provision costs:
  - One 50-place nurseries
- Off-site Contribution costs:
  - 1FE Primary School
  - 2FE Secondary School provision
  - Acute healthcare provision
  - Indoor sports provision
  - Outdoor sports provision
- To be confirmed on-site/off-site:
  - 2GP Primary Healthcare Facility
  - 40 unit extra care accommodation
  - 300 sqm multi use community facility

- 3.4ha outdoor sports

On-site abnormal costs include a 1FE primary school (nursey costs also included in this calculation) at £5,720,000, a primary care centre and dental centre at £530,000 and a community facility/ library at £330,000.

In addition, there are a number of off-site costs, a 2FE secondary school contributions at £2,822,727, acute healthcare contributions at £1,860,000, indoor sports contributions at £470,000 and outdoor sports contributions at £2,000,000.

This results in a total cost of 16,738,511 for social infrastructure including profession fees (£822,500) and design development and construction contingency (£2,183,284).

12. Light impact assessment

12.1 Existing reports / information referred to

- Institute of Lighting Professionals guidance note ILP GN01
- Google Earth and Streetview
- Engagement with representatives of the Mansfield & Sutton Astronomical Society

12.2 Detailed overview

Local areas will have a typical lighting character comprised of the nature of development which influences the type of lighting in use, and how it is used. This is primarily related to population density and frequency of lighting installations, particularly those with traffic route lighting or high power installations.

The lighting environmental zone is looks at criteria provided by the Institute of Lighting Professionals within their guidance note ILP GN01. There are five zones which range from dark through to high brightness which have corresponding limiting recommendations for new lighting to have a minimally obtrusive effect. The limiting criteria grows stricter the darker the environment.

Defining environmental zones can be aided by describing a location in terms of population density and traffic routes. This looks more at the overarching character of the wider area which may also influence an individual site. **Table 12.1** provides an overview of how the environmental zones are considered. The guidance does advise that when considering brightness characteristics and their limitations, the stricter criteria should be used.

Table 12.1: Environmental Zones (extract ILP GN01)

Zone	Surrounding	Lighting Environment	Examples	Equivalence Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks.	Few people, few paved roads, infrequent use of exterior lighting to promote dark skies with minimised sky glow.
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc.	No road lighting and low population density.
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations.	Road lighting lit to residential standards and relatively low population density.
E3	Suburban	Medium district brightness	Small town centres or suburban locations.	Roads lit to traffic route standards with a moderate population density.
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity.	Areas of high activity after dark, such as shopping centres or urban areas with a high concentration of restaurants and clubs.

12.3 Site context

Site 2 is located between Sutton in Ashfield and Mansfield urban areas, just north of Sherwood Way South. It sits within an area that has a combined character of woodland, arable farmland and development associated with Berry Hill.

The majority of land to the west and south has little development and a variety of landscape elements. Oakham Business Park sits to toward the north and Berry Hill to the north and east, with the large town of Mansfield further to the north.

The land adjacent to Derby Road north of Cauldwell Road consists of largely residential development, Vision West College and the Mansfield Crematorium before reaching Berry Hill. The south, west and east of Site 2 are more populated by woodland and farmland, having few roads and infrequent buildings, with most properties having residential or commercial uses. Coxmoor Golf Club is located further south of Derby Road turning north

and Two Oaks Quarry turning to the south. Sherwood Observatory is located toward the north-west corner of the golf course about 2km from Site 2.

Immediate to Site 2, lighting is likely to be more associated with the existing development associated with the current extent of Berry Hill. A variety of lighting is observed in nearby developed areas associated with residential properties and commercial / industrial buildings, statutory road installations, and residential development.

There is no road lighting observed along Sherwood Way S or Derby Road south of Cauldwell Road. Lighting in the local area is expected to be associated with security and perimeter lighting for businesses and lighting used for security or personalisation for residential properties.

12.3.1 Receptors

Currently, the closest receptors are expected to be residential properties or ecological species which might utilise the local area for commuting / foraging / breeding purposes.

With the mature landscape nearby and decreased instances of lighting, there is a higher potential for light sensitive species to be found within local woods or surrounding fields. This includes the increased likelihood for the presence of bat species and will be best informed by environmental survey.

Sherwood Observatory is a unique receptor which is expected to need additional consideration. Operated by the Mansfield & Sutton Astronomical Society (MSA), the observatory houses a 24-inch Newtonian Reflecting Telescope in its dome. As this is an optical telescope, its use can be significantly affected by light. They are planned to expand to include a new planetarium on the land next door to the existing observatory and dome. The planetarium is planned to have viewing platforms with smaller optical telescopes that can be used by visitors.

12.3.2 Lighting character

Site 2 is located has a more mixed character, having a more natural setting to the south and an increasingly suburban setting to the north. This typically describes a location that is consistent with a lighting environmental zone E1 / E2.

Smaller towns are expected to have characteristics consistent with environmental zones E2/ E3, where major towns and cities may trend toward the E3 / E4 range in terms of brightness.

Industrial development tends to have a higher lighting requirement and be more consistent with a lighting environmental zone E3.

Lighting character for Sherwood Observatory is better considered for what will support their requirements rather than they currently experience. Optical telescopes are sensitive to light and work best without artificial light. New or changed lighting should target limiting effects as much as possible to lower brightness characteristics consistent with environmental zones E0 / E1.

12.3.3 Constraints and opportunities

New development is expected to require new lighting for safe use and access. This lighting will be introduced in a location that itself contains little to no lighting, although it is more closely located toward the developed areas of Berry Hill and some level of light is present locally. This is expected to gradually decrease until light occurs in intermittent pockets associated with individual properties.

Site 2 is not lit, but it is likely to have a semi-rural character. New lighting associated with Site 2 is less likely to be noticeable when viewed against the larger developed towns, however it would extend into an area which is currently unlit which could affect some receptors.

Key receptors which could be affected by new lighting associated with Site 2 are expected to consist of:

- Sherwood Observatory and Future Planetarium;
- Local residential amenity;
- Ecology, where present; and
- Retention of night-time amenity

It is likely that development of Site 2 will be consistent with a new lighting character of zone E2 given the proximity to Mansfield, however effort should be made to limit obtrusive effects further.

Ecological assessment is likely to find bats or other light sensitive species in the area which could introduce further constraints on new lighting. Ecological receptors should be confirmed through ecological survey to inform future development.

While the residential and ecological receptors are more typical considerations, it is possible for there to be a larger influence on the observatory which will be sensitive to any changes in lighting which increase sky brightness or direct light exposure to telescopes. Consultation was undertaken with MSA to review their current challenges and what approaches for new lighting that could be beneficial for them. These are addressed in the section below.

12.3.4 Sherwood Observatory

Mansfield & Sutton Astronomical Society (MSA) as a Society is a non-profit making registered charity dedicated to furthering interest in astronomy within the community. They have a dedicated interest in astronomy and a strong interest in sharing with the community and supporting STEM learning for all ages.

In learning more about Sherwood Observatory and its requirements AECOM have communicated with Contacts: Mr Robert Dawes (Chairman & Group Visits Coordinator), Mr Chris Dakin (Optical Astronomy Coordinator), Dr Steve Wallace (Planetarium Planning Manager).

Sherwood Observatory has had a variable experience with lighting in the wider area. They have observed Mansfield (north of the observatory) using sodium lamps without optical control measures. This limits the ability to make visual observations from the observatory to the north.

The change to LED has been recognised as a general improvement, but there are still some effects that are not conducive to good use of optical equipment. It affects their current arrangements and it is likely to also affect the future smaller telescopes on viewing platforms.

The following image was provided as an example that shows a 70 second exposure toward Mansfield about 1km away and about 75m below the elevation of the observatory. The image shows a traditional blue filter which would be used for sodium lamps of certain wavelengths. This does not allow for filtering of all LED lighting due to its different spectral quality. The image also shows the amount sky glow that is likely to be present and of light that shines in the direction of the observatory.

Figure 12.1: Photograph Sherwood Observatory facing north toward Mansfield, MSA 2020

There is currently not a community-wide programme that looks at dimming or turning off lighting within an agreed distance of the observatory for events or scheduled classes, so they are affected by all light as it is used in the

surrounding area. In instances where light has been misdirected toward the observatory it has been difficult to coordinate mitigation and this is a concern for any new lighting that is relatively close.

12.3.4.1 Future expansion

MSA has had increasing numbers of visitors over the years who visit in groups or as part of open days or classes and plans to expand the Observatory and introduce a new Planetarium on the grounds, becoming the Sherwood Observatory Science Discovery Centre and Planetarium.

The expansion supports their vision to create a science discovery centre and planetarium that will inspire STEM learning in people of all ages, provide a pipeline of talented and motivated people that will support prosperity in the area and provide a unique visitor attraction and supporting the visitor economy by increasing footfall by up to 5 times their current numbers as well as providing a new location that can be used for community or business hire for events.

Figure 12.2 provides an overview of the current observatory and future planetarium location.

The current observatory and dome will be retained and the new planetarium will be a largely enclosed building which itself has no particular requirements in terms of light, however there will be viewing platforms with smaller optical telescopes which will have the same light control needs as the larger optical telescope within the observatory.

MSA has secured an expression of interest in the planetarium and they are in the process of confirming funding and plan to carry on with detailed design development with a view to opening in the next three years. The last projection looked at a construction phase which would complete around September 2023, although there might be some delay due to effects of the coronavirus.

Figure 12.2: Planetarium expansion site, perspective view , MSA proposals overview 2020

12.3.4.2 Key issues with LED lighting

Key issues with LED lighting were identified and consist of problems with light direction, brightness and sky glow, in addition to the spectral composition of light.

12.3.4.3 Light direction, brightness and sky glow

Not all LED lighting exhibits good upward light control, so there are areas where light shines above the horizontal, contributing light into the sky.

There have also been observations of local community lighting causing visual interference through the use of bright floodlighting. It was not confirmed the exact source but bright floodlighting from the direction of industrial units / the brewery was directed toward the observatory for a time which also impacted visual observations.

12.3.4.4 Spectral Quality

The broad spectral light from standard LED is problematic for observation. There can be some limited success with filtering photographs of the sky, but this is noted to be complex (requiring up to 6 different filters used in combination with a monochrome camera) and will not aid live observations. This is more involved than filtration of older (low pressure) sodium lights which are overall limited to between 588 – 600 nm. The graphs below were provided in outline showing the spectral distribution of low pressure sodium and neutral/cool white LED, and one showing high pressure sodium peaks followed by the ranges that their filters can cover.

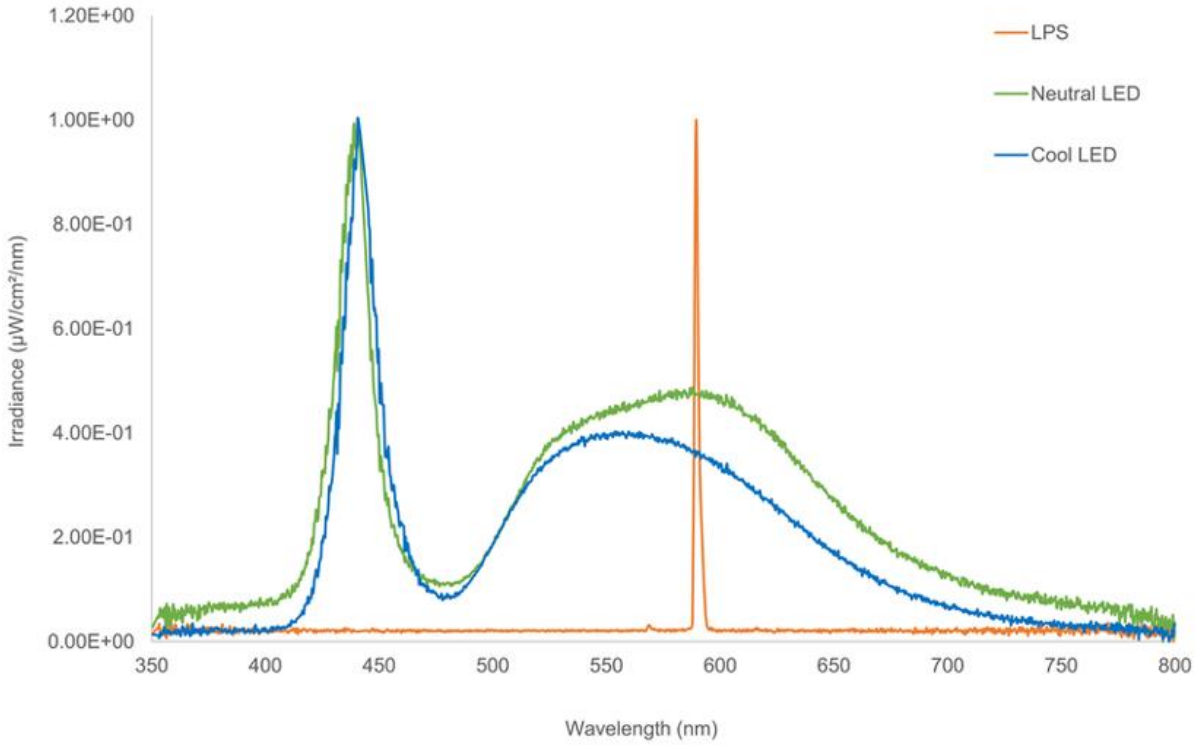

Figure 12.3: Traditional Low Pressure Sodium vs LED spectral peaks, referenced by MSA 2020

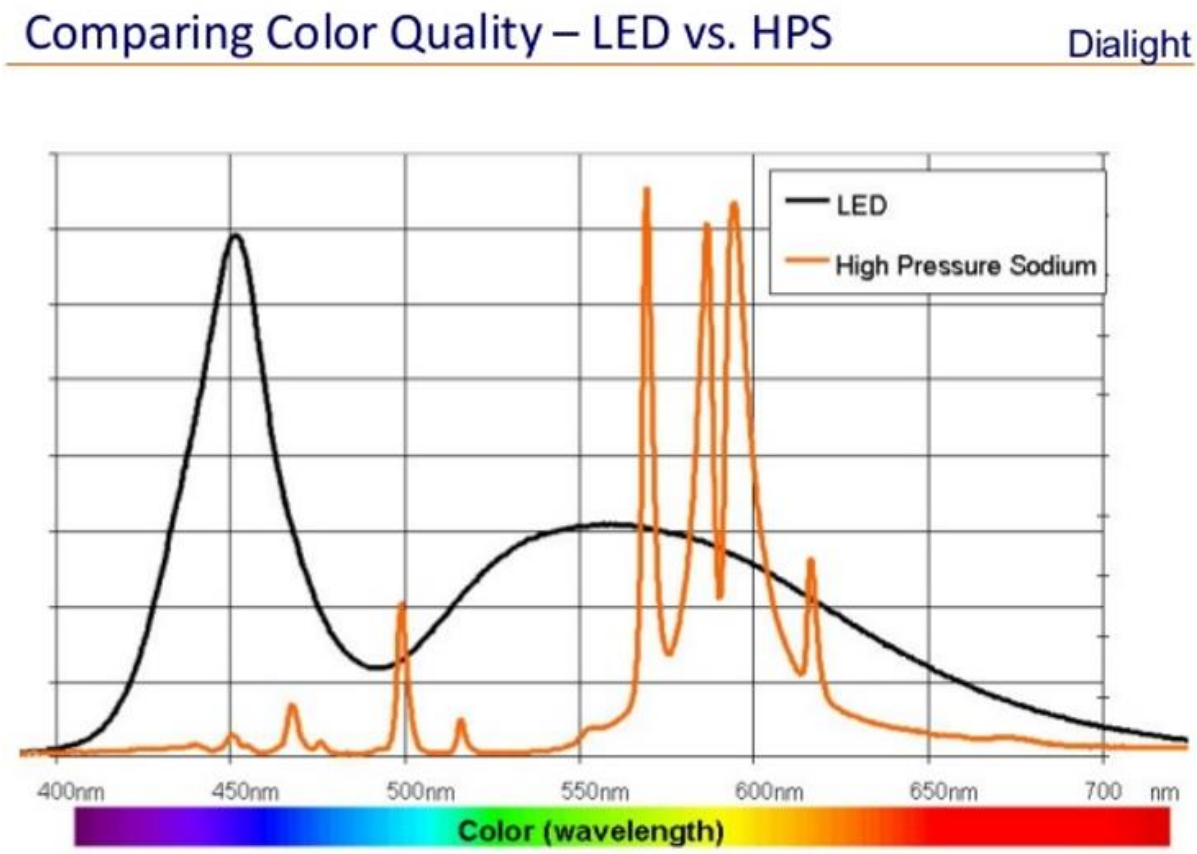

Figure 12.4: Traditional High Pressure Sodium vs LED spectral peaks, referenced by MSA 2020

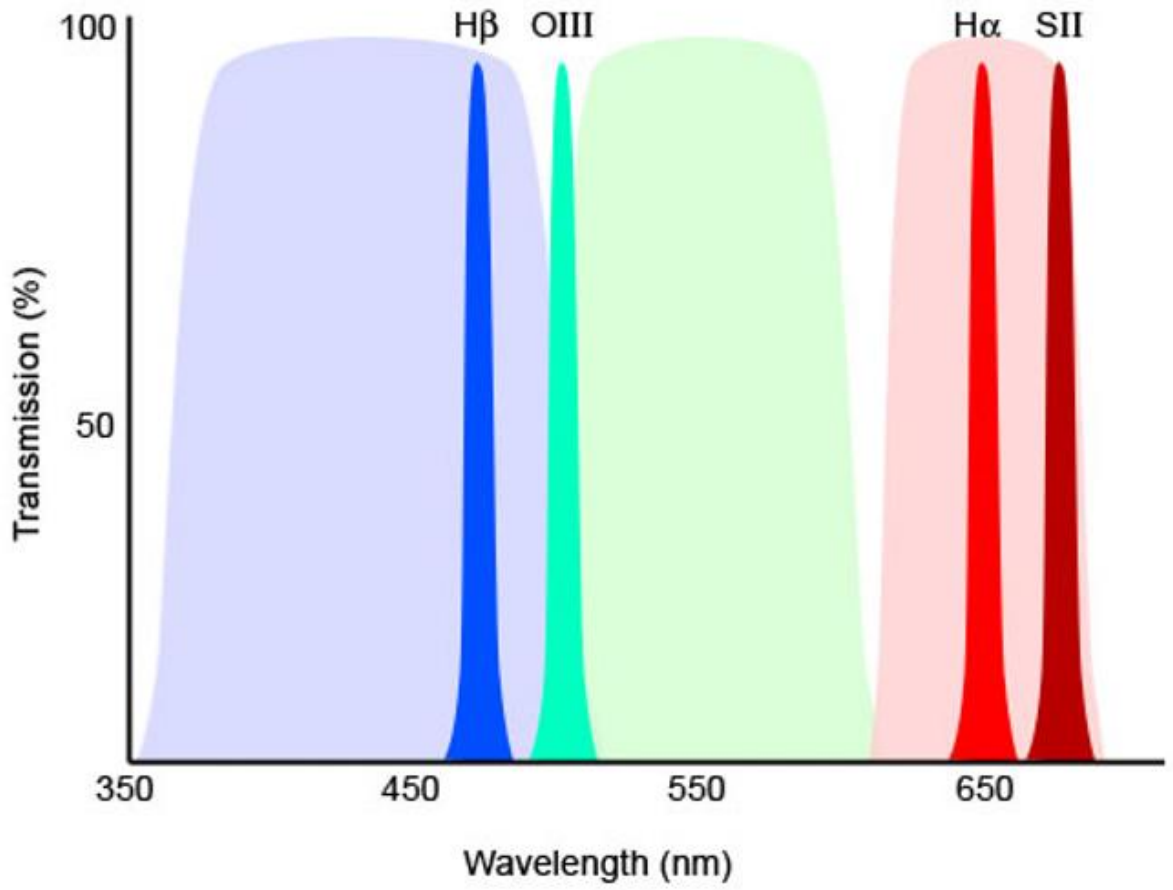

Figure 12.5: Image filtration coverage, referenced by MSA 2020

There is additional sensitivity when detailing which wavelengths inform on visibility of nebula to the human eye and to a camera, where those nebulae are composed of mostly ionised hydrogen or ionised oxygen. Hydrogen nebulae are indicated as the most difficult to see and relies on photography.

The most successful spectral filtering historically has been for low pressure sodium light, whereas LED and high pressure sodium will have more peaks between 400 - 700nm which are in the visible light range which would require multiple filters to address.

Based on the variation of light, the filtering process has been found to offer only moderate success and the more light that can be limited which emit those visible wavelengths, the easier it would be to filter out of photographs. This would not necessarily improve all viewing with the naked eye or optical equipment without other measures being undertaken but would offer some improvement over the current lit condition.

12.3.4.5 Beneficial lighting approaches

Some initial beneficial lighting approaches have been identified that would improve the use of optical telescopes, including following recommendations made by the International Dark Sky Association. This would look at design approaches that consider:

- Use of full cut-off lighting in all areas;
- Not angling or directing lighting above the horizontal, especially in the direction of the Observatory;
- Less variance in the types of exterior light where there are many peaks across the spectrum of visible light; and
- Increase community awareness / support of the Observatory and what they can share.

12.4 Risks

Risks of harm to the community facility at Sherwood Observatory and their future growth aspirations.

12.5 Proposed mitigation solution

Existing brightness does impact direct observation of the night sky. This has the potential to be exacerbated by new, closer lighting depending on the needs of the final installation. It is expected that there are a number of aging installations with variable light control and it would be beneficial for any new lighting to have improved performance in controlling how light is distributed from a fitting, as well as when that type of light is used. It is important to promote lighting without overlighting, this helps to both support darker skies, but may also have a positive impact by reducing energy in some cases.

The existing optical telescope and planned smaller telescopes for the planetarium are affected by existing lighting in the wider area, with current images recording the impairing effects from Mansfield at an approximate 2 -3 mile distance to the north both for observation using the human eye and photographic filtration.

Site 2 is much closer in relation to the existing Observatory and future Planetarium that control measures are advised for new lighting installed as part of new development.

Good design will need to be carefully considered within public realm areas or for statutory installations. It would also be worth exploring developing guidance for private lighting installations which would support the retention and increase of darker skies.

Strict full-cut-off lighting is recommended which limits or removes the distribution of light above the horizontal. It is likely that a cut-off further limited to below the horizontal, where possible, will prove to have an increased benefit in control of exterior lighting.

Light colour / spectral distribution plays a role in how effective image filtration will be. The greater the restriction to visible wavelengths, the more successful filtered photographs will be.

There have been successes in managing local brightness within the community by agreeing minimum lighting necessary within a certain distance of telescopes, where normal lighting used could ideally be dimmed or turned off to decrease overall levels of visible light. This could be especially useful for public open nights or classes.

A stronger community engagement process could also improve how people think about light as part of homes and businesses when purchasing or using it, and what they might be able to do to help maintain their own night-time amenity and relating with the night sky, as well to help the success of Sherwood Observatory.

12.6 Estimated abnormal costs for proposed mitigation

Strict full-cut-off lighting is recommended to mitigate the impact on Sherwood Observatory; however, the cost is not identified as an abnormal cost.

13. Site capacity

The initial estimated capacity for the site is identified as 994 dwellings (subject to further testing through this study). As a result of further assessment work, it has been possible to refine this estimate, taking into account identified constraints and opportunities from the previous chapters.

Figure 13.1 overleaf identifies spatially the constraints that affect the site and limit the amount of developable land. The gross developable area has been estimated using GIS software and then subject to further refinement to identify an indicative development capacity for the site, as outlined in **Table 13.1**. The calculation for both sites has applied a gross-to-net ratio of 60% (i.e. 60% is developable for residential use), and then a 35 dwelling per hectare multiplier on the net developable area to calculate overall capacity.

Table 13.1: Site 1 developable area and capacity schedule

Site / parcel	Site Size (ha)	Net Developable Area (60% gross-to-net)	Dwellings (35 dph)
Site 2 total	47.32	28.392	994

The constraints that have been taken into account in arriving at the developable area and site capacity for Site 2 are as follows:

- Avoiding harming the setting of the Hamilton Hill Scheduled Monument to the north west of the site, as evidenced and objected to by Historic England. This requires avoiding development north of Cauldwell Road where there are open views of Hamilton Hill and utilising the screening vegetation along Cauldwell Road to limit intervisibility with the site further to the south.
- Unsuitable landscape areas are identified by AECOM landscape specialists by virtue of the potential harm to landscape character, a lack of containment and creating perceptions of sprawl.
- A buffer zone from the consented quarry to the south east (also avoiding part of the Minerals Safeguarding Area and Minerals Consultation Area)
- Avoiding disturbance of the historic landfill at Sutton Quarry within the west of the site.

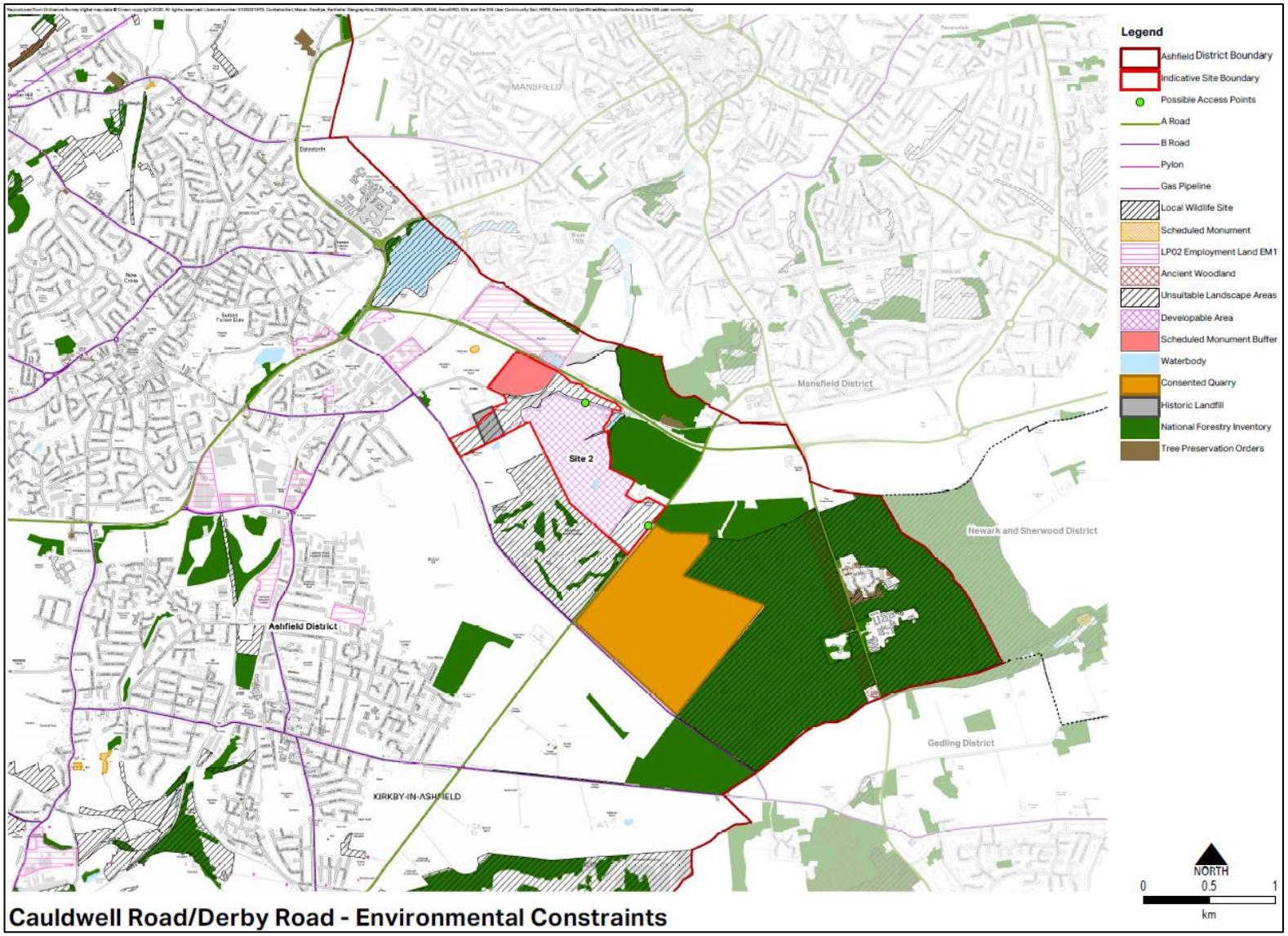

Figure 13.1: Site 2 Constraints and developable area map

14. Delivery and implementation

Based on the preceding capacity assessment there is approximately 28 hectares net developable area (the revenue-earning proportion of the site i.e. land developed for housing or commercial buildings). This is based upon a gross site area of approximately 47 hectares. The viability modelling builds in a 60:40 net to gross ratio, meaning at least 40% of the site would be required for formal and informal open space, sustainable urban drainage systems, community facilities and strategic on site infrastructure etc. Applying a density of between 35 to 40 dwellings per hectare would generate approximately 1,000 new dwellings (see **Table 14.1**).

Table 14.1: Site 2 capacity assumptions

		Gross	Net	Units
Site 2	Cauldwell/ Derby Rd	47.32	28.40	994

14.1 Land ownership constraints

The PPG requires all sites to be assessed for their availability. This should consider whether there are legal or ownership impediments to development e.g. unresolved multiple ownerships, ransom strips tenancies or operational requirements of landowners, which may affect the availability of the site. There are no ransom strips affecting site 2 with the main access points expected to be delivered in the north and south of the site. However, land to the west of the site area (NT313981) would be required for a western access.

Figure 14.1 (overleaf) shows the landownership boundaries alongside the sites submitted to Ashfield District Council through the preparation of the Strategic Housing and Economic Land Availability Assessment. Site 2 includes one large landowner which may assist with site assembly.

Table 14.2 (Site 2 land ownership schedule) summarises the main information held in the Land Registry title deeds for each parcel of land. This reveals that a number of the sites include rights over neighbouring land and/or restrictive covenants. These factors would need to be explored in consultation with the landowners should the land be taken forward as a housing allocation and is required for the delivery of strategic infrastructure (such as access or on-site reinforcements).

Figure 14.1: Site 2 land availability

Table 14.2: Site 2 land ownership schedule

Title No	SHELAA Call for Sites Ref	Owner	Price Paid £	Freehold/ Leasehold	Mortgage – Yes/No	Public Rights of Way	Rights over adjoining land e.g. easements	General boundary information issues	Deliverability issues e.g. ransom strips, protective covenants, numerous landowners etc.
NT72903	N/A	Individual(s) A	288,000	Freehold	No	No	No	No	No
NT74093	SA075	Midland Land Reclamation Limited	Unknown	Freehold	No	No	Yes – access to the site is allowed from Cauldwell Road	Yes- the boundary of this register does not match the boundary for this land submitted in the SHELAA.	No
NT196720	SA076	Campfield Farms Limited	1,291,490	Freehold	Yes	No	Yes – access to the site is allowed from Cauldwell Road from the land adjacent to Cauldwell Dam.	No	Restriction on the disposition of the estate without agreement from The Agricultural Mortgage Corporation PLC (and Barclays Bank PLC or their conveyancer that the provisions of para 8 schedule 1 of an Agreement dated 28 April 2017 made between 1) Sherwood Developments Limited 2) Ballco Limited and 3) Campfield Farms Limited have been complied with.
NT531742	SA076	Campfield Farms Limited	383,239	Freehold	Yes	No	No, the conveyance does not include any right of way or easement for the benefit of the land conveyed or any part of land retained by the vendor.	No	Restriction on the disposition of the estate without agreement from The Agricultural Mortgage Corporation PLC and Barclays Bank PLC or their conveyancer that the provisions of para 8 schedule 2 of an Agreement dated 28 April 2017 made between 1) Sherwood Developments Limited 2) Ballco Limited and 3) Campfield Farms Limited have been complied with.
NT313981	N/A	Individual(s) B	Unknown	Freehold	No	No	Yes – easements agreements with adjoining land.	No	No

14.2 Viability assessment

The table of results (overleaf) includes several appraisals for the site that show the residual land value per hectare (Ha) with varied levels of affordable housing (0% to 30%) and developer contributions (£0/unit to £40,000/unit). The residual land value is the (residual) sum of money available for the purchase of land, it is calculated by taking the total value of the completed development minus the total costs of development (including the developer's profit, construction costs, fees, interest etc.)

The Existing Use Value of site 2 is assumed to be £25,000/Ha (agricultural land value)[31]. The EUV 'plus' approach propounded by the PPG requires viability appraisals to build in a return to the landowner that would incentivise them to release their land for development. In this study we have assumed £250,000/ha as the 'plus' above the EUV (benchmark land value or threshold land value). The residual land value must equal or exceed the EUV 'plus' (£275,000/Ha) in order for the site to be considered viable. The EUV 'plus' assumed in the appraisal is low in comparison to the previous Whole Plan & Community Infrastructure Levy Viability Assessment (July 2016) which assumed £790,407 per Ha. New settlements require more upfront strategic infrastructure investment than a typical brownfield strategic or large site and this has been reflected in the assumptions of the appraisal.

The remediation and off-site services are treated as abnormal costs and the transport and social infrastructure costs as s106 costs. On this basis, the abnormal costs are estimated to be within a range of £7,500 - 10,000 per unit on each site (based on AECOM cost management specialist estimates)[32]. A summary of the abnormal costs and s106 assumptions are set out below.[33]

Table 14.3 Site 2 Abnormal costs and s106 assumptions

Site 2. Cauldwell Road/Derby Road

Abnormal Costs			
	Remediation	£2,613,490	
	Off-site services	£4,946,150	£7,559,640
S106			
	Transport	£9,005,700	
	Social Infrastructure	£16,738,511	£25,744,211
Total			£33,303,851
	£/unit		£33,505

The market survey revealed low house values in the study area compared to the wider region. The average values for new homes in Ashfield ranged from ~£2,200/m^2 - £2,300/m^2 (see Appendix D). An assumption of £2,300/m^2 is applied in the appraisals. Construction costs have been based on the Building Cost Information Service administered by the Royal Institution of Chartered Surveyors (RICS). The BCIS lower quartile and median costs for housing in Ashfield in July 2020 were used in the appraisals[34]. Dependent on the mix, the approximate costs were £1,266/m^2.

The housing mix has been informed by the 2015 Strategic Housing Market Assessment. The recommended mix has been altered to reduce 1 bed flats in the affordable sector and increase the numbers of larger market units.

[31] See – Appendix D, Viability Appraisal, paragraph 5.8 & Land value estimates for policy appraisal (MHCLG, 2019). Accessed at: https://www.gov.uk/government/publications/land-value-estimates-for-policy-appraisal-2019
[32] All cost and value estimates are based on the best available information at the time the report was written. A range is provided reflecting that these figures are changeable and will be subject to more detailed investigations if the sites are taken forward as allocations.
[33] Please note that the summary of mitigation costs set out in this detailed report has informed the viability appraisal assumptions. However, the costs detailed in this report have not been inputted directly into the modelling which was undertaken at a later date and after further engagement with stakeholders, ADC and AECOM masterplanners who provided inputs such as the net developable area that were subject to refinement throughout the preparation of this report.
[34] BCIS costs for flats, terraces, semi and detached are utilised to arrive at an average (see summary sheets in Appendix D).

Policy Requirements, with abnormals, varied developer contributions. BCIS median

	Aff %		EUV	BLV	Residual Value								
		Developer Contribution			£0	£5,000	£10,000	£15,000	£20,000	£25,000	£30,000	£35,000	£40,000
Site 2	0%	Cauldwell/ Derby Rd	25,000	275,000	45,003	-35,270	-120,584	-209,639	-309,091	-420,847	-532,602	-644,358	-756,114
Site 2	5%	Cauldwell/ Derby Rd	25,000	275,000	22,109	-59,964	-146,317	-237,534	-343,418	-455,173	-566,929	-678,685	-790,440
Site 2	10%	Cauldwell/ Derby Rd	25,000	275,000	-2,123	-86,144	-173,863	-268,464	-379,161	-490,917	-602,673	-714,428	-826,184
Site 2	15%	Cauldwell/ Derby Rd	25,000	275,000	-26,105	-111,157	-200,338	-301,673	-413,429	-525,184	-636,940	-748,696	-860,451
Site 2	20%	Cauldwell/ Derby Rd	25,000	275,000	-51,523	-137,892	-229,627	-337,154	-448,909	-560,665	-672,421	-784,176	-895,932
Site 2	25%	Cauldwell/ Derby Rd	25,000	275,000	-76,931	-164,639	-260,509	-371,981	-483,737	-595,492	-707,248	-819,004	-930,759
Site 2	30%	Cauldwell/ Derby Rd	25,000	275,000	-103,007	-192,533	-295,818	-407,573	-519,329	-631,085	-742,840	-854,596	-966,351

Policy Requirements, no abnormals, varied developer contributions. BCIS median

	Aff %		EUV	BLV	Residual Value								
		Developer Contribution			£0	£5,000	£10,000	£15,000	£20,000	£25,000	£30,000	£35,000	£40,000
Site 2	0%	Cauldwell/ Derby Rd	25,000	275,000	160,696	85,002	7,450	-75,943	-162,903	-255,141	-362,616	-474,372	-586,127
Site 2	5%	Cauldwell/ Derby Rd	25,000	275,000	138,543	62,849	-16,424	-100,998	-189,276	-285,580	-396,943	-508,698	-620,454
Site 2	10%	Cauldwell/ Derby Rd	25,000	275,000	115,397	39,040	-41,526	-127,177	-217,585	-320,931	-432,686	-544,442	-656,197
Site 2	15%	Cauldwell/ Derby Rd	25,000	275,000	93,281	16,184	-66,516	-153,457	-246,379	-355,198	-466,954	-578,709	-690,465
Site 2	20%	Cauldwell/ Derby Rd	25,000	275,000	70,258	-8,209	-92,556	-180,851	-278,923	-390,679	-502,434	-614,190	-725,946
Site 2	25%	Cauldwell/ Derby Rd	25,000	275,000	47,577	-32,569	-117,965	-208,625	-313,750	-425,506	-537,262	-649,017	-760,773
Site 2	30%	Cauldwell/ Derby Rd	25,000	275,000	23,746	-58,366	-145,340	-239,056	-349,343	-461,098	-572,854	-684,609	-796,365

Policy Requirements, with abnormals, varied developer contributions. BCIS lower quartile

	Aff %		EUV	BLV	Residual Value								
		Developer Contribution			£0	£5,000	£10,000	£15,000	£20,000	£25,000	£30,000	£35,000	£40,000
Site 2	0%	Cauldwell/ Derby Rd	25,000	275,000	307,751	234,293	160,007	84,313	6,736	-76,723	-163,719	-256,048	-363,633
Site 2	5%	Cauldwell/ Derby Rd	25,000	275,000	282,604	209,146	134,229	58,496	-21,112	-105,880	-194,388	-291,589	-403,311
Site 2	10%	Cauldwell/ Derby Rd	25,000	275,000	256,562	183,104	107,525	30,886	-50,412	-136,455	-227,402	-332,553	-444,308
Site 2	15%	Cauldwell/ Derby Rd	25,000	275,000	231,457	157,486	81,791	4,253	-79,520	-167,072	-261,502	-372,161	-483,917
Site 2	20%	Cauldwell/ Derby Rd	25,000	275,000	205,791	131,163	55,468	-24,284	-109,297	-198,660	-300,759	-412,515	-524,270
Site 2	25%	Cauldwell/ Derby Rd	25,000	275,000	180,186	104,916	28,340	-53,309	-139,909	-232,464	-341,168	-452,924	-564,680
Site 2	30%	Cauldwell/ Derby Rd	25,000	275,000	154,088	78,393	744	-83,311	-171,456	-270,126	-381,881	-493,637	-605,392

Policy Requirements, no abnormals, varied developer contributions. BCIS lower quartile

	Aff %		EUV	BLV	Residual Value								
		Developer Contribution			£0	£5,000	£10,000	£15,000	£20,000	£25,000	£30,000	£35,000	£40,000
Site 2	0%	Cauldwell/ Derby Rd	25,000	275,000	417,802	346,026	272,569	199,111	123,753	47,591	-32,554	-117,757	-206,678
Site 2	5%	Cauldwell/ Derby Rd	25,000	275,000	393,071	320,879	247,422	173,670	97,976	20,942	-61,239	-147,652	-238,939
Site 2	10%	Cauldwell/ Derby Rd	25,000	275,000	367,473	294,837	221,379	146,966	71,272	-7,215	-91,446	-179,414	-274,952
Site 2	15%	Cauldwell/ Derby Rd	25,000	275,000	342,785	269,733	196,275	121,232	45,137	-35,129	-120,554	-210,691	-313,931
Site 2	20%	Cauldwell/ Derby Rd	25,000	275,000	317,525	244,067	170,603	94,909	17,919	-64,655	-151,641	-244,898	-354,284
Site 2	25%	Cauldwell/ Derby Rd	25,000	275,000	291,920	218,462	144,357	68,663	-9,886	-94,343	-182,868	-282,938	-394,693
Site 2	30%	Cauldwell/ Derby Rd	25,000	275,000	266,055	192,597	117,834	41,772	-38,670	-124,720	-216,152	-323,650	-435,406

GARDEN TOWN PRINCIPLES. Policy Requirements, no abnormals, varied developer contributions. BCIS lower quartile

	Aff %		EUV	BLV	Residual Value								
		Developer Contribution			£0	£5,000	£10,000	£15,000	£20,000	£25,000	£30,000	£35,000	£40,000
Site 2	0%	Cauldwell/ Derby Rd	25,000	275,000	567,113	495,463	423,812	351,742	278,284	204,827	129,353	53,276	-26,589
Site 2	5%	Cauldwell/ Derby Rd	25,000	275,000	538,187	466,537	394,887	322,308	248,851	174,861	99,167	22,065	-59,931
Site 2	10%	Cauldwell/ Derby Rd	25,000	275,000	508,507	436,856	365,206	292,094	218,636	143,867	68,173	-10,695	-94,992
Site 2	15%	Cauldwell/ Derby Rd	25,000	275,000	479,635	407,985	336,173	262,715	189,257	113,737	37,270	-43,399	-129,074
Site 2	20%	Cauldwell/ Derby Rd	25,000	275,000	450,498	378,848	306,505	233,047	158,994	83,300	5,793	-77,832	-165,166
Site 2	25%	Cauldwell/ Derby Rd	25,000	275,000	421,041	349,391	276,532	203,075	128,256	52,420	-27,487	-112,601	-201,981
Site 2	30%	Cauldwell/ Derby Rd	25,000	275,000	391,561	319,911	246,522	173,064	97,471	20,585	-61,752	-148,635	-241,696