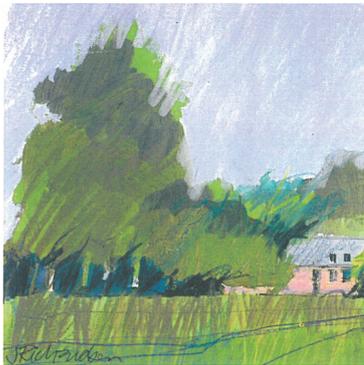


9

Traffic and Transport



Broadnook Garden Suburb

Environmental Statement

Traffic and Transport

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9.0 Traffic and Transport

9.1 Introduction

- 9.1.1 This chapter of the ES assesses the likely significant effects of the Project in terms of transport and incorporates the findings of the Transport Assessment (TA) and accompanying documents.
- 9.1.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the site and surroundings; the Project design measures required to prevent, reduce or offset any significant adverse effects and states the effects after these measures have been employed. The chapter has been prepared by Walker Engineering (LWL).
- 9.1.3 The proposed development is located to the north of the village of Birstall, approximately 2km from the Village Centre and 7km north of Leicester City Centre.
- 9.1.4 As described in Section 2 of the TA, the broad principles of development have been established by the recently adopted Charnwood Local Plan Core Strategy 2011-2028 and framed by the bespoke and prescriptive elements of Policy CS20. The proposals for Broadnook have been brought forward in accordance with this policy.
- 9.1.5 The Traffic & Transport section of the Planning Application comprises 7 documents in total, which have been summarized in this Chapter of the ES. Of these, 6 are provided with it as numbered Appendices, whilst the Non-Technical Summary (NTS) is provided as part of the overall NTS for the scheme. Information provided within each is intended to be complimentary and separate documents are intended to be read in conjunction with one another to establish the full transport picture. The ES Transport Chapter provides only an overview of the findings and reference should therefore be made to the individual reports for further detail. The 7 numbered Appendices are as follows, with the abbreviated title of each provided for reference:-

9.1	Transport Assessment	TA
9.2	Travel Plan	TP
9.3	Stage 1 Road Safety Audits	RSA's
9.4	Non-Motorised Users - Context Reports	NMU's (1)
9.5	Non-Motorised Users - Audit Reports	NMU's (2)
9.6	Junction Designs (A1 Plans)	Drawings
9.7	Phasing & Traffic Management	PTM

9.2 Assessment Methodology

The Transport Assessment (TA)

- 9.2.1 This Chapter describes the findings of the TA that has been undertaken to support the formal Planning Application for the Project. It in turn examined the relationship between the Project and the local transport network, the Project's effect on that network and the need to provide improvements to infrastructure and services to accommodate the proposed uses in a sustainable manner.
- 9.2.2 The TA includes an assessment of the proposed access arrangements and the wider highway network serving the site. It also assesses proposed improvements and states any likely significant adverse effects.
- 9.2.3 In addition to Charnwood Borough Council (CBC) who is the Planning Authority for the site, the Local Highway Authorities are Leicestershire County Council (LCC) and Leicester City Council (LCityC). Highways England (HE) has responsibility for the A46 Leicester Western Bypass (a Trunk Road) that flanks the site to the south and connects with the A6 at the Birstall Interchange to the immediate south-east. The TA for the Project seeks to meet the requirements of all four Authorities in so far as it affects the highways network in the surrounding area.

Quantification of Impacts

- 9.2.4 For the purposes of assessment five categories of impact have been used, comprising; None; Negligible; Slight; Moderate and Major. Where impacts are recorded as being Slight, Moderate or Major and cause an increase in existing congestion, journey times or exacerbate existing safety problems, then the individual impact is described as an Adverse one. Where they relieve, then the impact would be termed Beneficial. Negligible impacts cannot be perceived by the road user and hence are neither Adverse nor Beneficial (see below).
- 9.2.5 An immeasurable change is described as zero change, resulting in no impact (None). In the absence of National Guidance, a Negligible change has been viewed as one resulting in a less than 5% deterioration or improvement in existing driving conditions which would be unlikely to be perceived by the road user. A Slight change would generally be one involving a measurable change of between 5% and 10% in either congestion, queuing or journey times along a particular route or through a given junction, whilst a Moderate change would be one involving a noticeable deterioration or improvement of over 10%. A Major change would involve a step-change in a driver's perception of a route or journey, generally suggesting at least a 20% improvement or deterioration in queuing, delay, speed of travel or safety prospects.

9.3 Planning Policy Context

Planning Context

- 9.3.1 The development site itself is not subject to any extant Planning Consents of significance in terms of traffic generation. On this basis, the TA does not take account of any existing land uses at the site.
- 9.3.2 There are several proposed or incomplete development schemes with Planning Consent in the vicinity of the site, whose traffic effects need to be taken into account. In addition, other major developments that are currently the subject of Planning Applications, but are not yet committed, have been considered. All of these schemes are assessed in detail in the TA.

Relevant Planning Policies

National Planning Policy Framework (NPPF or “The Framework”)

- 9.3.3 The Government’s planning policies for England are set out in the NPPF (published in March 2012) which explains how they are expected to be applied in order to achieve sustainable development.
- 9.3.4 At Para 14 the Framework emphasises:-
- “At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development which should be seen as a golden thread running through both plan-making and decision-taking...
- For decision-taking this means:-
- “approving development proposals that accord with the development plan without delay... “
- 9.3.5 At para 17 the Framework establishes a set of Core Planning Principles which “underpin both plan-making and decision-taking”. One of the 12 principles is to:-
- “actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling and focus significant development in locations which are or can be made sustainable”.
- 9.3.6 Section 4 of the Framework deals with “Promoting Sustainable Transport”. It encourages solutions that support a pattern of development which facilitates transport choice and sustainable modes. The Borough Council has heeded this advice in preparing the new Charnwood Local Plan.

9.3.7 Paragraph 32 of the Framework states:-

“All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment Plans and decisions should take account of whether:-

- the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- safe and suitable access to the site can be achieved for all people; and
- improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impact of development are severe”.

9.3.8 Paragraphs 34-36 expand the advice as follows:-

“Plans and decisions should ensure developments that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised...

Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods and people. Therefore, developments should be located and designed where practical to:-

- accommodate the efficient delivery of goods and supplies;
- give priority to pedestrian and cycle movements;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;
- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of people with disabilities by all modes of transport.

A key tool to facilitate this will be a Travel Plan. All developments which generate significant amounts of movement should be required to provide a Travel Plan”

- 9.3.9 In applying the Principles the Framework emphasises that a key consideration is the careful attention to the mix and integration of land uses:-
37. Planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities
 38. For larger scale residential development in particular, planning policies should promote a mix of uses in order to provide opportunities to undertake day-to-day activities including work on site. Where practical, particularly within large-scale developments, key facilities such as primary schools and local shops should be located within walking distance of most properties.
- 9.3.10 As explained further below the Borough Council has progressed its Local Plan Core Strategy with this advice very much at the centre of its considerations. The application proposals correspondingly are based on the adopted Local Plan policies and provisions, namely:-
- an integrated mixture of uses with key facilities at their heart;
 - excellent bus service provision providing high quality connections with local as well as higher-order services and facilities;
 - a comprehensive network of pedestrian and cyclist routes serving a walkable Broadnook neighbourhood and significantly improving the public rights-of-way network overall;
 - a highway strategy to ensure safe access to the site without causing delay to A6 users or diversion of traffic on to alternative less suitable routes.

Department for Transport Circular 02/2013

The Strategic Road Network and the Delivery of Sustainable Development

- 9.3.11 Highways England (HE) is responsible for operating, maintaining and improving the Strategic Road Network (SRN) in England on behalf of the Secretary of State for Transport. This Circular sets out the way in which HE will engage with communities and the development industry to deliver sustainable development and, thus, economic growth whilst safeguarding the primary function and purpose of the SRN. It is currently under review but HE has advised that it should be used in the interim in connection with the assessment of the application proposal.
- 9.3.12 The Circular records the same priorities and principles for SRN as the NPPF does on a general basis. For example, in relation to plan-making the pattern and location of development should encourage the minimisation of trip generation and the use of sustainable modes of transport, whilst not compromising the fulfilment of the Primary Purpose of the SRN.

9.3.13 At paragraph 9 the Circular states:-

“Development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction) of the strategic road network, or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed. However, development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe”.

9.3.14 With respect to decision-making the Circular advises (Para 21) that:-

“Where development proposals are consistent with an adopted Local Plan, the Highways Agency (HA) does not anticipate the need for engagement in a full assessment process at the planning application stage. In such circumstances consideration will normally be limited to the agreement of the details of the transport solution, including any necessary mitigation measures, and to ensuring that the transport impacts are included in the overall environmental assessment provided to the local planning authority, rather than the principle of the development itself”

9.3.15 In assessing development impact the Circular further advises that:-

The overall forecast demand should be compared to the ability of the existing network to accommodate traffic over a period of up to ten years after the date of registration of a planning application or the end of the relevant Local Plan period whichever is the greater;

HE expects promoters of development to put forward initiatives that manage down the traffic impact of proposals to support the promotion of sustainable transport and the development of accessible sites – which is particularly necessary where the potential impact is on sections of the strategic road network that could experience capacity problems in the short or medium term, and;

Where the overall forecast demand at the time of opening of the development can be accommodated by the existing infrastructure, further capacity will not be appropriate.

The 6C's Design Guide

- 9.3.16 The 6C's Design Guide advises on all aspects of highways and transportation infrastructure for new development proposals throughout the six areas where the following Highways Authorities operate:-
- Leicestershire County Council
 - Leicester City Council
 - Nottinghamshire County Council
 - Nottingham City Council
 - Derbyshire County Council
 - Derby City Council
- 9.3.17 The document provides guidance on preparing and considering proposals; the relevant context for preparing a Transport Assessment, Transport Statement or Travel Plan; and sets out design requirements to assist developers in bringing forward design layouts that provide for safe and free movement of all road users. The document also contains standards for parking within the six areas.
- 9.3.18 The Masterplan and Transport Assessment for the proposed Broadnook Garden Suburb have been brought forward mindful of and in line with the 6C's Design Guide.
- Local Transport Plan 2011-2026 (LTP3)
- 9.3.19 The third Local Transport Plan (LTP3) for the County of Leicestershire covers the period up to 2026 and was adopted by Leicestershire County Council on 1 April 2011. It sets out the vision and policy context for the transport system in Leicestershire to 2026 and provides a framework for how the County Council will manage and develop Leicestershire's transport system in the future.
- 9.3.20 The long term vision for the transport system in Leicestershire is for:-
- “Leicestershire to be recognised as a place that has, with the help of its residents and businesses, a first class transport system that enables economic and social travel in ways that improve people's health, safety and prosperity, as well as their environment and their quality of life”.

9.3.21 LTP3 has six “Strategic Goals” with corresponding “Strategic Outcomes” which will determine the success of the strategy. They are:-

Leicestershire County Council LTP3 Goals, Activities and Outcomes

Our strategic transport goals	Our LTP3 activities	Our strategic transport outcomes
Goal 1 A transport system that supports a prosperous economy and provides successfully for population growth	Supporting the economy and population growth	Our transport system provides more consistent, predictable and reliable journey times for the movement of people and goods <i>(All residents have efficient, easy and affordable access to key services (such as employment, education, health care and food shopping), particularly by public transport, bike and on foot)</i>
Goal 2 An efficient, resilient and sustainable transport system that is well managed and maintained	Managing the condition and resilience of our transport system	Our transport system and its assets are effectively managed and well maintained Our transport system is resilient to the impacts of climate change
Goal 3 A transport system that helps to reduce the carbon footprint of Leicestershire	Encouraging active and sustainable travel	The negative impact of our transport system on the environment and individuals is reduced More people walk, cycle and use public transport as part of their daily journeys
Goal 4 An accessible and integrated transport system that helps promote equality of opportunity for all our residents	Improving the connectivity and accessibility of our transport system Encouraging active and sustainable travel	All residents have efficient, easy and affordable access to key services (such as employment, education, health care and food shopping), particularly by public transport, bike and on foot
Goal 5 A transport system that improves the safety, health and security of our residents	Improving road safety Encouraging active and sustainable travel	The number of road casualties is reduced <i>(More people walk, cycle and use public transport as part of their daily journeys)</i>
Goal 6 A transport system that helps to improve the quality of life for our residents and makes Leicestershire a more attractive place to live, work and visit	Managing the impact of our transport system on quality of life	There is improved satisfaction with the transport system amongst both users and residents The natural environment can be accessed easily and efficiently, particularly by bike or on foot <i>(The negative impact of our transport system on the environment and individuals is reduced)</i>

9.3.22 Clearly LTP3 seeks to deliver new development in locations and where site proposals provide opportunities to minimise travel distances and genuine and high quality choices are available for people to walk, cycle and use public transport. These priorities have been a key influence in defining the development strategy which forms the basis of Charnwood’s recently adopted Local Plan Core Strategy 2011-2028. They are also appropriate and readily achievable priorities for the Broadnook Garden Suburb proposal.

Charnwood Local Plan 2011-2018 Core Strategy

9.3.23 The Core Strategy for Charnwood was adopted by the Borough Council on 9 November 2015 and sets out to deliver high levels of new housing and employment provision. The development strategy is based on urban concentration with the priority location for growth being the Leicester Principal Urban Area. Around 40% of the Borough's housing growth is concentrated here in two sustainable urban extensions – North East of Leicester and North of Birstall (the application site).

9.3.24 In endorsing the Borough Council's strategy the Local Plan's Examining Inspector was very clear in terms of transportation advantages. In his final report he states:-

“There are convincing arguments in favour of large planned extensions to the urban areas. Compared with a more dispersed approach involving a number of smaller extensions to the urban areas and Service Centres, they provide better opportunities for the co-ordinated delivery of social and community infrastructure. A larger scale development gives scope for employment and retail provision within the site itself. It is likely to be more self-contained in terms of travel patterns, assist in the provision of public transport and promote its use”.

9.3.25 The adopted Core Strategy takes up these advantages and the ability to deliver, inter alia, LTP3 outcomes:-

“Sustainable urban extensions are planned extensions to the existing urban areas which are large enough developments to support new businesses, schools, shops, health care facilities, open space and leisure facilities. This gives the people who live in them the opportunity to meet their daily needs without needing to make journeys by car”. (4.25)

9.3.26 The Core Strategy also emphasises that the North of Birstall location on the edge of the Principal Urban Area:-

“... has the potential to deliver a development that reflects the garden suburb principles underpinning the original concept behind Rothley Ridgeway just north of the site along the Great Central Railway. This location is well connected to the City with high frequency bus links, an existing Park and Ride and a national cycle route. It also provides an attractive location for both new homes and businesses which will support housing delivery and bring investment into our Borough. This location is also able to accommodate a sustainable urban extension which meets the day-to-day needs of its community with a good range of jobs, services and facilities”. (4.38)

- 9.3.27 Leicestershire County Council (LCC) has endorsed the emphasis on sustainable urban extensions in accommodating planned growth. In its formal supporting response to the Core Strategy process LCC stated:-

“Duty to Co-operate:-

The Highway Authority welcomes the close involvement that it has had with Charnwood Borough Council in the development of its strategy, the transportation evidence base that underpins it and the identification of infrastructure requirements.

Housing and Employment Distribution:-

The County Highway’s view is that the approach to the housing and employment distribution adopted in the submission Core Strategy is the most appropriate in the circumstances.

- 9.3.28 The concentration of the bulk of the Borough’s provision either on the edge of the Principal Urban Area (PUA) or of Loughborough and Shepshed provides the greatest opportunities to reduce the need to travel and/or to access facilities other than by car. Further, concentrating development in Sustainable Urban Extensions provides greater opportunities to secure the necessary scale of transport (and other) infrastructure required to mitigate the impacts of growth as compared to a more scattered distribution of development”
- 9.3.29 The adopted Core Strategy, at Chapter 8 “Access and Travel” establishes the generic policy approach to the priorities of providing transport choice and maximising walking, cycling and public transport “especially for shorter trips to work and school”.
- 9.3.30 Policies CS17 & 18 define the Borough Council’s position:-

Policy CS17 – Sustainable Travel

“By 2028, we will seek to achieve a 6% shift from travel by private car to walking, cycling and public transport by:-

Requiring new major developments to provide walking, cycling and public transport access to key facilities and services;

Requiring new major developments to provide safe and well-lit streets and routes for walking and cycling that are integrated with the wider green infrastructure network;

Securing new and enhanced bus services from major developments and new bus stops where new development is more than 400 metres walk from an existing bus stop;

Securing contributions from our sustainable urban extensions towards improvements to public transport corridors into Leicester City and Loughborough in accordance with Policy CS19, CS20 and CS22; and

Working with our partners to maximise opportunities for freight movement by rail.

We will do this by:-

Assessing the impact of major developments through Transport Assessments and Travel Plans; and

Working with our partners, including Leicestershire County Council and Leicester City Council, to secure funding for and delivery of sustainable transport improvements”.

Policy CS18 – The Local and Strategic Road Network

“We will maximise the efficiency of the local and strategic network by 2028. We will do this by:-

Delivering sustainable travel improvements in accordance with Policy CS19;

Requiring our strategic developments to deliver an appropriate and comprehensive package of transport improvements in accordance with Policies CS19, CS20, CS21, CS22 and CS23; and

Requiring other network improvements as identified by appropriate Transport Assessments”.

9.3.31 Chapter 9 of the Core Strategy sets out the Borough Council’s perspective on South Charnwood’s Edge of Leicester:-

“The southern part of Charnwood sits on the edge of Leicester and forms an integral part of the way the City functions and grows. The villages and towns on the edge of Leicester, including Birstall and Thurmaston, play a significant role in Leicester’s economy. The people that live in these communities very often work in the city and also benefit from good access to, and support, the city’s shops, services and leisure facilities...

Our priority location for growth is within and adjoining the Leicester Principal Urban Area. We will provide for the majority of this growth in two sustainable urban extensions, providing homes and jobs with facilities and services, and an employment-focused Regeneration Corridor”

9.3.32 The prescribed location for the North of Birstall Direction of Growth is defined as:-

“... adjacent to the Leicester Principal Urban Area at Birstall. This sustainable urban extension will be to the north of the A46, west of the A6, east of the Great Central Railway and to the south and west of the Broadnook Spinney - an area which “benefits from excellent connections with the City”.

9.3.33 The Core Strategy's "Vision" for the proposal is to create a new garden suburb based on earlier Charnwood heritage associated with the Great Central Railway. Moreover:-

"It will have been comprehensively planned to offer an excellent quality of life for its community. The range of homes, jobs, community facilities and shops will meet the day-to-day needs of the people who live there. Community uses will provide a focus of civic pride".

9.3.34 In turn this comprehensively planned proposal is expected to (Core Strategy Paras 9.46 – 9.57):-

on homes;

"... make a significant contribution to meeting the housing needs by delivering approximately 1,345 homes by 2028 and the remaining homes beyond the plan period".

for jobs;

"... include employment development so that people living within the development and nearby have the opportunity to live close to work as part of our plans to reduce commuting..."

We expect the sustainable urban extension to meet the employment needs of the new community in accordance with garden suburb principles. However given the area's excellent connections and relationship with Leicester City there is also an opportunity for new jobs that contribute to our wider employment requirements... In total this direction of growth may deliver up to 15 hectares of general employment land as part of this sustainable extension.

We expect an appropriate mix of business uses, reflecting the needs of the local economy and maximising the opportunity to work locally. We want to ensure provision for new and developing business".

in terms of shops and facilities;

"... benefit from access to a wide range of services and facilities including school, shops, new or expanded health facilities and community facilities such as a place of worship and a community centre. We expect new facilities to be delivered as part of the centre within the development. This will reduce the need to travel for the people who live in the new homes..."

on access and travel;

“we want the sustainable urban extension to connect new residents to employment, schools, shops, leisure facilities, open spaces and other community facilities both within the development and beyond. Whilst the sustainable urban extension will include a range of uses to meet day-to-day needs, it will also enjoy good connections with the City Centre, Watermead Regeneration Corridor, Charnwood Forest, Loughborough and Birstall District Centre where additional services and facilities are available.

We will expect the development to make the most of opportunities for high quality walking and cycling routes and high frequency bus services. We want the new development to be accessible and connect the community to services and facilities, National Cycle Route 6 and the Park and Ride facility in Birstall.

Whilst we will maximise the opportunities to walk and cycle there will still be a need for new roads to service the new development, provide links to the wider road network, support high frequency bus services and to avoid adverse impacts on neighbouring communities.

This sustainable urban extension will be next to the A6 and A46 which are the main transport corridors connecting Leicester to Loughborough and the area to the M1 Motorway. We will work with our partners to understand the impact of more detailed development proposals on these corridors, the A46/A6 interchange and the wider network and develop a package of transport measures to support the development”.

9.3.35 Location-specific Core Strategy Policy CS20 therefore establishes the framework for the overall proposal and, with specific respect to “Transport” includes a section which reads:-

“The sustainable urban extension will create a balanced community and a safe, high quality and accessible environment. We will do this by...

Transport:-

Requiring well connected street patterns and walkable neighbourhoods that provide high quality, safe and direct walking, cycling and public transport routes in accordance with Policy CS17;

Requiring a comprehensive package of transport improvements in accordance with Policies CS17 and CS18 and including;

new and improved cycling and walking routes, well related to the green infrastructure network, connecting to existing and new employment areas and centres, the Birstall Park and Ride, Watermead Country Park and Charnwood Forest;

bus service enhancements connecting the new community with local employment opportunities and Birstall, Leicester City Centre and Loughborough, as identified through a Transport Assessment;

a new roundabout on the A6, north of the A46 interchange;

appropriate access arrangements including a connection to the A6 and Rothley;

appropriate capacity improvements at the A46 interchange; and

other network improvements as identified by an appropriate Transport Assessment.

9.3.36 The Broadnook Garden Suburb proposals have been formulated firmly on the basis of the above Core Strategy policies and principles and, in turn, the traffic modelling work undertaken in support of this Transport Assessment addresses the policy-compliant proposals.

9.3.37 The Broadnook site is well-located and close to existing sustainable transport infrastructure which can be utilised and enhanced to achieve policy imperatives and objectives. An independent Examination has confirmed the credentials of the proposals which accord well with all national and local transport policy priorities.

9.4 Baseline Conditions

Vehicular Traffic

9.4.1 Observations of existing traffic conditions on all parts of the local highway network were made over an extended period between July 2013 and February 2015. These observations encompassed the morning and evening peak periods, as well as various off-peak times. Additionally, Automatic Traffic Counters (ATC's) and Automatic Number-plate Recognition (ANPR) cameras were deployed at a number of locations to allow daily variations in traffic flows to be established; provide routing data and also provide 24 hour data for Noise and Air Quality work. Full details of the counts undertaken are available on request from LWL.

9.4.2 The observations in total suggested that at that time, the network within the area of interest defined in the TA operated mostly within capacity during weekday peak periods, with limited peak hour queuing at the A46/A6 Birstall Interchange being the only noted issue.

Pedestrian Routes

9.4.3 Extracts from the Definitive Map of Public Rights-of-Way are incorporated into Figure 4 of the TA. They show the footpaths and bridleways both in the immediate vicinity of the site as well as the wider context. There are no existing substantive Public Rights-of-Way on the Broadnook site to the west of A6 north of A46.

9.4.4 To the West and South:-

Public Footpath J54 passes the eastern edge of Thurcaston village and travels in a south-easterly direction to the Great Central Railway Underbridge towards the south-western corner of the garden suburb site. Here it flanks a gas governor facility before providing an east-west route parallel to the A46 trunk road and within highway land. J54 terminates at the A46/A6 Birstall Interchange.

9.4.5 To the North:-

Public Footpath J55 emerges from Rothley village travelling south through new housing development and adjacent a new primary school. J55 terminates at the 'Old' Loughborough Road and eastbound connections at this point are denied by the high speed A6 Dual Carriageway.

Bridleway J59 connects Town Green Street Rothley with Leicester Road Thurcaston at its junction with Rectory Lane. Travelling east to west it passes through or adjoins Rothley Park Golf Club before crossing the Great Central Railway (GCR) towards Thurcaston. Further to the north Footpath J57 also links Rothley to Thurcaston via an attractive route across Rothley Park and in this case under the GCR.

9.4.6 To the East:-

Bridleway J100 follows the route of a pleasant former lane between Wanlip and Rothley villages and adjoins the western boundary of the Wanlip treatment works. The Bridleway is truncated at the point it reaches the A6 Dual Carriageway and passage beyond that point in the Rothley direction is not feasible. At this location J100 meets Footpath J53 which follows a route eastwards to the River Soar adjacent to the landmark Wanlip wind turbine and northwards to Cossington Lane Rothley where routes across the wider Public Rights-of-Way network are accessible.

Cycle Routes

9.4.7 In similar fashion to pedestrian facilities and the footpath/bridleway network, the North of Birstall location is well-placed to take advantage of an established hierarchy of cycle routes as well as providing some desirable and attractive new connections and links.

9.4.8 The existing network is shown on Figure 5 of the TA; an extract from Leicestershire County Council's Cycling Map showing that:-

National Cycle Network (Sustrans) Route 6 is the strategic Charnwood route linking Loughborough and Shepshed with Birstall and into Leicester via the key settlements of Quorn, Mountsorrel and Rothley. It utilises the bypassed "old" A6 for the majority of its route.

To the east of A6 the County Council has introduced "Route 1", a "Green Route" from Cossington and Syston into Watermead Park. This route extends into the City Centre alongside the River Soar Corridor, via Abbey Park and in conjunction with National Cycle Network 6.

To the west of the Great Central Railway there are a number of cycling leisure routes, lanes and off-road tracks throughout Charnwood Forest and within north Leicester and the Country Parks at Bradgate and Beacon Hill are well within striking distance of Broadnook.

- 9.4.9 Figure 5 also shows generalised cycling isochrones of 1km, 2km and 5km from the centre of the Broadnook scheme – indicating graded cycling times of up to about 16 minutes based on an assumed speed of 12mph or 19kph (in line with the recommended cycling speed identified by the 6Cs Design Guide). As shown the 5km isochrone incorporates a large locally accessible area – Birstall, Rothley, Mountsorrel, Syston, Thurmaston and Beaumont Leys are all within easy cycling distance – and therefore so are a wide range of services, facilities and employment opportunities.
- 9.4.10 The Broadnook community can thus be readily linked in to this network of existing routes which will, in turn, enhance the provision and potential for existing residents in south Charnwood too.

Highway Safety Considerations

- 9.4.11 A full assessment of the road network surrounding the site has been undertaken as part of the TA, including a review of accident data for the last five years of operation. The review did not identify any locations where development traffic could exacerbate existing traffic safety issues, subject to implementation of the transport improvements described in the TA. Highways safety has thus not been considered further.

Public Transport – Buses

- 9.4.12 The Broadnook site lies adjacent to the pre-eminent transport choice corridor in Leicestershire. The Leicester-Loughborough Corridor (and its extension northwards to East Midlands Airport, Coalville and Derby) joins the County's two major settlements and is served by high quality and high frequency bus services. The application site is also reasonably close to the Birstall Park and Ride and existing Service 22A and 22B which currently terminates in north Birstall and to the south of the A46.

9.4.13 Figure 3 of the TA shows the existing services which pass the site, which include:-

Table 1: Local Bus Services

Operator	Service and Key Destinations	Monday to Saturday Frequency		Sunday Frequency
		Daytime	Evening	Daytime
Kinchbus	Service 2 Leicester via Birstall Barrow upon Soar Loughborough	30 minutes	60 minutes	60 minutes
Arriva Midlands	Service 126/127 Leicester Loughborough Shepshed & Coalville	10 – 15 minutes	30 minutes	30 minutes
Kinchbus	Skylink Leicester Loughborough EM Airport	30 minutes	60 minutes	30 minutes
Paul S Winson	Service X27E Leicester Birstall Loughborough	Twice		

9.4.14 Clearly there is excellent potential for bus service provision to serve Broadnook. The existing services however require alteration (since currently they are too far away from the majority of the site) which is discussed later in this Chapter.

Existing Rail Services

9.4.15 Figure 3 also shows the relationship of the site to the Midland Main Line – which in the Leicestershire context links Loughborough to Leicester with intermediate Stations at Barrow-upon-Soar, Sileby and Syston. Syston is slightly nearer to Broadnook than Leicester but serves significantly fewer destinations and is not connected via the proposed bus routes which have a north-south orientation.

9.4.16 Leicester Station is directly connected with Broadnook by frequent bus services and is also within 20 minutes easy cycle time (8km) using established cycle routes. All trains stop at Leicester which provides excellent local as well as strategic services all over the country. For example there is a good service to and from Nottingham at least every 20 minutes at peak times (see Appendix B of the Broadnook Travel Plan) together with direct, fast and frequent trains to London and other cities/towns outside the region.

- 9.4.17 Leicester Station offers very good commuter facilities which have been upgraded in recent years. The Station is currently managed by East Midlands Trains and benefits from car parking, waiting rooms, platform seating, waiting and services. This high level set of train services and facilities will deliver a viable alternative to the private car for those residents and employees at Broadnook wishing to travel to and from e.g. Nottingham, Lincoln, Sheffield, Birmingham, Luton and London.

Committed Highway Improvements

- 9.4.18 There are no known significant highways improvements within the vicinity of the site that can be regarded as committed.

9.5 Scheme for Assessment

General

- 9.5.1 The Project will provide improved public transport, pedestrian and cycle provisions to encourage non-car based modes of transport. Road improvements are also proposed in order to minimise the effects of the Project upon the surrounding highway network. Car usage, which currently accounts for 81% of all movements locally, is likely to reduce as a result, as described in The Broadnook Travel Plan (TP). The TA has, however been based on a higher 90% figure, at the request of LCC. Reference is made to a lower 75% value in the TP, as an aspirational target.
- 9.5.2 To encourage greater use of sustainable modes of transport and lessen the negative effects from the private car on the highway network, in accordance with the national and local transport policies identified previously, a package of measures has been identified. The package of measures proposed is summarised below and includes the components listed; more details of which can be found in the referenced report:-
- New Public Transport Measures (TP)
 - Improved Pedestrian Facilities (TP)
 - Improved Cycling Facilities (TP)
 - Internalisation of Trips (TP)
 - Road Junction Improvements (TA & Drawings)
 - A Travel Plan (TP)
- 9.5.3 The measures identified will provide a comprehensive package of alternatives to the private car capable of accommodating up to 25% of the site's transport needs.

Public Transport

- 9.5.4 The Project involves improvement and augmentation of the existing public transport provisions for routes between the site and particularly Leicester City to enable them to cater for at least 5% of development commuter traffic. To help stimulate the use of public transport and other sustainable modes, Broadnook will provide new foot and cycleway linkages between the site and the extended network to the east and south from the outset.
- 9.5.5 In brief, the following bus-specific measures are proposed:-
- i) Diversion of the existing Route 126/127 Service through the site; and
 - ii) A new “Broadnook Shuttle”, based on an extended Route 22A/B Service.

Pedestrians and Cycling

- 9.5.6 The Project design maximises opportunities for journeys to be undertaken by foot or by cycle. In order to facilitate both walking and cycling, the proposed internal road network will be designed with equal priority for pedestrians, cyclist and vehicles, wherever possible, to deliver a 5% external modal split for Non-Motorised Users (NMU's). The internalisation of trips intended to account for a further 10%.
- 9.5.7 The existing Public Rights of Way and other informal routes close to the site would be accommodated within the Project proposals. Routes will be situated both within the new built areas and a linked Green Infrastructure framework of open space, which also includes a new landscaping. The retained network along with proposed additional routes will enhance opportunities for all non-vehicular modes of travel.
- 9.5.8 In addition to the above, the Project contains a number of specific initiatives to prioritise cycling and walking. These include:-
- A “Movement Parameter Plan” to ensure that the site will be fully permeable for cyclists and pedestrians. There will be direct and convenient connections between the key land uses and destinations and the “Central Walk” (an east/west pedestrian/cycle link) forms a key element of the site layout. It will provide and enhance strategic and local connectivity – Charnwood Forest destinations to the west with River Valley and Watermead Park to the east at the sub-area level; and ease of movement to Wanlip, Birstall and associated destinations such as Cedars Academy as local links.
 - A comprehensive network of pedestrian and cyclist routes within the site. Non-motorised users will be able to access the development via a dedicated footway/cycleway to be provided off the existing A46/A6 Birstall Interchange and from several other locations, including the new Site Access Roundabout and via the “Old” Loughborough Road. These will be augmented by the provision of the new primary route via the A6 using the new Underpass. Several connections towards the north and west of a more rural nature are also included in the scheme, as identified in The Broadnook Travel Plan. These include a new connection to the Great Central Railway, where a new Halt is proposed

- Community facilities will be included within the development as part of a walkable neighbourhood, including a new Primary School, Health Care Facilities, Local Shops and Services. These facilities will be within comfortable walking distance for residents and other site occupants, enabling many trips to remain wholly within the site and made by sustainable modes of travel.

15.5.9 In addition to the physical infrastructure identified above, information about safe cycle routes and the encouragement of employees to use cycles will be promoted by the Travel Plan Co-ordinator as part of the overall Broadnook Travel Plan.

Car-Share Initiative

9.5.10 Car sharing can be an effective means of reducing the number of cars driven to the work place and is particularly useful in doing so amongst shift workers. For this reason, it forms an important component of The Broadnook Travel Plan and is designed to cater for 5% of total commuter movements.

9.5.11 Specific measures to aid car sharing will include:-

- The establishment of a car-share club and database for the site;
- Joining of Leicestershire County Council's existing web-based car share initiative.

Site Access Strategy

9.5.12 The adopted Charnwood Local Plan Core Strategy process has concluded that access to the Broadnook Garden Suburb will be achieved by:-

- A new roundabout on the A6, north of the A46 interchange;
- Appropriate access arrangements including a connection to the A6 and Rothley;
- Appropriate capacity improvements at the A6/A46 Birstall Interchange.

9.5.13 These measures were established during the plan-making process and formed the basis of transport modelling carried out on behalf of Charnwood Borough Council in relation to its emerging Core Strategy options. The Borough Council has sustained its support for this set of measures through the later stages of the process and the Core Strategy's Independent Examination. The adopted policy provides clear site-specific guidance in this respect.

9.5.14 As explained in the TA, a key consideration throughout has been to ensure that the new A6 junction should not lead to unnecessary delay for A6 through traffic nor, by association, diversion of traffic on to inappropriate, less suitable routes with an impact on existing settlements. LCC advised as early as March 2013 that delays to the priority A6 arterial route resulting in traffic diverting to less suitable routes e.g. through Rothley and South Charnwood would not be acceptable.

- 9.5.15 Early tests undertaken as part of the Local Plan evaluation demonstrated that delays below 30 seconds avoided this effect. The concluding signalised design has therefore been based on an average acceptable delay of 25 seconds through the junction as a whole, thereby ensuring that delays on any one part will not exceed the 30 second limit. This principle was encapsulated by the signalised roundabout design incorporated into the Charnwood Core Strategy “Setting Strategic Direction” modelling during 2012 and 2013 and the LWL Scoping Report of August 2013.
- 9.5.16 In terms of location for the new roundabout, the stretch of A6 north of the A46 Interchange is the subject of a number of significant highway design constraints which are summarised in the TA. The chosen location is thought to be the only point at which a compliant design can be provided within the demise of the site.
- 9.5.17 Based on the above, the base highway package comprises the following works:-
- Construction of a new at grade signalised three-arm A6 Site Access Roundabout including two-way connections to Loughborough Road to the north. The Junction is designed to function fully in the Design Year and includes a temporary fourth arm to the east which serves a temporary Highways Construction Depot. This is expected to be in use for approximately three years from commencement of development, before being removed following completion of the works and associated maintenance period;
 - Improvements to the existing A46/A6 Birstall Interchange around the southern and western sides in order to provide three through lanes on the northbound A6 Leicester Road to A6 Loughborough Road. The improvement will also provide a new bus priority route through the Interchange;
 - The provision of two emergency accesses/exits:-
 - i) On the (Old) Loughborough Road; and
 - ii) Via the new Bus Link to the A46/A6 Birstall Interchange
 - The provision of an underpass below the A6 approximately half way between the Birstall Interchange and the new site access roundabout. This would be part of a comprehensive network of footways and cycleways with strategic as well as local benefit;
 - The consideration of additional traffic calming measures at Rectory Road through Wanlip;
 - Comprehensive on-site transport infrastructure including the construction of new access roads and junctions, bus stops and shelters in a public realm and hierarchy of streets with a distinctive garden suburb character.

9.5.18 The temporary fourth arm to the east of the A6 Site Access Roundabout will provide the main off-site highways construction access since the extensive off-site improvements to the A6 north of the A46 include the pedestrian/cyclist underpass. The A6 is not coplanar (i.e. the two carriageways have a significant level difference between them) and highways construction vehicles cannot readily cross between the two sides. It will therefore be necessary for large construction plant to have access from both sides of the A6. A temporary Highways Construction Depot is therefore proposed to the east (in addition to a smaller “on-site” facility to the west that will serve primarily Estate Roads and Housing construction needs) served directly from the new Roundabout and is expected to be in place for about three years. It should be noted that the eastern arm has been designed for this purpose – it is sufficiently wide to enable large, abnormal loads (such as cranes and low loaders carrying piling or digging equipment) to negotiate the tight bends safely. The scale of this temporary access is therefore at the minimum that can be provided to meet this need satisfactorily. The access will be signalled to ensure that large plant can access the Depot and cross the A6 safely.

Land Uses

9.5.19 The following description provides a summary of the overall key components of the proposals and is given spatial expression by the Development Framework Plan and Parameter Plans:-

- Up to 1650 Dwellings with a range of tenures, types and sizes;
- Up to 15 hectares of Employment Land providing a range of uses to meet “strategic and local employment needs” to include 7,500 m² of Class B1(a) Office, up to 17,500 m² of Classes B1(b and c) Research and Development and Light Industry, up to 10,000 m² of Class B2 General Industry and up to 15,000 m² of Class B8 Storage and Distribution;
- A Primary School on a site of 1.9 hectares with potential to provide for a “two-form entry” capacity of 420 pupils, managed in an “extended” way to include community uses in a “dual use” arrangement;
- A Local Centre (the “Broadnook Centre”) incorporating a Class A1 Foodstore of 1,600 m² (nett), local shops, small scale employment uses and a range of non-food retail and other facilities to serve the new community. These will include Use Classes A1 (shops); A2 (Financial and Professional Services); A3 (Restaurant(s)/Café(s)); A4 (Drinking Establishments); A5 (Hot Food/Takeaway(s)); B1 (Business Uses); C2 (Residential Institution) including a 70 bed care home; C3 (Dwellings); D1 (Day Nursery/Medical Centre); D2 (Leisure) and Sui-Generis uses in an additional combined Floor-space of up to 2,200 m²; of non residential uses
- A “Community Resource Centre” incorporating social and community facilities and the offices of the Broadnook Garden Suburb Trust;
- Health care facilities;

- Extensive multi-functional Green Infrastructure;
- Associated drainage infrastructure including SUDs features;
- A comprehensive network of new and enhanced pedestrian and cycle links and public rights-of-way;
- Site Access Works – with primary access from A6, engineering works, new infrastructure and utilities and landscape as noted above.

On-Site Parking Provisions

- 9.5.20 The Application is in Hybrid format, combining an Outline “in-principle” approach to the overall garden suburb proposal with Full detailed definition for a specific area forming an important northern area of the garden suburb which includes and is served by the new A6 Site Access.
- 9.5.21 The approach to car parking provision is based on the 6C’s Design Guide and the detailed areas of the Hybrid Application include bespoke house types and layout proposals by Davidsons Homes and Barwood Homes incorporating appropriate car parking provision.
- 9.5.22 As far as non-residential land uses are concerned, it is currently proposed that a total of 1,250 car parking spaces will be provided for the employment uses, with a further 250 allocated for visitor use in accordance with the more detailed “First Principles” assessment contained within the Broadnook Travel Plan.

Assessment Year

- 9.5.23 A single Design Year of 2026 has been adopted for all junction evaluations and design, which is the date by which the site is expected to be approaching full occupation. No other years have been assessed specifically for improvement purposes, but intermediate years commensurate with operation of the temporary Highways Construction Depot have been examined to prove that individual phases have the capacity to accommodate their respective levels of traffic.

Traffic Growth

- 9.5.24 For the Local Road Network (LRN) background traffic growth up to 2026 has been included, based upon outputs from the Leicester and Leicestershire Integrated Transport Model (LLITM). The updated version – LLITM 5.1 – was made available by Leicestershire County Council (LCC) for use in connection with the application proposals.
- 9.5.25 Highways England (HE) is responsible for the A46 and M1 to the south and west of the site and requested that the highway capacity assessments for all “Strategic” roads be based on an alternative to LLITM, which ignores the possible beneficial effects of re-assignment due to journey displacement. HE also requested that a higher overall trip generation be used for testing the Strategic Road Network (SRN) and Site Access Roundabout (as the traffic lights at the A6/A46 Birstall Interchange will ultimately be linked to those of the Site Access) as discussed later in the Chapter.

Committed Development

- 9.5.26 Committed Developments are defined as those with either a valid planning consent which were wholly or partially incomplete at the time of the traffic surveys, or those that would be expected to come forward within the TA assessment period.
- 9.5.27 Agreement was reached with Leicestershire County Council (LCC) on which Committed Developments needed to be included in the 2026 Reference Case, along with the overall methodology to be adopted. The included packages are available on request, as the list is extensive.
- 9.5.28 The adopted approach accounts directly for the traffic growth attributable to the major committed schemes that are likely to significantly influence traffic volumes and patterns in the vicinity of the site. However, many of the schemes are well established proposals and as such are already included in the NTM and TEMPRO 6.2 traffic and economic growth forecasts. It was therefore necessary to allow for a reduction in TEMPRO growth to avoid traffic growth effects being double-counted.

Junctions for Assessment

- 9.5.29 Identification of the scope of impact of the proposed development upon the surrounding road network has been based upon the modelling approach outlined in the TA and summarised above. The impact of the development itself has been determined by comparing the flow and congestion changes from the 2026 Reference Case with the calibrated and agreed 2026 With Development LLITM Test 6 run.
- 9.5.30 In general, no junction or link has been examined where the change in flow resulting from the development is numerically less than 30 PCU's one-way or 50 PCU's two-way, per peak hour.
- 9.5.31 Based upon the above criteria and by agreement with the relevant Highways Authority in each case, the following 18 junctions were identified for detailed assessment. For ease of calculation and presentation, these were split into four groups, with the assessment of each group then being provided in the TA:-

Group 1 – Site Access & SRN Junctions

- A46/A6 Birstall Interchange (Combined Model with A6 Site Access)
- Loughborough Road Site Access Roundabout
- A46/A607 Syston Interchange
- A46/A5630 Anstey Lane Roundabout
- A46/A607 Hobby Horse Roundabout

Group 2 – A6 Junctions (North)

- A6 Loughborough Road Interchange
- A6 Sibley Road Interchange
- A6/Granite Way Roundabout
- A6 Barrow Road Interchange
- A6/A6004 Roundabout

Group 3 – Local Junctions (North)

- Hallfields Lane/Cossington Lane Junction

Group 4 – Local Junctions (South)

- A607/Melton Road Roundabout
- A50/A563 Roundabout
- A6/A563 Red Hill Interchange
- A563/A607 Melton Road Cross-Roads
- A563/Krefeld Way Roundabout
- Loughborough Road/Checketts Road Cross-Roads

15.5.32 Overall, the TA seeks to demonstrate that for Broadnook as a whole:-

- i) The proposed infrastructure at the Site Access Junction will provide sufficient traffic capacity for all forecast traffic in the Design Year and will not delay through traffic on the A6 by more than 25 seconds on average and 30 seconds as a maximum;
- ii) At the A46/A6 Birstall Interchange, the proposed improvement will provide sufficient traffic capacity to allow it to function within normal DMRB limits in the Design Year;
- iii) At all other locations where the combined scheme is forecast to have a material traffic impact and the junction is also over-capacity, highway improvements of sufficient scale to achieve “Nil-Detriment” have been identified (i.e. conditions with the development in place will be no worse than if the development were not to take place).

Traffic Modelling – Local Roads

- 9.5.33 LCC requested that the highway capacity assessments for all local “County” roads be based upon outputs from the Leicester and Leicestershire Integrated Transport Model (LLITM). At the request of Leicester City Council the same methodology has been applied to roads to the south of the A46 within the administrative area of the City and under that Authority’s control.
- 9.5.34 Initial assessment of the Broadnook development was undertaken using the LLITM Highway Model only, based on the Charnwood BC 2026 With Core Strategy assessment. The purpose of this analysis was to apply corrections to the modelling of the A6 Site Access Junction serving Broadnook to remove several errors, thereby demonstrating that the extraneous traffic redistribution onto adjacent routes shown by the model at that time would not actually occur. This assessment is known as the “North Birstall Development Assessment”.
- 9.5.35 Following this initial work, a second stage assessment was undertaken based on more detailed modelling of the development using the LLITM 5.1 traffic model. The approach included the following three stages:-
- i) Stage 1: Identify the levels of Highway Validation in the AoI;
 - ii) Stage 2: Identify, agree and prepare the Broadnook Reference Case
 - iii) Stage 3: Development Testing.
- 9.5.36 During the Stage 1 assessment LLITM was shown to have poor validation within the Area of Interest (AoI). For this reason, it was subsequently agreed that results produced by a modified manual calculation process would instead be used for junction assessment. It essentially took flow differences between the 2008 Base Case and the 2013 Traffic Surveys and then added these numerically to the 2026 Reference Case for the agreed future year scenarios to produce an accurate set of turning movements for junction assessment purposes. It notably assumed that zero traffic growth occurred between 2008 and 2013, meaning that the 2008 Base Case data could be directly compared with the 2013 Traffic Surveys. The process is described in more detail in the TA.
- 9.5.37 Using the 2026 Reference Case, the various “With Development” scenarios were prepared using the LLITM model with the Broadnook site included (but without any mitigation). This work utilised the DELTA Land Use Model and included the proposed Site Access arrangements.

- 9.5.38 The proposed improvements to the A46/A6 Birstall Interchange were also included in the “With Development” scenarios, as these are considered part of the Site Access rather than mitigation in order to deliver the Bus Link. Embedded default traffic generation rates contained within LLITM were not used however and were instead substituted by generations based on TRICS. Interactions were agreed with LCC as noted in the TA. These revised generations were subsequently used in the definitive “With Development” test described in the TA (which was designated as LLITM Test 6) and resulted a two-way figure of around 1,550 two-way peak hour vehicle trips being adopted. This figure represents the total amount of traffic that is likely to be produced by the permanent development once fully built-out as far as the LRN is concerned and was therefore used for all subsequent assessment work on these roads.

Traffic Modelling – Strategic Roads

- 9.5.39 As noted above Highways England (HE) requested that a higher overall trip generation be used for testing the Strategic Road Network (SRN) and Site Access Roundabout. A figure of 1,750 two-way PCU trips in either of the peak hours was subsequently agreed, which was then applied to the Site Access Junction in accordance with the splits given in Table 6.4 of the TA. These were intentionally weighted towards the A6 to the south of the site to ensure a robust SRN assessment.
- 9.5.40 It was additionally agreed during this process that some traffic be assigned to the temporary Highways Construction Depot as part of the final distribution (even though it is unlikely to be co-existent with that of the full development) to identify any possible delays caused to through traffic that might affect routing to and from the A46 in the short term.

Travel Plan Measures

- 9.5.41 A detailed sustainable Travel Plan is included as part of the Transport Submission for Broadnook and it identifies a number of key measures aimed at supporting 25% non-car usage. For the purposes of assessment however, 10% has been adopted in the TA. The prevailing figure locally is 19%.

9.6 Likely Significant Effects

Construction (General Development)

- 9.6.1 The need for the external transfer of bulk materials associated with the construction of the Broadnook project will be largely avoided since the undulating nature of the site is such that the materials generated by plateauing can be reused within it in areas that need to be filled. This means that in the early stages at least, construction traffic associated with preparing the site for development will not be significant and its effect will thus be negligible.

- 9.6.2 Out-with the initial ground preparation phase, the majority of the construction traffic will involve vehicles associated with the construction of the buildings and houses. Whilst some degree of material importation will be associated with the construction of the internal roads, this is likely to be minor in nature when compared with that of the main built development. For this reason, it is possible that construction traffic will be intermittent over a period of time (depending on whether building construction is underway or not) with only a negligible effect being experienced outside of these periods.
- 9.6.3 For the buildings and houses themselves, all materials will arrive by road. Delivery vehicles will be routed via the A46 (and thence the A6) to avoid effects on local residential areas. During a typical year, up to 500 Heavy Goods Vehicles (HGV) per day are likely to visit the site, although this rate is likely to be a peak rather than an average. That equates to around 50 per hour inbound during the busiest construction periods, which is similar to the levels likely to be experienced once the site becomes fully operational. It is unlikely therefore that these will cause a separate problem, but the impact of the associated construction staff in combination with the road builders has been assessed separately as part of the TA.
- 9.6.4 In terms of the latter, whilst up to 400 workers could easily be employed building the development itself and a further 200 on the roads, the combined conventional peak hour through-put is unlikely to exceed 150 new trips as discussed in the TA, suggesting a total traffic generation of 250 PCU's. Compared to the final scheme traffic generation levels of between 1,550 and 1,750 described above, this is unlikely to cause an issue once the new roads become operational and can therefore be classed as a Negligible impact. The TA appraisal of construction impacts was thus limited to the interim period before works to the A6 have been completed and the temporary Highways Construction Depot removed. Reference should be made to the Phasing & Traffic Management Report (PTM) in this respect in terms of delivery.

Interim Development Proposals – The Highways Construction Depot

- 9.6.5 In addition to the completed development flows, the Site Access Roundabout needs to accommodate construction traffic as a result of the proposal to site a Highways Construction Depot to the east of the A6. Whilst this would be a temporary feature and would only be in existence for approximately three years following the commencement of construction, it does mean that the four-arm version of the junction would initially need to provide for around 250 PCU construction trips at peak times as noted above. A separate test would thus normally be required for this case.

- 9.6.6 Now irrespective of this temporary position, the SRN assessment undertaken at the request of HE assumes 1,750 permanent development trips occur at the Site Access. To avoid a third series of assessments being required to cover the LRN, the SRN and the Depot separately, HE instead agreed that the SRN test could be modified slightly to include a small number of additional construction assignments to cover any overlapping construction effects in one test (TA Table 6.4). The SRN test as run for the TA thus covers temporary use of the Highways Construction Depot by default.
- 9.6.7 In the long term, highways construction traffic will clearly cease, whilst over the initial three year period it is extremely unlikely that the levels of development traffic produced by the site will exceed 1,500 trips two-way; being the headroom between the 250 temporary trips and the 1,750 movements included in the SRN assessment. As a result, the permanent SRN assessment effectively covers the temporary construction case too and no further analysis in capacity terms is therefore required. A more detailed justification is provided at Sheet 13 of Appendix I to the TA in this respect, which demonstrates that the overall allowances for construction traffic built into the SRN junction assessments are adequate.

Completed Development

- 9.6.8 For the purposes of evaluation, the TA assumes that the levels of development proposed will be in accordance Section 9.5.19 above.
- 9.6.9 The analytical approach taken in the evaluation of likely effects resulting from the project is described in detail in the TA. For the evaluation of traffic flows including all ancillary components, the TA provides a series of calculations of vehicle trips generated by the development. The results for the scheme are noted above and are summarised below in **Tables 2 & 3:-**

Table 2: Proposed Traffic Generation (LRN)

Description	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Total Trips	730	788	751	807

Table 3: Proposed Traffic Generation (SRN)

Description	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Total Trips	725	1025	925	825

- 9.6.10 A more detailed description of the analysis process and of the calculations themselves is given in the TA. Essentially however, the flows given in Tables 2 & 3 represent the likely total traffic movements that would be produced by Broadnook on the LRN and SRN respectively once fully complete. It should be noted that in the case of the SRN, where the assumed flows and distribution occasionally combine to deliver a trip assignment that is less than LLITM Test 6 would suggest, then the latter higher figure has been adopted for the purposes of assessment. This ensures a robust and consistent approach overall.
- 9.6.11 In terms of HGV movements, the maximum hourly flow is expected to be very low at peak times and has therefore been ignored.
- 9.6.12 The distribution of peak hour vehicle trips generated by Table 2 was based on LLITM Test 6. For the SRN, the distribution of Table 3 flows was agreed with HE and intentionally biases traffic towards the A6 to the south to ensure a robust assessment of the SRN in accordance with Table 6.4 of the TA.
- 9.6.13 Based on the above methodology, proposed trip rates and distribution, the 14 junctions included in the AoI were assessed using a combination of industry standard software including ARCADY, TRANSYT and LINSIG. The results for each of the four main groupings can be summarised as follows:-

Group 1 – Site Access & SRN Junctions

- 9.6.14 The permanent three-arm version of the proposed A6 Site Access Roundabout was analysed using TRANSYT 15 for the greater SRN traffic flows. A series of tests on the four-arm version were also undertaken assuming various conversion possibilities. In all cases the junction remained within the design limits previously set and a maximum delay to A6 traffic of 28 seconds was reported. The overall impact was therefore thought to be Negligible.
- 9.6.15 In addition to the A6 Site Access Roundabout, the TRANSYT model also included A6/A46 Birstall Interchange, at the request of HE. It was therefore also tested for the greater SRN flows and was found to operate within design limits under all scenarios tested up to 2026. Since some queuing is already present on the western and southern quadrants at peak times, the improvements proposed represent a degree of betterment over the base case and impacts can therefore be described as **Moderate Beneficial** with regards to future year operation.
- 9.6.16 Next within this group the Loughborough Road Site Access Roundabout was tested for the same SRN flows using ARCADY. The junction design is primarily based on geometric considerations (the need to accommodate large construction vehicles) so unsurprisingly capacity was not an issue. As a new feature affecting only the development overall impacts are not relevant, but as the access will in the future allow southbound traffic on Loughborough Road to reach the A6 where it cannot join at present, the net impact must be considered to be **Moderate Beneficial**.

- 9.6.17 Finally moving on to the three remote SRN Junctions included in the Group 1 test, the A46/A607 Syston Interchange was found to be operating within capacity in 2026 within the ARCADY models used to assess it for the greater SRN flows. Impact here would thus be **None**. That at the Hobby Horse Roundabout was also found to be no greater than **Negligible**, with only a 1.7% deterioration in performance being reported. Only at the A46/A5630 Anstey Lane Roundabout where a 27% impact on Gynsill Lane was prevalent within the ARCADY model for the PM Peak Hour were any issues noted, but these were dealt with by way of a proposed modest improvement. With this in place “Nil-Detriment” was restored, leaving a net impact of **None**.

Group 2 – A6 Junctions (North)

- 9.6.18 Turning then to the individual junctions on the A6 to the north of the site, those on the A6 itself to the south of Loughborough were shown to have more than adequate spare capacity to deal with the development. Impact at each was therefore classed as **None**. The one exception was the A6/A6004 Roundabout, which showed a 4% deterioration in performance in the AM Peak Hour on one arm of the junction. Again therefore no improvements were thought to be justified and the impact was assigned to the **Negligible** category.

Group 3 – Local Junctions (North)

- 9.6.19 Only the Hallfields Lane Cross-Roads with Cossington Lane was assessed in this category and it is known to have congestion issues at peak times. As a result, a modest improvement scheme is included as part of the project and when tested using the lower LLITM Test 6 flows, was found to fully mitigate the development with small degree of betterment also being achieved. As a result the scheme’s impact at this location was termed as **Slight Beneficial**.

Group 4 – Local Junctions (South)

- 9.6.20 There are six junctions located to the south of the A46 that were included in the TA at the request of the City Council. The vast majority of movements from the site do not travel towards Leicester with less than 100 predicted to do so in total in either of the peak hours, suggesting that impacts are never likely to be more than negligible at any of the six locations noted. The analysis was therefore principally confined to a macro-level assessment.
- 9.6.21 Overall the TA concluded that Broadnook will have no material impact on any of the local junctions to the south of the A46 assessed. This is largely because LLITM predicts no significant demand between the site and the City for commuter traffic and where it does occur, it largely replaces existing journeys - building new houses and jobs north of the A46 creates simply the opportunity for people to live and work in a different way in future years than today. No improvements are therefore required or proposed to the six junctions assessed to the south of the A46 and the overall impact was classified as **Negligible**.

Completed Development - Summary

9.6.22 Based on the above appraisal and proposed mitigation measures, it is believed that the site can be accessed in an acceptable manner, whilst still allowing the existing highway network to function in a safe and efficient way. All parts of the improved Highway Network would operate either within capacity or marginally over capacity (but no worse than would otherwise be the case) which is in stark contrast to the “Do Minimum” results. Under this scenario, queuing would be present at several locations, including the key A46/A6 Birstall Interchange. Overall therefore, the net benefit of the scheme in terms of transport must be viewed at the very least as being **Slight Beneficial**.

9.7 Cumulative Effects

9.7.1 The cumulative impacts of the development in combination with other defined and potential land uses in the locality have been fully assessed as part of the overall modelling work undertaken within the TA. The results show that cumulative impacts have largely been dealt with as part of the improvements proposed and in all cases, the works necessary to fully mitigate Broadnook up to 2026, either in isolation or in combination, have been provided.

9.8 Statement of Effects

9.8.1 As a result of the proposed design measures, the effects of the project on the surrounding local highway network would not result in any significant adverse effects at any location.

9.8.2 All construction traffic to and from the site would be controlled by routing restrictions, which would prevent the use of local roads by such vehicles. As a result, construction traffic would be confined primarily to the A46 and thence the A6 to the south of the development, thereby avoiding sensitive areas. No significant adverse effects are expected to occur during construction of the Project (TMP refers) with traffic produced generally being lower than that of the completed scheme. Impacts during construction can therefore be defined as **Negligible**.

9.8.3 Material impacts resulting from the completed Project on the Local Road Network would be wholly mitigated up to 2026 by the proposed Highway improvements even the associated Public Transport enhancements are ignored. This is also true if any potential new modal split away from private car usage created by The Broadnook Travel Plan is similarly ignored. In this respect the new Signalised Site Access Roundabout would delay through traffic on the A6 by less than 30 seconds, meaning that its impact on such movements would be minimal and it would not cause traffic to divert to less suitable routes. Overall, impacts to the north and south of the A46 are thought to be **Slight Beneficial**.

- 9.8.4 Following improvements proposed to the A46/A6 Birstall Interchange, the Strategic Road Network would continue to operate within capacity to 2026 following development of the site and all associated Local Plan “Committed” schemes. The Project would also provide minor junction improvements at other locations to address any significant adverse effects identified away from the main core routes. As a result, only a small number of roads within the entire model area are projected to be operating over capacity in 2026; those that are would be only marginally so and none are taken over capacity by the combined scheme that would not already be so under the “Do Minimum” scenario. In all such cases, impact is no greater than 4% and in most below 2%. At these sorts of impact levels drivers would be unlikely to detect any material change in their journey and any residual effects can therefore be regarded as **Negligible** for the purposes of assessment at these few locations. Because of the benefits accrued at the Birstall Interchange however, the overall impact on the SRN would be **Moderate Beneficial**.
- 9.8.5 At Paragraph 32, the NPPF is clear that “Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe”. In this case, the cumulative impacts of the Broadnook scheme, along with all the other schemes in the location likely to come forward over the next 10 years and all strategic traffic growth on the A46 and A6 will be mitigated by the proposals, to the extent that the residual impacts will be **Moderate Beneficial**. On the other hand if Broadnook did not proceed, then there would be extensive queuing at numerous locations on the network by 2026, including the key Birstall Interchange on the A46.
- 9.8.6 In summary therefore, the net benefit of the scheme in terms of transport is unequivocally **Moderate Beneficial**. It is uniquely placed to serve the local and regional economies in this context, and in a way that no other location or site ever could.

10

Ground Conditions and Minerals



Broadnook Garden Suburb

Environmental Statement

10.0 Ground Conditions and Minerals

10.1 Introduction

- 10.1.1 This Chapter has been prepared by Brookbanks Consulting to identify any existing constraints to development from existing ground conditions and to assess any potential environmental effects of the Proposed Development on ground conditions. This Chapter should be read in conjunction with the assessment of the development proposals contained within Chapter 12 with regards to flood risk and drainage.
- 10.1.2 The following sections will outline the baseline and proposed site conditions with a view to providing confirmation of the appropriateness of the site for the nature of development proposed in accordance with local and national guidance.
- 10.1.3 The scope of Environmental Impact Assessment has been the subject of a formal Scoping Opinion from Charnwood Borough Council (April 2014)
- 10.1.4 This assessment discusses ground conditions in the following sequence:
- Geology
 - Hydrogeology
 - Contaminative Land Quality
- 10.1.5 The assessment comprises:
- (i) a baseline survey of the history of the site, regulatory status, potential land and groundwater contamination and geo-technical status prior to development;
 - (ii) identification and evaluation of any impacts with respect to land contamination both on the proposed development and from the proposed development on existing ground conditions;
 - (iii) assessment of any impacts during both construction and operational phases of the development;
 - (iv) identification of mitigation measures including any remedial activities if required;
 - (v) the eastern edge of the North of Birstall location lies within a Minerals Consultation Area. An intrusive investigation and associated testing has been undertaken to assess the minerals resource and any impact on sand and gravel deposits.

10.2 Methodology

Study Area

- 10.2.1 For the purpose of this assessment the study area has been taken as the area defined by the application site boundary together with a wider area including land to the east of A6 north and south of A46. This wider area was the basis of the scoping review involving Charnwood Borough Council in April 2014.

Surveys

- 10.2.2. Intrusive soakaway investigation has been completed at the site. Geotechnical and/or contaminative site investigations have been completed during the period 2013-2016.

Consultation

- 10.2.3 During the development of this chapter, the following statutory bodies and interested parties have been consulted regarding the proposals;

- Environment Agency

- 10.2.4 Published information has been obtained in the form of;

- historical land use and mapping
- published geology (British Geological Survey)
- environmental statutory registers

and information gathered as follows:

- Environmental Search – Envirocheck Report (September 2013) **(Appendix 10.1)**
- Geo-Environmental Phases Investigation Report – Geo Environmental Group **(Appendix 10.2)**

Significance Criteria

- 10.2.5 The format of this section of the ES follows a standard study pattern, by setting out an appraisal of the baseline conditions, followed by a description of the proposed development and an identification of potential environmental effects due to that proposed development. The importance of each mechanism and an assessment of each potential effect are then considered along with any mitigation measures and recommendations for further investigations where necessary.
- 10.2.6 Methods of assessment have been employed that are consistent with current guidance and recommendations in the form of statutory documents and recognised publications to ensure that the findings represent a robust assessment approach.
- 10.2.7 The basis of the contaminated land regulatory regime in the UK is the “pollution linkage” concept which encompasses the source-pathway-receptor (SPR) approach. This can be explained as follows:

- (i) source – potential contaminants or pollutants which may cause harm
- (ii) pathway – a potential route by which contaminants can move from the source to the receptor
- (iii) receptor – a target that may be harmed (e.g. groundwater, humans, fauna, flora). Baseline conditions and information have been used to establish a Preliminary Conceptual Model (PCM)

10.2.8 **Tables 10.1** and **10.2** below outline the criteria for determining the magnitude and significance of the identified impacts:

Table 10.1 Magnitude of Effect

Magnitude	Criteria
Major (or substantial)	Loss of attribute
Moderate	Losses on integrity or partial loss of attribute
Minor (or slight)	Minor impact/minor loss of attribute
Negligible	Insignificant loss of attribute that does not affect use or integrity

Table 10.2 Significance of Effect

Magnitude	Importance			
	Very High	High	Medium	Low
Major (or substantial)	Very significant	Highly significant	Significant	Low significance
Moderate	Highly significant	Significant	Low significance	Insignificant
Minor (or slight)	Significant	Low significance	Insignificant	Insignificant
Negligible	Low significance	Insignificant	Insignificant	Insignificant

Table 10.3 Impact Significance Category

Significance of any identified impacts will be assessed with reference to this Table 10.3:

Magnitude	Criteria
Major Adverse	Result in loss of attribute which may include short-term risk to human health and likely to result in significant harm as defined by the Environmental Protection Act 1990 Part 2A. Short-term risk to controlled waters
Moderate Adverse	Results in impact on integrity of attributes or part of attribute including long-term damage to human health or pollution of controlled waters. A significant change in a particular ecosystem or organism forming part of that ecosystem
Minor Adverse	Results in minor impact on attribute ranging from pollution of non-sensitive water resources. Temporary health effects or easily repairable effects of damage to buildings, structures and services
Negligible	Results in an impact on attribute but insufficient magnitude to affect use/integrity
Neutral	No measurable impact on attribute
Minor Beneficial	Results in minor positive impact on quality of attribute
Moderate Beneficial	Results in positive impact on attribute
Major Beneficial	Results in a major positive impact on attribute

10.3 Planning Context

DEFRA: Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance and DETR Circular 02/2000

- 10.3.1 Guidance has been published by the Department for Environment, Food and Rural Affairs (DEFRA), The Environmental Protection Act 1990: Part 2A promotes the “suitable for use” approach.
- 10.3.2 DEFRA’s “suitable for use” approach focuses on risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore need to be assessed on a site-by-site basis.
- 10.3.3. At Phase 1 stage it is necessary to develop an initial conceptual site model to understand the possible relationships between contaminants, pathways and receptors - the “SPR” concept. If a hazardous source via an exposure pathway to a potential receptor can be established then there is a ‘pollutant linkage’. At this stage the conceptual model contained in the Geo-Environmental appraisal is prepared without site specific soils, groundwater or gas testing and as such the findings should be considered only as first and general indications of possible SPR linkages.
- 10.3.4 The “suitable for use” criterion requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and appropriate and cost effective remediation techniques exist taking into account the actual or intended use of the site. The assessment follows the process set out in Environment Agency (EA) report CLR11 “*Model Procedures for the Management of Land Contamination*”. CLR11 explains the key requirements for each step in the assessment and subsequent remediation of any land contamination.

National Planning Policy Framework (NPPF) (“The Framework”) (2012)

- 10.3.5 The NPPF establishes national guidance on “*conserving and enhancing the natural environment*” and includes references to ground conditions as a material consideration. At paras 120-122 the Framework confirms;

“To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.”

Planning policies and decisions should also ensure that;

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and*
- *adequate site investigation information, prepared by a competent person, is presented.*

In doing so, local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes”

Charnwood Local Plan Core Strategy 2011 -2028

10.3.6 The replacement Local Plan which was adopted by the Borough Council on 9 November 2015 has identified strategic priorities for the Borough for the next fifteen years or so following a robust and evidence based plan-making process over a considerable period. The North of Birstall sustainable extension at the Leicester Principle Urban Area is a key proposal in the new Plan’s development strategy and the planning application is a direct response to the plan’s generic and location-specific policies and provisions.

10.3.7 Core Strategy **Policies CS2** and **CS16** maintain the national and preceding local approach to environmental protection. The location-specific **Policy CS20** also extends the safeguarding issue to minerals. The Plan explains, at para 9.68, that;

“The eastern part of this location lies within a sand and gravel Minerals Consultation Area and there is potential for mineral resources to be sterilised. We will expect the policies in the Leicestershire Minerals Development Framework to safeguard minerals from sterilisation to be applied and further detailed investigation undertaken to assess the resources that could be affected and the necessary mitigation”

and this expectation is confirmed in the wording of Policy CS20.

Leicestershire Minerals Core Strategy and Development Control Policies Development Plan Document (2009)

- 10.3.8 Leicestershire County Council was consulted as minerals authority by the Borough Council when concluding a Scoping Opinion to frame environmental impact assessment for the Broadnook Garden Suburb Proposals. In its reply dated March 2014 the County Council advised as follows;

“... the eastern edge of the location lies within a Mineral Consultation Area (MCA). The purpose of the Consultation Area is to ensure that mineral resources are not needlessly sterilised by non-mineral development.

There is considerable uncertainty regarding the precise disposition and extent of mineral in the location of the proposed development. Deposits of sand would appear to extend westwards beneath a cover of till so that the actual area of workable mineral may be greater than that of the surface outcrop.

The proposed development could therefore sterilise some potential mineral reserves, but further detailed investigation would be necessary to assess the mineral resources that could be affected. It will also be necessary to consider whether there are any potential workable deposits on adjacent land as the proposed development could have the effect of sterilising such deposits.

... The need to safeguard valuable mineral resources is recognised in paragraph 143 of the NPPF ... The Development Plan contains policies to safeguard mineral resources and any Environmental Statement (ES) for this proposal should therefore contain an assessment of the mineral resource likely to be present. I am pleased to note from the scoping report that an intrusive investigation and associated testing is being undertaken to assess the minerals resource and any impact on sand and gravel deposits”

- 10.3.9 These issues are dealt with formally in the Development Control policies of the Leicestershire Minerals Development Framework. **Policy MDC8** “Safeguarding Mineral Resources” and **Policy MDC9** “Extraction in Advance of Surface Development” set the position. As at July 2015 an updated draft “Leicestershire Minerals and Waste Local Plan” has been approved by the County Council for consultation purposes. It carries forward the approach.
- 10.3.10 In October 2014 the County Council published a “Mineral and Waste Safeguarding” Document (S2/2014) for Charnwood Borough. It identifies the “Areas of the Borough for Mineral Safeguarding categorised by mineral type”. Figure C1 from the document forms **Appendix 10.3** of the **ES Volume 2**.
- 10.3.11 As requested by the County and Borough Councils a Review of Mineral Potential has been completed and forms **Appendix 10.4** of **ES Volume 2**.

10.4 Baseline Conditions

10.4.1 The assessment of ground conditions within this ES is based on the Geo-Environmental Appraisal by Brookbanks Consulting Limited contained within **ES Volume 2 Appendix 10.2**. The site has a long history of agricultural use with watercourses, ponds, field boundaries, woodland and vegetation as landscape features. Inspection of the progression of Ordnance Survey maps reveals that the site has remained undeveloped except for a small collection of farm buildings (two with residential occupation) and a couple of recent industrial units at the A6 edge of the main Garden Suburb site west of A6, north of A46.

Geology

- 10.4.2 Reference to the British Geological Society Sheets shows the underlying solid geology is bedrock of Edwalton Mudstone with overlying superficial deposits of sand and gravel and diamicton.
- 10.4.3 An intrusive ground investigation completed by Geo-Environmental Group confirmed the presence of the underlying mudstone on site.
- 10.4.4 A hydrogeological assessment completed as part of the Geo-Environmental Appraisal confirms that in the baseline;
- The site lies within the catchment of the Rothley Brook to the north of the site and the River Soar to the east. Both Rothley Brook and River Soar are designated by Environment Agency as Main River
- 10.4.5 The majority of the bedrock underlying the site forms a Non-Aquifer with soils of a low leaching potential.
- 10.4.6 Three ground water abstraction licenses have been granted on or within 500m of the site boundary as listed below;

Table 10.4 Groundwater Abstractions

Abstractor/ Company	Abstraction	Distance from Site (m)	Direction	Date
W Bentley & Sons Ltd	Farming and domestic	On site	East	2000
Rothley Park Golf Club	Farming and domestic	128	North-west	2000
W Bentley & Sons Ltd	Agriculture – Spray irrigation	405	South	1985

- 10.4.7 A further twenty three ground water abstraction licenses have been granted within 2,000m of the site boundary.
- 10.4.8 There are no source protection zones within 1,000m of the site boundary.

Contamination

- 10.4.9 To appraise the baseline contaminative conditions for the Project, a Generic Quantitative Risk Assessment has been completed as part of the Geo-Environmental appraisal using the phase 1 data in support.
- 10.4.10 A review of the statutory registers provides further baseline contamination and waste related information.
- 10.4.11 Three **Integrated Pollution Prevention and Controls** have been identified within 500m of the site boundary as follows;

Figure 10.5 Integrated Pollution Prevention and Controls

Name	Date	Description	Distance (m)	Direction
Severn Trent Water	March 2013	Associated Process	197	North East
Severn Trent Water	Oct 2007	Combustion, Waste Derived Fuel (3Mw to 50Mw)	197	North East
Biffa Waste Services	March 2005	Combustion, Waste Derived Fuel (3Mw to 50Mw)	217	North East

- 10.4.12 Two **Local Authority Prevention and Controls** are identified within 1,000m of the site boundary as follows;

Figure 10.6 Local Authority Pollution Prevention and Controls

Name	Date	Description	Distance (m)	Direction
Shell, Thurcaston	Not supplied	Petrol Filling Station, Permitted	130	West
Rothley Service Station	Dec 1998	Petrol Filling Station, Revoked	683	North West

10.4.13 Five **Pollution Incidents to Controlled Waters** have been recorded within 500m of the site boundary, as indicated below;

Figure 10.7 Pollution Incidents to Controlled Waters

Pollutant	Receiving Water	Category	Date	Distance (m)	Direction
Oils -unknown	Watercourse	3 (minor)	Feb 1997	372	East
Miscellaneous	Not given	3 (minor)	Feb 1996	66	North
Miscellaneous	Not given	3 (minor)	Oct 1996	234	North-East
Inert Suspended Soils	Watercourse	3 (minor)	Sept 1995	312	East
Miscellaneous	Not given	3 (minor)	Aug 1999	441	East

10.4.14 A further fifteen pollution incidents to controlled waters have been identified within 1,000m. Two were reported as category 2 (significant) incidents relating to gas oil pollutants within the canal (to the east). The remainder stated as category 3 (minor) incidents.

10.4.15 Three **BGS Recorded Landfill Sites** have been identified within 1,000m of the site boundary. Details have been provided as follows;

Table 10.8 BGS Recorded Landfill Sites

Location	Authority	Impacts	Distance (m)	Direction
Leicester Corporation Site	British Geological Survey, National Geological Information Service	Ground and Surface Water	324	South East
Meadow Lane	British Geological Survey, National Geological Information Service	Ground and Surface Water	429	South West
Leicester Corporation Site	British Geological Survey, National Geological Information Service	Ground and Surface Water	819	East

10.4.16 Eight **Historic Landfill Sites** inclusive of the BGS Recorded Landfill Sites referred to above, have been identified within 1,000m of the site boundary, the details of which are as follows:

Table 10.9 Historic Landfill Sites

Name	Last Input	Waste Type	Distance (m)	Direction
Land off Butchers Lane	Not supplied	Inert Waste	282	East
Wanlip Meadows	Not supplied	Inert/Commercial	282	East
Leicester Corporation Site (1)	April 1993	Inert Waste	324	South East
Leicester Corporation Site (2)	April 1993	Inert/Commercial / Household	427	South West
P Winterton Ltd Site	Not supplied	Industrial Waste	429	South West
Wanlip Gravels	Dec 1984	Inert/Industrial/ Comm/Household	617	North
Wanlip Road	April 1993	Inert Waste	843	North East
Wanlip Gravels	Dec 1984	Inert/Industrial/ Comm/Household	891	North East

10.4.17 Four **Licensed Waste Management Facilities (LWMF)** locations are identified within 1,000m of the site boundary as follows:

Table 10.10 Licenced Waste Management Facilities

Operator	Category	Issued	Status	Distance (m)	Direction
Amec/McAlpine	Construction/ Demolition / Dredging	March 1994	Surrendered	On site	A6
Severn Trent Water	Biological Treatment	Nov 1994	Modified (2004)	25	North
Biffa Waste Services	Biological Treatment	Nov 2003	Modified (2009)	258	North
P Winterton Ltd	Inert/ Excavation	Feb 2010	Issued	763	North East

- 10.4.18 One **Licensed Waste Management Facility (LWMF Landfill Boundary)** has been reported on site, under the operation of Amec/McAlpine and assumed to be part of the works carried out to implement the A6 bypass. It has been stated that the facility had taken construction, demolition and dredging waste with a large maximum input of equal to or greater than 75,000 tonnes per year. However the licence is now inactive.
- 10.4.19 Seven **Local Authority Recorded Landfills** have been recorded within 1,000m of the site boundary, all of which are under the authority of Leicestershire County Council.
- 10.4.20 Three **Registered Landfill Sites** have been reported within 1,000m of the site location. The following information has been provided;

Table 10.11 Registered Landfill Sites

Location	Max Input Rate	Authorised Waste	Prohibited Waste	Distance (m)	Direction
Amec/McAlpine	Between 75,000 and 250,000 t/y	Inert / non-putrescible Slow decomp. / putrescible Inert	Not specified	On site	A6
P Winterton Ltd	Undefined	Cement Asbestos Construction / Demolition Cement Asbestos	Asbestos Plasterboard / Plaster	871	South East
Wanlip Gravels	Between 75,000 and 250,000 t/y	Construction / Demolition Mine / Quarry Wastes	Asbestos Plasterboard / Plaster	891	North East

- 10.4.21 Two **Registered Waste Treatment or Disposal Sites** have been identified within 250m of the site boundary as follows;

Table 10.12 Registered Waste Treatment or Disposal Sites

Location	Category	Max Input Rate	Authorised Waste	Prohibited Waste	Distance (m)	Direction
Wanlip Composting Plant	Composting	Undefined	Household Sewage Commercial Animal /Food Wastes Industrial Wastes	Not specified	80	East

Wanlip STW	Treatment	Greater than 250,000 t/y	Silt dredging/ Tank cleaning sludge Contaminated Water	Dyestuffs Special Wastes	178	East
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10.4.22 None of the following have been recorded on site or within 1,000m of the site boundary;

- Contaminated Land Register Entries and Notices
- Enforcement and Prohibition Notices
- Integrated Pollution Controls
- Integrated Pollution Prevention and Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcements
- Prosecutions Relating to Authorised Processes
- Prosecutions Relating to Controlled Waters
- Registered Radioactive Substances
- Substantial Pollution Incident Registers
- Water Industry Act Referrals

Hazardous Substances

10.4.23 There are no records of the following on site or within a 1,000m radius of the site boundary;

- Control of Major Accident Hazards Sites (COMAH)
- Explosive Sites
- Notification of Installations Handling Hazardous Substances (NIHHS)
- Planning Hazardous Substance Consents
- Planning Hazardous Substance Enforcements

10.4.24 There are thirteen recorded **Contemporary Trade Directory Entry** listings within 500m of the site boundary which commonly relate to;

- Electrical Appliance Servicing
- Air Conditioning and Refrigeration Contractors
- Lingerie and Hosiery Manufacturer and Wholesalers
- Engine Rebuilding and Reconditioning
- Chemical Manufacturers
- Garage Services
- Service Stations
- Dairies

10.4.25 Four **Fuel Station Entries** have been recorded within 1,000m of the site boundary.

Waste

10.4.26 There are no provided reports of the following within 1,000m of the site boundary;

- Integrated Pollution Control Registered Waste Sites
- Registered Waste Transfer Sites

Radon

10.4.27 The site is reported to lie in a low probability area affected by radon, where less than 1% of homes are above the action level.

10.4.28 It is reported that no radon protection measures are necessary for new developments within the site.

Mining

10.4.29 The site lies on an area that is not reported to be affected by coal mining.

Soil Conditions

10.4.30 Information provided in a report by Land Research Associates “Soil Resources and Agricultural Use and Quality of Land North of Birstall” states that the soils west of A6 are mainly clay or heavy clay loam topsoil with dense, slowly permeable clay subsoil. (see ES Chapter 16 “Agriculture and Soils”)

10.5 Potential Effects

Impact During Construction Phase: short to medium term

10.5.1 One potential construction phase environmental effect has been identified relating to hydrology and hydrogeology. These mechanisms are as follows;

- Direct contamination of the soil and potential groundwater contamination due to earthwork operations and potential spillage of fuel oils and site stored materials during construction activities.

Impact During Operation Phase: long term

10.5.2 As a result of the proposed development two potential operational environmental effects are identified relating to water. The mechanisms are as follows;

- **Existing Contamination:** direct or indirect contamination of flora, fauna, controlled waters and building fabric due to the mobilisation of baseline contaminants during earthwork operations;
- **Development Contamination:** direct and indirect contamination of the soil and potential groundwater contamination due to leakages of fuel oils, general operational spillages and other contaminants from within the project site and the associated collection of surface water drainage from hardstanding areas.

Sensitivity of Potential Receptors

10.5.3 The baseline survey produces the following assessment of the importance and sensitivity of the site and surrounding area;

Table 10.13 Sensitivity of Potential Receptors

Receptor	Importance	Reasoning
Physical Aspects of Site	Local	Impacts due to the underlying ground conditions such as unstable ground will be restricted to the site and will not extend outside of the site's boundaries
Site Soils	Local	Impacts due to potential soil contaminants arising as a result of the earthworks and construction activities
Site Surface Water/ Groundwater	District	Any potential impacts by contamination of the watercourses which could impact a wider area through migration

10.6 Design and Mitigation

10.6.1 Prior to the commencement of any phase of development a Phase 2 intrusive investigation will be carried out to make sure that health and safety risks are evaluated further and that ground stability is confirmed. The results of this assessment will inform the conceptual site model for the site, the parameters for foundation design and construction methodology for infrastructure and buildings. A framework Phase 2 study has been completed to inform overall development suitability and feasibility.

Construction Effects

10.6.2 Site good practice measures implemented under a **Code of Construction Practice and a Construction Environmental Management Plan** will be adopted to mitigate against potential adverse effects. These could include for example;

- benching of excavations to reduce soil erosion;
- a **Site Waste Management Plan** to minimise and control the generation and handling of waste;
- use of settling tanks to remove particulates from water generated from excavations prior to discharge to the drainage system;
- damping down earthworks to reduce generation of dust;
- a surface water drainage system which incorporates petrol interception in order to reduce the potential for spillages of fuels and lubricants from vehicles using the site to migrate into the sub-surface and impact soil and groundwater.

10.6.3 To minimise the potential adverse environmental effects on ground conditions related matters, the following specific measures are being incorporated into the proposed development;

- an efficient system for the collection of storm and foul water from the site and conveyance to an appropriate receptor;
- measures to remove background contaminants from surface water drainage prior to discharge and to contain any accidental liquid spillages at the site.

10.6.4 The proposed development has been designed and will be controlled by an approved **Construction Environmental Management Plan (CEMP)** to avoid significant adverse effects resulting from construction works and best design practice will ensure the built, i.e. operational, development will meet exacting standards. Particular design measures are also described in detail below. A Framework CEMP accompanies the planning application.

10.7 Assessment of Effects

Operational Effect:

Existing Contamination: direct or indirect contamination of flora, fauna, controlled waters and building fabric due to existing contaminated materials.

- 10.7.1 To appraise the baseline conditions and suitability of a site for development it is established practice to outline a preliminary conceptual site model of possible environmental contaminative risks. Assessments are based on evidence identified during the baseline search and the planned development proposals. The Geo-Environmental Phase 1 Desk Study included within Appendix 10.1 of this ES contains this assessment.
- 10.7.2 The Geo-Environmental Phase 1 Desk Study Appraisal identifies no significant contaminative considerations relating to the project and the preliminary conceptual model identifies the contaminative risk for the project to be **low**.
- 10.7.3 It is concluded therefore that the preliminary Conceptual Model Assessment identifies no prohibitive constraint to development of the site for a predominantly residential end usage (and therefore supports the other operational uses – employment, commercial, social and community).
- 10.7.4 In mitigation of any residual risk relating to specific background contamination or unidentified former contaminative use if present, a detailed site investigation will be completed prior to development of each phase to include specific soil, gas and ground water contamination testing and identify any potential threat. Should contaminants be identified, the application of a risk based assessment, based on potential harm, will be completed and proposals developed to protect adequately the ground water quality environment and occupiers of the site.
- 10.7.5 The Conceptual Model will be updated with site specific information as this becomes available and mitigation measures implemented that are necessary in response to site specific conditions and requirements. No conditions can be foreseen where measures cannot be implemented to fully mitigate against identified contaminative risks.
- 10.7.6 **As a result of the planned implementation design and mitigation proposals, no environmental effect is anticipated.**

Operational Effect:

Development Contamination: direct and indirect contamination of the soil and potential groundwater contamination due to leakages of fuel oils, general operational spillages and other contaminants from within the project site and the associated collection of surface water drainage from hardstanding areas.

- 10.7.7 Direct contamination of the soil and indirect contamination of ground water may arise from accidental spillages of liquid products and the leakage of fuel oils from vehicles. Such spillages can result in major pollution incidents, but such events are normally associated with industrial developments and, for example, where large volumes of chemicals are stored and where HGV vehicles are used.

- 10.7.8 In development that predominantly comprises a residential end usage, the volumes of chemicals being stored are such that an accidental significant pollution incident of material consideration is unlikely. The volume of fuel oil washed from cars and non-industrial commercial vehicles represents a lower pollution risk to the soil or groundwater than heavy use industrial vehicles. Nonetheless, good practice measures should be incorporated to protect in the event of a spillage.
- 10.7.9 A water quality conceptual model has therefore been developed to establish appropriate protection measures and the design measures tailored accordingly. The principal of the means of protection will be to break the linkage in the source -> pathway -> receptor process, so the potential contaminant can be isolated for appropriate treatment.
- 10.7.10 The output from the conceptual model informs the following design measures for the project;
- hard paving of all parking areas and commercial use service yards to prevent infiltration of vehicle contamination and direct spillage of liquid products;
 - efficient collection of surface water run-off by way of a positive drainage system;
 - provision of a Sustainable Drainage System (SuDS) designed to maximise passive treatment to remove potentially contaminative materials;
 - higher risk commercial uses to have a treatment chain system and measures to isolate accidental spillage.
- 10.7.11 **As a result of the development proposals and proposed mitigation measures the environmental effect is assessed as insignificant.**

Construction Effect:

Contamination: direct contamination of the soil and potential groundwater contamination due to earthworks operations and potential spillage of fuel oils and site stored material during construction activities.

- 10.7.12 Disturbance of the ground during construction operations has the potential to contaminate the soil and both ground and surface waters due to discharge of solids into water or by the short term mobilisation of any background contaminants within the soil matrix.
- 10.7.13 The potential environmental effect of suspended solids discharges to watercourses and ground waters will be mitigated by adequate site controls developed by way of a **Construction and Environmental Management Plan (CEMP)**, agreed with the regulatory authorities prior to implementation. All contractors working on the site will be required to adopt the pre-set procedures and proposed means of mitigation outlined in the document.

10.7.14 Specific matters covered in the CEMP will include;

- prohibition of any temporary construction discharges without approval of the Environment Agency;
- earthworks to be completed in a manner that protects the water environment and ecological interest of the area. The nature of the work and the proposed implementation methods will be agreed with Environment Agency in advance and all works will accord with the recommendations of EA Guidance Note *“Pollution Prevention Guidance for Work in, Near or Liable to Affect Watercourses”*;
- discharges of waters resulting from construction activities will generally be directed to foul sewer, subject to approval of the drainage authority;
- all fuel oils and potentially contaminating substances to be stored in bunded tanks or suitable hard paved and protected areas as appropriate;
- all works will be completed in accordance with Environment Agency documents, **PPG6** *“Working at Construction and Demolition Sites”* and **PPG21** *“Pollution Incident Response Planning”* together with current best practice measures for the management of construction activities;
- all surplus construction and demolition materials to be removed from site and re-used, recycled, or disposed of in that order of preference;

10.7.15 It will be incumbent on the selected contractor(s) to assess working practice related risks and impacts prior to implementation and to ensure control by employing industry good practice techniques throughout the construction phases. Furthermore, the contractor will be required to develop emergency spillage, flood, fire and contamination control procedures such that any inadvertent incidents are immediately controlled to minimise the potential impact in the unlikely event that they occur.

10.7.16 **As a result of the development proposals and mitigating measures being implemented, no significant adverse environmental effect will result from the project.**

10.8 Review of Mineral Potential

- 10.8.1 The eastern part of the North of Birstall location lies within a sand and gravel Minerals Consultation Area. To review the potential for commercial deposits of aggregate minerals being present across not only this area but the entire site as far west as the Great Central Railway D K Symes Associates has been commissioned to complete a full study which is included as **Appendix 10.4**.
- 10.8.2 The background work for the application proposals includes intrusive field investigation to obtain geo-technical data on the existing ground conditions. As part of the fieldwork bulk disturbed samples were obtained from a matrix of trial pits in order to, inter alia, enable a visual inspection to be carried out to determine if the material is suitable as a construction aggregate.
- 10.8.3 The fieldwork comprised 19 trial pits being excavated across the site – the results from which are included in an Infiltration Testing Report prepared by the Geo-Environmental Group (GEG) (September 2013). A copy of the Plan showing the trial pit locations is attached at **Appendix 10.5**.
- 10.8.4 The conclusions of the Symes Associates report are;
- (i) the field investigation carried out by GEG confirms that the geological mapping published on British Geological Survey (BGS) Geological Sheet 156 is mostly correct with the majority of the central and western part of the overall site being underlain by glacial till of the Oadby Member. This material has no economic potential.
 - (ii) in the east of the overall area of interest (i.e. east of A6) the geological mapping shows an outcrop of Bytham Sand and Gravel, the majority of which is shown as having been excavated. An earlier DoE report had identified the presence of sand in this eastern part of the site. The recent work found some sand to the east of the A6 but based on the published information it is considered that any economic deposits in this area have been excavated (in association with the construction of the A6 and A46 dual carriageways). The mineral that remains will be very limited in extent, is a medium to fine sand with little or no gravel and is considered to be of no commercial interest.

(iii) The geological mapping shows the zone of land immediately west of the A6 as being underlain by glacial till, whereas the DoE report indicated that sand may be present. The recent investigation confirmed that the area was underlain by till, with one trial pit finding sand at depth. The presence and extent of any sand beneath the till is considered to be very limited based upon the previous geological investigation by the DoE.

(iv) In conclusion, the geological mapping is considered correct and that the only material that may be of commercial interest is the Bytham Sand and Gravel. This is only present within the area of land east of the A6 where the majority has been worked in the past. Any remaining deposits will be limited in both area and extent and are therefore not viable. **The geological mapping, as confirmed by the recent investigation, confirms there are no deposits of any minerals of economic interest that would warrant safeguarding.**

10.8.5 It is to be noted that earlier masterplan alternatives included built development east of A6 associated with potential new road infrastructure. Through iterative design and review under a Planning Performance Agreement, and now substantiated by the conclusions of an Independent Inspector following Core Strategy Examination, development is proposed to be contained within land in that part of the location west of A6, north of A46. This is confirmed by the final form of location-specific Core Strategy Policy CS20 and by the application proposals.

10.9 Residual Effects

10.9.1 **The assessments completed above do not identify any significant adverse effects and thus no residual effects are anticipated.**

10.9.2 **There will be no sterilisation of workable mineral resources.**

10.10 Statement of Effects

10.10.1 (i) **The implementation of appropriate and sustainable development proposals coupled with appropriate mitigation and best practice construction control will ensure that the project does not result in a significant adverse environmental effect during either the operational or construction phases.**

(ii) **Mineral reserves are not sterilised.**

10.10.2 The following tables summarise the ground conditions related impacts;

Table 10.14 Matrix of Operational Effects

Operational Impacts	Significance					
	Nil	Insignificant	Low	Significant	High	
						-ve, neutral +ve impact
Existing Contamination	•					Neutral
Development Contamination	•					Neutral

Table 10.15 Matrix of Construction Effects

Construction Impacts	Significance					
	Nil	Insignificant	Low	Significant	High	
						-ve, neutral +ve impact
Contamination	•					Neutral

10.10.3 **There are no significant impacts or constraints on the development proposals resulting from existing ground conditions.**

10.10.4 **It may be summarised that no significant adverse environmental effects will result in relation to ground conditions from the development proposals and effects are therefore considered to be negligible.**

11

Archaeology and Heritage



Broadnook Garden Suburb

Environmental Statement

11.0 Archaeology and Heritage

11.1 Introduction

11.1.1 This chapter of the Environmental Statement has been prepared by Prospect Archaeology following desk-based assessment and extensive field work and has been subject to peer review by the University of Leicester Archaeology Service. The objectives of the research were to identify any constraints to development and in the iterative masterplanning exercise to examine the potential impact of the proposals on below-ground archaeology and the built heritage.

11.1.2 The primary purposes of this chapter are:

- to assess the potential of the site to contain archaeological evidence;
- to assess the potential survival of archaeology at the proposed development area, its condition and extent;
- to assess and evaluate the potential significance of any archaeology and to examine whether this might be the subject of further evaluation or mitigation;
- to assess whether the archaeological evidence, or potential evidence, would provide a constraint to development;
- to assess the effect of the proposed development on identified archaeology and to evaluate the significance of those effects;
- to assess any indirect effects upon cultural and heritage assets; listed buildings, conservation areas, Scheduled Ancient Monuments, designated landscapes;
- to identify any residual impacts which cannot be mitigated.

11.1.3 **Timescales** utilised in this section as the basis of the historic references are as follows;

Prehistoric	From	To
Palaeolithic	450,000	10,000 BC
Mesolithic	10,000	5,000 BC
Neolithic	5,000	1,000 BC
Bronze Age	1,000	800 BC
Iron Age	800 BC	AD 43
Historic		
Roman	43 – AD 410	
Saxon / Early Medieval	410 – AD 1066	
Medieval	1066 – AD 1485	
Post-Medieval	1486 – AD 1800	
Modern	1800 – Present	

11.2 Assessment Appraisals

11.2.1 The assessment includes an evaluation of documentary evidence, ground inspection and local appraisals accounting for guidance and advice contained, for example, in

Institute of Field Archaeologists: Standards and Guidance on Desk Based Assessments (IFA, 2008)

Environmental Assessment and Archaeology

Environmental Assessment: A Guide to Good Procedures (former Department of Environment, Transport and the Regions (DETR) amended by Department of Communities and Local Government (DCLG))

Design Manual for Roads and Bridges Department for Transport (DfT)

Institute for Archaeologists' Code of Conduct (revised edition 2013) and standards and guidance for:

- historic environment desk-based assessment (1994, revised 2012)
- archaeological field evaluation (1994, revised 2008)
- archaeological geophysical survey (2011)

11.2.2 Data sources used to inform the assessment include;

- historic maps (County Records Office)
- topographical survey data
- Archive documents including Historic Environment Records (HER) for Leicestershire. These were examined for below-ground archaeological sites, within an area up to 500m from the prospective application site

11.2.3 The baseline study also involved reference to available historical and archaeological data from the following cartographic and documentary sources;

- Leicestershire Historic Environment Record
- Leicestershire List of Buildings of Special Architectural or Historic Interest
- Leicestershire Records Office and Local Studies Library
- English Heritage Register of Historic Parks and Gardens
- English Heritage database of Scheduled Ancient Monuments for Leicestershire

Scoping

- 11.2.4 The evaluation and assessment of archaeology and heritage was the subject of a scoping report submitted to Charnwood Borough Council in February 2014. The Borough Council's Scoping Opinion dated 3 April 2014 confirmed the nature and extent of Matters to be addressed.
- 11.2.5 The study area (see **Appendix 11.1**) includes land within three of the quadrants formed by the intersection of A6/A46. This extensive area was included to inform and consider alternative development scenarios and associated infrastructure. The conclusion of the Charnwood Local Plan (Core Strategy) plan-making process following Examination is to contain all new built development within the northwest quadrant west of A6. This is confirmed by Policy CS20. The only proposed land use change east of the A6 is to facilitate a pedestrian/cycleway/bridleway link and to include new green infrastructure - including a small park, a tree and shrub nursery for the garden suburb and possibly some additional playing fields if the need arises.
- 11.2.6 A site inspection has been undertaken in accordance with the Institute for Archaeologists recommended practice.
- 11.2.7 Extensive archaeological investigation has occurred over parts of the study area since 1976 related to a number of development proposals and infrastructure projects including A6 and A46 roads, pipeline proposals, Hallam Fields development, Park and Ride.
- 11.2.8 Rothley Park and the Rothley and Rothley Ridgeway Conservation Areas are situated to the north of the application site. There are Conservation Areas at Birstall and Thurcaston. The respective Conservation Areas include a concentration of listed buildings and further listed buildings are situated outside the Conservation Area boundaries. The Borough Council has also identified "locally listed" buildings. Two scheduled monuments are noted – a Saxon Cross at Rothley Parish Church and the site of a Roman Villa adjacent the junction of Swithland Lane Rothley with The Ridgeway.
- 11.2.9 The desk-based assessment recommended further evaluation, particularly with respect to those areas of the overall study area which had not been subject to earlier investigation. Fieldwalking has therefore been undertaken, by Cotswold Archaeology, across those previously unexamined areas and a comprehensive geophysical survey completed over the whole area by Phase Site Investigations.

Planning Policy Context

11.3 National Planning Policy Framework (NPPF) (2012)

11.3.1 The NPPF (“The Framework”) sets out Government’s planning policies, in support of sustainable development which it explains, has economic, social and environmental dimensions. 12 “*core planning principles*” emphasise the need to balance these interests. Whilst high quality growth and economic development is firmly supported it is also a core principle to;

“conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations”

11.3.2 Section 12 of the Framework advises on “*conserving and enhancing the historic environment*”. Planning authorities are asked to take into account;

“

- *the desirability of sustaining and enhancing the significance of heritage assets...;*
- *the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;*
- *the desirability of new development making a positive contribution to local character and distinctiveness;*
- *opportunities to draw on the contribution made by the historic environment to the character of a place”*

11.3.3 The requirement in the context of planning applications is (expressed at paragraph 128) for;

“an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting”

and

“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”

11.3.4 The Glossary to the Framework at Annex 2 includes the following **definitions** in making the necessary assessment;

Heritage Assets:	<i>“A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing)”</i>
Designated Heritage Asset:	<i>“A World Heritage Site , Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under relevant legislation”</i>
Archaeological Interest:	<i>“There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them”</i>
Significance (for heritage policy)	<i>“The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset’s physical presence, but also from its setting”</i>

11.3.5 In summary the national policy is;

- (i) to protect nationally important, designated heritage assets and their setting;
- (ii) to seek proportionate evidence and information to enable informed decisions – and this will involve desk-based assessment and field evaluation;
- (iii) to provide for excavation and investigation of below-ground archaeology not significant enough to merit in-situ preservation.

Local Plan Policy

Borough of Charnwood Local Plan 1991 – 2006

11.3.6 The Local Plan was adopted by the Borough Council in January 2004. Whilst its development allocation proposals and associated policies have time-expired a number of its development control/management policies were “saved“ by the Secretary of State in September 2007 and at the time of writing, continue to form part of the Development Plan and are material to the consideration of proposals.

- 11.3.7 The majority of the 2004 Local Plan Policies concerned with archaeology and heritage were “expired” in 2007 (replaced by generic national policy statements) but two were “saved”;

“Policy EV/2 Nationally Important Archaeological Sites:

Planning permission will not be granted for development which would adversely affect a scheduled ancient monument or other nationally important archaeological site, or its setting”

and

“Policy EV/8 Buildings of Local Historic or Archaeological Interest:

Planning permission for development which would affect a building of local historic or archaeological interest or its setting will be granted provided:

- (i) the appearance or character of the building and its setting are safeguarded; or*
- (ii) the development would result in significant local community or environmental benefits”*

Charnwood Local Plan 2011 – 2018 Core Strategy

- 11.3.8 The Core Strategy of a replacement Local Plan for Charnwood has now been adopted by the Borough Council (November 2015). The strategic priorities forming the updated development strategy include the application proposal.

- 11.3.9 The Core Strategy makes a strong and positive response to the NPPF principles in seeking to safeguard Charnwood’s heritage assets;

“Our historic environment and its heritage assets should be understood, conserved and enhanced for their own value and for their contribution to the sense of place and a quality of life of those who live in Charnwood”

- 11.3.10 **Policy CS14 “Heritage”** expresses the Borough Council’s overall formal position as follows;

“We will conserve and enhance our historic assets for their own value and the community, environmental and economic contribution they make. We will do this by:

- requiring development proposals to protect heritage assets and their setting...”*

11.3.11 In framing proposals for the “North of Birstall Sustainable Urban Extension” the Core Strategy summarises its primary consideration with regard to heritage at this location;

“9.60 The topography in this location is partially lower lying on either side of the A6 and rises towards the south west. Rothley is located to the north of this location whilst Wanlip lies to the south east of the A6/A46 roundabout. We expect the design of the sustainable urban extension to protect the identities of Rothley and Wanlip and respond to the landscape. This should include ensuring that important views are protected and, where appropriate, used to full effect.

9.61 There are a number of features in the local area which are of historic value. The nearby Rothley Conservation Area and Rothley Park are home to a number of historic buildings including the Grade 1 Listed Rothley Court Hotel and Chapel. There is also potential for unscheduled archaeology in the area. Although these historic features are outside the development location, we expect their wider setting to be borne in mind at the start of the design process”

11.3.12 With this in mind, site-specific **Policy CS20 “North of Birstall Direction of Growth”** therefore identifies the following principles;

“The sustainable urban extension will create a balanced community and a safe, high quality and accessible environment. We will do this by;

Environment:

- *Protecting the separate identity of Wanlip, Rothley and Rothley Conservation Area;*
- *Responding to the landscape and surrounding areas to create a locally distinctive development in accordance with Policies CS2 and CS11;*
- *Protecting historic and archaeological features including the setting of Rothley Park and Rothley Conservation Area in accordance with Policy CS14.*

11.4 Scoping Criteria

- 11.4.1 **Significance of potential impact** has been assessed by taking into account the sensitivity of the archaeological features and the potential magnitude of the predicted impact.
- 11.4.2 **Impact magnitude** is a function of the nature, scale and type of disturbance or damage to the archaeological/heritage resource.
- 11.4.3 Criteria for assessing magnitude or predicted impacts has been derived from an assessment of direct physical impacts contained in Design Manual for Roads and Bridges, English Heritage advice and professional experience/judgement. - see table 11.1 below

Table 11.1 Criteria for Assessing Impact Magnitude

Significance	Criteria
Major Adverse	<p>Highly significant loss of archaeological material (>60% by area) or loss of specific area of material which contribute directly to the understanding of the asset concerned;</p> <p>Serious effect on the significance of a built structure through loss of physical material;</p> <p>Serious effect on the setting of a heritage asset where setting contributes to the significance of the feature;</p> <p>Examples;</p> <ul style="list-style-type: none"> • damage to features of national importance e.g. Scheduled Monument; • demolition of Listed building; • major loss of site or dramatic change to setting ; • mitigation measures unlikely to be adequate.
Moderate Adverse	<p>Moderate loss of archaeological material (>40% by area) or loss of small specific areas of material which contribute to the understanding of the asset concerned;</p> <p>Moderate effect on the significance of a built structure through loss of physical material;</p> <p>Moderate effect on the setting of a heritage asset where setting contributes to the significance of the feature;</p> <p>Examples;</p> <ul style="list-style-type: none"> • regional or district level assets; • extensive change to setting or visual amenity; • significant change in setting.

Minor Adverse	<p>Loss of archaeological material (>10% by area);</p> <p>Low effect on the significance of a built structure through loss of physical material;</p> <p>Low effect on the setting of a heritage asset where setting contributes to the significance of the feature;</p> <p>Examples;</p> <ul style="list-style-type: none"> • local scale effects; • slight change to setting; • mitigation likely to successful.
Negligible/None	No change – insignificant effect

Sensitivity of Receptors

- 11.4.4 The sensitivity of the archaeological/heritage resource will depend on factors such as the conditions of the site and the perceived heritage value/importance of the site;

Table 11.2 Sensitivity of Receptors

Sensitivity of Receptors	Definitions
High	<p>Sites of national importance including World Heritage Sites</p> <p>Scheduled Monuments</p> <p>Archaeological sites of schedulable quality and importance</p> <p>Listed Buildings and their setting</p> <p>Registered Parks and Gardens and their settings</p> <p>Registered Battlefields</p> <p>Conservation Areas</p>
Medium	<p>Local authority designated sites e.g. locally listed buildings and their settings</p> <p>Archaeological sites or buildings of demonstrable regional importance</p>
Low	Archaeological sites or buildings with specific and substantial importance in county or locally;
Negligible	Archaeological sites or buildings of little value at local, regional or national level

- 11.4.5 The sensitivity of the receiving environment, together with the magnitude of the impact, defines the significance of the impact;

Table 11.3 Significance Criteria

Impact Magnitude	Sensitivity of Receiving Environment			
	Negligible	Low	Medium	High
Major	Negligible	Moderate	Major	Major
Moderate	Negligible	Minor	Moderate	Major
Minor	Negligible	Minor	Minor	Moderate
Negligible	Negligible	Negligible	Negligible	Minor

- 11.4.6 In this case the main possible impact types of impact on heritage assets are anticipated to be;
- of a direct nature – for example physical damage to sites. - eg construction activities involving ground disturbance could lead to permanent and irreversible damage;
 - of an indirect nature – for example visual impact to the setting of buildings, sites or features and the perception of them. Indirect impacts may be temporary – during the construction phase - or permanent if there is irreversible change to an asset's site or surroundings.

11.5 Baseline Conditions

Site Description and Context

- 11.5.1 Wanlip is a small village in the Charnwood District of Leicestershire, north of Birstall, and west of Watermead Country Park and the River Soar. The land under assessment is approximately 160ha in extent comprising two principal irregular blocks of land either side of the A6 road and lying mainly within the Parish of Wanlip, (Fig 11.1). It is agricultural land, predominantly under arable cultivation. The largest land block (Block A) is c.127ha in extent. Its irregular northern boundary partly follows the parish boundary between Wanlip and Rothley, except in the western part of the area where four fields lie within Rothley Parish and three in Thurcaston Parish. It is bounded to the west by the Great Central Railway line, the south by the A46 and the east by the A6. The triangular plot of land to the east of the A6 (Block B) is c.28ha in extent and is bounded to the east by the treatment works and to the south by the A46.
- 11.5.2 The underlying bedrock of the area is Edwalton Member Sedimentary Bedrock. West of the A6 the superficial deposits comprise Oadby Member – Diamicton. To the east of the A6, closer to the course of the River Soar, superficial (drift) deposits comprise sands and gravels (Bytham Sand and Gravel Formation), the local environment being previously dominated in this area by rivers. (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). Current ground levels vary from 53m OD in Wanlip village, rising to 68m OD in Area A west of the A6.

Baseline Survey Information

UPPER PALAEOLITHIC (15,000 - 10,000BC) AND MESOLITHIC (10,000 – 5,000BC)

- 11.5.3 A small amount of Mesolithic or early Neolithic flint was found amongst a large scatter of later material during fieldwalking in 1985/6 at Bentley's Roses. These included an awl, blades, blade cores and an end scraper (MLE 1095). A single Mesolithic microlith was found amongst a scatter of late Neolithic or Early Bronze Age flints during groundworks for the Wanlip to Rothley mains sewer pipeline in 2002 (MLE 10071) on the eastern boundary of the site. The largest concentration of Mesolithic flint found in the study area was to the east and west of the Icehouse in Wanlip village, Mesolithic flint (including a blade core) was found here between 1910 and 1920. Fieldwalking in 1982 and 1985 found a number of Mesolithic flints suggesting occupation (blades, retouched blades, microliths, blade cores etc.) (MLE 1085). Fieldwalking in 1983 and evaluation trenches at Wanlip Treatment Works in 2002, revealed 12 Mesolithic blade technology flints (MLE 1100). In the same area were a flake and an angled backed blade of Upper Palaeolithic date, the only finds of this period to be identified within the study area.

NEOLITHIC (5,000 – 1,000BC) AND BRONZE AGE (1,000BC – 800BC)

- 11.5.4 Fieldwalking in 1985 on ground above the Bentley's Roses garden centre recovered over 200 flints: cores, scrapers, knives, other tools etc, dating from the late Neolithic/Bronze Age as well as 31 sherds of late Bronze Age pottery. Further work in 1986 recovered 5 more pot sherds and more worked flint (MLE 1094). Geophysical survey in 1993 over this area recorded 2 probable enclosures and 25 pits (MLE 1093). It is assumed that these features are contemporary with the flint and pottery.
- 11.5.5 On the eastern site boundary near the treatment works (in the same area as MLE 10071 above) excavation in 1998 revealed two late Neolithic/early Bronze Age pits and a number of other features. Work in 2002 recovered further finds of this date, flints and a sherd of Peterborough ware pottery (MLE 9126). Metal detecting during 1998 excavation recovered a copper alloy chisel (MLE 9127).
- 11.5.6 Other clusters of prehistoric activity are present within the 500m study zone. On the southern fringes of Rothley an irregular ring-shaped ditch, possibly a barrow, diameter 33m was noted on aerial photographs in 1972 (MLE 885).
- 11.5.7 Excavations in 2010 on the Temple Garth site, Hallfields Lane, Rothley, revealed a range of prehistoric remains. The earliest of these was a rare early Neolithic site comprising at least four structures, 5 'working hollows' and various pits. Within the hollows were over 1000 objects (pottery sherds and worked lithics) (MLE 19773). A circular structure composed of c.50 post holes was also recorded (MLE 19772). A small amount of Bronze Age flint was recovered from Areas 2 and 4 during these excavations (MLE 19774). Bronze Age material was also found north east of the Neolithic complex, including a pit containing a collared urn and a second vessel of unknown form (MLE 19767). A post hole containing a fragment of a Bronze Age beaker was found west of the Neolithic complex, during the same programme of investigation (MLE 19768).
- 11.5.8 A second concentration of prehistoric finds was recorded just north of the treatment works, east of the site. On the site which produced small quantities of Palaeolithic and Mesolithic material (MLE 1100 and 17515, see above) fieldwalking in 1983 recovered cores, flakes, scrapers, a preform and notched knife of Late Neolithic/Bronze Age date. Fieldwalking and trial trenching in 2002 found further flint of this date (MLE 1102).
- 11.5.9 In the northern part of the study area, close to the A6, a small concentration of discrete clusters of pits and post holes, which were apparently delimited to the north and south by linear features along the route of the Wanlip-Rothley pipeline in 2002. A small scatter of unstratified worked flints was recovered from the vicinity of the features (MLE 9528). A group of linear features was found to the south of these features and thought to represent an associated field system (MLE 9530).

- 11.5.10 A late Neolithic/early Bronze Age flint scatter was recorded during fieldwalking for the A46 Western Bypass in 1992. The flints included scrapers, arrowheads, cores, a knife and a piercer. Subsequent evaluation on the northern edge of the scatter was negative. (MLE 7167). A subsequent watching brief during construction of the bypass in 1993 recovered a large amount of flint, probably Neolithic to early Bronze Age (MLE 7435). This site was close to the area where flints including a blade core, blade, flakes, a struck fragment and a scraper were found in the 1980s, west of Ryeclose Spinney and Manor Farm (MLE 7434).
- 11.5.11 Immediately south of site MLE 7434 another scatter of flints was identified during fieldwalking in 1982, 1985 and 2009. These included Neolithic and Bronze Age arrowheads and scrapers (MLE 1087). This was on the same site as a concentration of Mesolithic flints (see MLE 1085 above). A sub-rectangular cropmark enclosure was noted on an aerial photo on the western edge of this flint scatter (MLE 9539).
- 11.5.12 Farther east on the eastern limits of the study area near the banks of the River Soar ditches and pits were revealed during excavations in 1998. Some of the features contained late Mesolithic/early Neolithic flints. This site seems to represent riverside activity with on-site flint tool production as well as possible bone working and/or meat consumption (MLE 9154).
- 11.5.13 In the south-western part of the study area is further evidence for pre-historic occupation during fieldwalking in 1986 and further worked flint was found in 2001 and 2003. Geophysical survey in 2003 and 2004 located areas of possible archaeological remains (MLE 7432). A Bronze Age pit containing 15 sherds of pottery was excavated in this paddock in 2005 (MLE 17386). Just outside the study area further evidence for Neolithic/Bronze Age occupation was found in 2005 when 9 sherds of Neolithic pottery and 8-9 Bronze Age Collared Urns plus worked flints were found (MLE 17385).

IRON AGE (800BC – AD43)

- 11.5.14 There is one focus of Iron Age activity on the site, located on the eastern boundary near to the treatment works. In the south-east corner of the field, adjacent to the A46, a small sub-rectangular enclosure was noted on Cambridge University aerial photographs. Excavation in 1992/3 revealed a Middle Iron Age farmstead consisting of a roundhouse, enclosure, rectangular structures and evidence of an un-urned cremation burial (MLE 1092).
- 11.5.15 In 1998 two pits containing Iron Age pottery and a triangular loom weight were found in the same zone where pre-historic remains were also recorded (see above). More Iron Age pits and two phases of a circular structure, one overlying the other, was found in 2002 (MLE 9124). Geophysical survey in 1998 recorded a possible enclosure ditch and ring ditch. Trial trenching in 1998 recorded 4 ditches, 3 gullies, a post hole and pit in the area but there was no further dating evidence (MLE 20676).

- 11.5.16 Excavation in 2010 recorded a number of gullies/ditches making up an Iron Age field system and a pit containing four saddle querns. It appears that this may have been an act of deliberate deposition. 186 sherds of pottery were recovered from the area (MLE 19769). To the north of the site a rectilinear cropmark enclosure shows up on a 1970 aerial photograph. Other less distinct marks and a ring ditch lie to the north-west (MLE 10301).
- 11.5.17 South of the A46 various anomalies were recorded by Geophysical survey in 2001. Trial trenching later in 2004 confirmed the presence of a large rectangular enclosure containing pits. 41 sherds of Iron Age pottery were recovered (MLE 17180). The ditches and enclosure may have been part of livestock management. To the west of this site in the large paddock where pre-historic remains were also found (see MLE 17386 above) were two small enclosures, thought to be Iron Age in date and part of a long curving ditch, thought to be a field boundary, containing 29 sherds of Iron Age pottery. These two sites are thought to be associated with a farmstead (MLE 1104), excavated in the same year, which lay just outside the study area.

ROMAN PERIOD (AD43 – AD410)

- 11.5.18 Evidence for Roman occupation within the site boundary and the surrounding study area is sparser than for the pre-historic periods. On the site itself it is again on the eastern site boundary that evidence was found in 1998 for a metalled road surface and side ditch (MLE 9125) in the vicinity of the Iron Age site (MLE 9124 see above). A corn drier was found close by (MLE 9128). Further work on the same site in 2002 recorded significant Roman remains including two rectangular structures associated with over 100 sherds of 3 – 4th century pottery.
- 11.5.19 Excavations on the Temple Garth site, Hallfields Lane, Rothley, in 2010 in the vicinity of the large pre-historic site (MLE 19768, 19772 and 19773 see above) also recorded part of a large double ditched enclosure. The ditches contained Roman pottery, tile and wall plaster so it is possible a villa lay nearby (MLE 19770).
- 11.5.20 The third area with evidence for possible Roman occupation lies close to the Neolithic site by the River Soar in the south-eastern part of the study area. A collection of 33 sherds of Roman pottery (28 grey ware, 2 black burnished, 2 Samian and 1 rim-sherd of stamped mortarium) were found 'in disturbed banks or mounds near the church' in the mid 20th century (MLE 1107). Roman pottery was also found on the Iron Age site west of the church in 1998 and 1990 (MLE 9156). Some of the ditches and other features may have been Roman.
- 11.5.21 A Roman brooch was found on the site of the treatment works in 1964 (MLE 7795) and more recently metal detected finds include brooches from near the railway line, west of the site (MLE 7787 and 7788), on the site of the roundabout at the junction of the A6 and A46 (MLE 7796) and south the A46 (MLE 9670). So far no associate Roman material has been reported from these findspots. A single piece of Roman tile was found in a field south of the A46 (MLE 20081).

EARLY MEDIEVAL (AD410 – AD1066)

- 11.5.22 Excavation in 1998 at Gravelhole Spinney recorded three possible sunken featured buildings, one of which contained early Anglo-Saxon pottery and 3 loom weights. Further work in 2002 extended the site to the west and south-west, discovering another sunken featured building, pits, pottery, animal bone (MLE 9123).
- 11.5.23 Excavation in 2010 at the Temple Garth site, Hallfields Lane, Rothley revealed a probable sunken featured building, containing 58 sherds of early Anglo-Saxon pottery. Both these sites were multi-period.
- 11.5.24 Evidence for Anglo-Saxon activity is more difficult to assess than for other periods where pottery is recorded, without associated features. This is because some of the hand-made pottery is similar to Iron Age pottery. Pottery sherds found in 1985 at MLE 6122, 6123 and in 1992 (MLE 6124) come from areas where pre-historic material has also been found and re-examination of the material would be useful. That being said evidence for two sites where buildings have been identified were also multi-period sites.
- 11.5.25 In addition to the evidence for occupation a Pagan Anglo-Saxon inhumation cemetery was found at the southern edge of the study area in 1958 during construction of Longslade School. Finds were made but no actual burials seem to have been recorded, suggesting earlier disturbance. The area immediately to the north of the school was metal detected in the early 1990s. The headplate of an Anglo-Saxon cruciform brooch, a pair of side knobs from a florid cruciform brooch and bucket fittings were found (MLE 1098).

MEDIEVAL (AD1066 – AD1486)

- 11.5.26 Medieval features are concentrated in the areas of existing settlement at Wanlip (MLE 1112). An area around Wanlip Parish Church has a group of banks and terraces thought to represent shrunken village features and/or garden terraces for Wanlip Hall (MLE 1108). Excavation in 1998 recorded the wall footings of a substantial north-south wall built during the C14th. The wall was robbed and superseded at some time between the C16th-C18th by another wall that used the remains of the medieval boundary as a foundation (MLE 9158). During fieldwalking in 2009, two sherds of late medieval pottery were recovered (MLE 20082) on land south-west of Manor Farm and Hall Farm.
- 11.5.27 A medieval lead spindle whorl was found in parkland south of Rothley Temple (MLE 6672). A half groat of Edward III and a long cross penny of Henry III was found north east of Breech Spinney in the 1990s (MLE 6687 and 6688) along the route of the A46 bypass.

POST-MEDIEVAL AND MODERN (AD1486 – PRESENT)

- 11.5.28 During fieldwalking in 2009, a scatter of post-medieval to modern pottery was recovered in the area close to the medieval pottery discovered east of A6, south of A46 (see MLE 20082 above). This is likely to represent manuring practices (MLE 20083).

11.5.19 The fields in the main part of the site were created at the time of enclosure. Remnants of medieval cultivation remain. The A6 which bisects the two main parts of the site was the “London to Manchester Turnpike Road” (MLE 20648) running between Loughborough and Market Harborough in Leicestershire. The route of the Great Central railway forms part of the western site boundary. It was opened in 1899 and closed in 1969. It now operates as a preserved steam railway, currently for leisure purposes with longer term potential.

MAP REGRESSION

11.5.30 There is no enclosure or tithe award map for Thurcaston.

Rothley Estate Map 1780

11.5.31 Block A extends into Rothley Parish and the 1780 estate map shows 9 fields within the Site boundary. The apex of the triangular boundary is part of a larger field.

Wanlip Tithe Award Map 1839

11.5.32 Block A. Along the sinuous northern boundary is a belt of trees. There are 15 fields with a small building in Field 93, towards the northern boundary. Buildings are also shown in two locations on the east side of this land block, adjacent to the road. The southern site boundary does not follow a regular line of the field boundaries.

11.5.33 Block B. To the east of the road there are 10 fields and four small spinneys, the largest being near the centre of the site. There is one at the apex of the Site, a third lies on the main road, opposite the farm in Block A and the fourth, in the south-east corner. There is a small rectangular outbuilding north of the central spinney and a track follows the eastern site boundary.

Ordnance Survey 1884 1:2500

11.5.34 Block A extends into Thurcaston Parish but the Site boundaries only respect much later features. The land comprises parts of 6 fields and a further four entire fields. A tiny rectangular copse is present close to the point where the three parish boundaries meet.

11.5.35 In Rothley the nine fields depicted on the estate map 1780 have been reduced in number to five. The triangular spur of land has been planted with copse.

11.5.36 In Wanlip Parish the belt of trees along the northern Site boundary is named Broadnook Spinney. There is a pond, close to the spinney but the outbuilding on the tithe map has gone. The farm on the main road has been enlarged with a large courtyard, and labelled Wanlip Hill. The second building on the main road, to the south of Wanlip Hill, shows surrounding trees. A small outbuilding is shown near the southern Site boundary.

11.5.37 Block B is the same as shown on the tithe map, except for the small outbuilding, which has now gone, although the kink in the field boundary is retained.

Ordnance Survey 1903 1:2500

11.5.38 With the arrival of the Great Central railway in 1899 the field boundaries were re-aligned in the north-west corner of the Site.

11.5.39 Block B is the same as shown on the tithe map.

A notable and consistent feature is a landscape including woods, spinneys and copses.

Ordnance Survey 1929-30 1:2500

11.5.40 Both land blocks are as depicted on the 1903 map, except that the spinney in Block B is named Gravelhole Spinney.

Ordnance Survey 1938 1:10560

11.5.41 Both land blocks are as depicted on the 1929 – 30 map.

Ordnance Survey 1956-57 1:2500

11.5.42 Block A – there is a pond in the south-east field, near the main road.

Block B – is the same as shown on the 1929 – 30 map.

Ordnance Survey 1967-72 1:2500

11.5.44 Block A – as 1956 except the farm courtyard on Wanlip Hill has been infilled. The area is labelled Nursery. There is a windpump and a second area labelled Nursery, to the west of the farm.

11.5.45 Block B – is the same as shown on the 1929–30 map but shows the treatment works which were built in 1964.

Ordnance Survey 1985 1:10000

11.5.46 Block A – additional buildings have been constructed south-west of the farm at Wanlip Hall.

Block B – is the same as shown on the 1967 – 72 map.

SITE VISIT

11.5.47 A site visit was made on 19 February 2013.

Block A. Land West of the A6

11.5.48 Block A is the largest of the areas under consideration and lies west of the A6 and north of the A46. It excludes the property Hill Top and outbuildings formerly belonging to Bentley's Roses lie within the boundary, as does the garden buildings display area. The agricultural land is bounded to the north by a belt of trees (Broadnook Spinney), which runs along part of the parish boundary between Wanlip and Rothley. A small stream also follows this boundary. The land east of Broadnook Spinney is divided into rectangular fields, the majority of which are bounded by traditionally laid hedges, interspersed with a limited number of mature trees. Land west of Broadnook Spinney has a less regular field pattern. The vast majority of the land is under arable cultivation.

Block B. Land East of the A6

11.5.49 This triangular block of land lies east of the A6, bounded to the east by the treatment works and to the south by the A46 and by its predecessor, the former Fillingate (A607). The ground rises gently from the south to a plateau north of a spinney, before falling gradually to the north and north-east. It is currently under arable cultivation. Some hedge boundaries have been removed leaving a small triangular field at the north end of the Site, and a large field comprising the remainder of the site. Gravelhole Spinney is located near the centre of the site and there are small spinneys in the south east corner and at its northern apex.

Land South of the A46 in Wanlip Village

11.5.50 This area comprises a grass paddock west of Manor Farm on Rectory Lane and includes 20th century farm sheds to the north and west – a largely redundant farmyard site and buildings formerly used in connection with dairy farming.

FIELDWALKING

11.5.51 In October 2013 a fieldwalking survey was undertaken by Cotswold Archaeology over farmland near Wanlip. The survey, which was commissioned by Prospect Archaeology, covered three areas (45.1ha) to the west and north-west of the village. The survey had originally intended to include a fourth area immediately to the west of the village but this was omitted because of access restrictions.

11.5.52 The distribution of pre-historic worked or modified flint shows an apparent concentration in the southern part of Area A. However, the assemblage contains only one item, part of a Mesolithic or Early Neolithic blade, which cannot be dated with any certainty, so it is not clear if the material is associated with a relatively narrow period of activity on the site, perhaps dating to the Mesolithic or Early Neolithic periods, or is the result of accumulation over millennia in an area that was generally favourable for this activity.

15.5.53 The medieval and post-medieval material was probably introduced to the site through manuring or the opportunistic dumping of rubble around the edges of the fields. The greater incidence of post-medieval/modern material in the central and western part of Area 1 shown on Fig11.2 is assessed to be accounted for by past activity along the railway line and around a 19th century building near Bridle Road Spinney.

GEOPHYSICAL SURVEY

- 11.5.54 A magnetometer survey was undertaken across all available land in October – December 2013 by Phase SI. Whilst a number of anomalies were identified across the site, those in the central northern part of the site (Area 2 shown on Fig 11.2) are the only ones that can confidently be associated with archaeological activity.
- 11.5.55 Two sub-rectangular enclosures were identified close to one another and cut by later field boundaries. The enclosures appear to contain evidence for sub-divisions and two possible roundhouses may also be located within the more southerly of the two. The results were fragmentary, suggestive of plough damage. Other anomalies across the site may also have archaeological origins but, perhaps as a result of truncation, produced no clear discernible patterns.

11.6 Summary and Potential for Archaeological Finds

For this development the main possible types of impact on sites of archaeological interest are anticipated to be;

Direct Impacts

Physical damage to sites, whether recorded or, as yet, undiscovered. Due to the nature of the proposed development most direct impacts will be irreversible to permanent. With most of the ground disturbances occurring during the construction stage it is at this time that potential direct impacts on the archaeological resource are most likely - eg topsoil stripping, excavation, machine movement, ground * placement of temporary soil or construction material storage.

Indirect Impacts

Visual impacts on the setting of sites, buildings or features because of changes in the perceptions of those features as a result of the development. These indirect impacts many occur during the construction phase and / or subsequent use of the site. Indirect impacts may be temporary, during the construction phase, or permanent.

11.7 Designated Heritage Assets

- 11.7.1 Built heritage includes listed buildings, conservation areas, registered parks and gardens, and scheduled monuments. It also includes non-listed buildings of local architectural or historic interest which are included in the Historic Environment Record. All statutorily protected built heritage assets are of national importance.
- 11.7.2 There are four designated Conservation Areas in the combined parishes of Rothley, Thurcaston and Birstall; (see **Appendix 11.4**)
- (i) **Rothley Conservation Area** covers the older parts of the settlement focusing on Cross Green, Town Green and the Church of St Mary the Virgin and St. John the Baptist. It was designated in 1972. Some 28 listed buildings and structures together with a scheduled monument, the Saxon Rothley Cross, in the Churchyard form an important heritage resource.
 - (ii) **Rothley Ridgeway Conservation Area**, designated in 2010, embraces the historic Rothley Temple and surrounding parkland to Rothley Brook and an area established in the early 20th Century as the Rothley Garden Suburb. A number of statutory listed and locally listed buildings and dwellings are highlights in an area of high quality housing in a heavily landscaped setting.
 - (iii) To the west of the Broadnook site, beyond the Great Central Railway sits the settlement of **Thurcaston**. Its historic core is centred around the Church of All Saints and was designated a **Conservation Area** in 1988. It includes some 18 listed buildings and structures.
 - (iv) The **Birstall Conservation Area**, designated in 1984, covers the historic core of what is now a significantly enlarged community with very large areas of mid to late 20th Century housing and additional expansion at 'Hallam Fields' currently being completed. This Conservation Area is some 2.5km away from the study area and proposals will not interact or be of any significance in terms of prospective impact on this heritage asset or its setting.
- 11.7.3 There are **two Scheduled Monuments** within 1km of the Site; (see **Appendix 11.4**)
- (i) The site of a Roman villa – is designated as a Scheduled Monument at a site close to the junction of The Ridgeway, Station Road and Swithland Lane;
 - (ii) Mercian Cross, St. Mary and St. John's churchyard, Rothley.

11.7.4 There are listed buildings within 1km of the Site that lie outside of Conservation Areas;

- (i) Church of St. Nicholas, Church Road, Wanlip (Grade II, NHL 1177761)
- (ii) Ice House, off Rectory Road, Wanlip

11.7.5 Manor Farm and Hall Farm on Rectory Road at Wanlip are undesignated assets having been “locally listed” by the Borough Council. The farm buildings on the A6 that were formerly part of Bentley’s Roses and lie within the Site are of local historical interest but are not listed.

11.8 Impact Assessment

- 11.8.1 There are no designated heritage assets within or at the edge of the application site; there are no direct impacts therefore on built heritage assets. The potential impact on built heritage assets is considered in terms of potential for indirect impact on their settings.
- 11.8.2 Birstall Conservation Area is outside the wider study area. The Conservation Areas of Thurstaston, Rothley and Rothley Ridgeway are within the wider study area. Distance, topography, mature vegetation and lack of intervisibility combine to ensure that there will be negligible impact on these heritage assets and their settings.
- 11.8.3 The two Scheduled Monuments are not intervisible with the Site and would suffer no impact as a result of development.
- 11.8.4 The two listed buildings/ structures located within the search area but outside of Conservation Areas are not intervisible with the Site and neither direct nor indirect impacts are predicted.
- 11.8.5 The buildings at Hall Farm and Manor Farm, Wanlip are locally listed. These buildings were the subject of a building survey and assessment prior to recent refurbishment and redevelopment. The former agricultural buildings at Wanlip Hill Farm, Bentley's Roses buildings may require building survey and assessment in advance of development.

Undesignated Heritage Assets

- 11.8.6 There are 3 sites of known undesignated heritage assets within the site recorded in the HER and/or identified by geophysical survey and fieldwalking. It is also possible that other sites of as yet unidentified heritage assets exist. The three areas of interest are shown on Fig X numbered and defined as follows:
1. Flint scatter indicating the possible location of a pre-historic settlement or other activity area;
 2. Iron Age and/or Romano-British enclosure and settlement identified from geophysical surveys and evaluation excavation;
 3. An Iron Age enclosure excavated in advance of road construction in the south-eastern part of the site. It is unknown whether further features relating to this site extend beyond the excavated area.

11.9 Key Impacts and Likely Significant Effects

(i) Direct Construction Impacts

Construction processes within the Site which could affect archaeological assets encompass the following;

- Ground levelling exercises;
- Foundations for new structures;
- Infrastructure (including roads);
- Ground works associated with construction of cranes and other necessary plant;
- Services installations; and
- Hard and soft landscaping.

(ii) Indirect Impacts of Development

Indirect impacts involve implications of development on heritage assets off-site, including any potential visual impacts of the proposals on the setting of the heritage assets - Conservation Areas, Scheduled Monuments and listed buildings (within and outside the conservation areas)

English heritage recommend a stepped process to examine indirect impact. The initial steps are to consider prospective impact on setting and any mitigation by design or enhancement. If necessary further steps may be required. As anticipated by the Charnwood Core Strategy the iterative design process has ensured that setting of the assets has been fully considered and is confirmed by the initial steps.

Table 11.4 Summary of the heritage and archaeological assets within the study area, their sensitivity and the anticipated impact prior to mitigation.

Cultural Asset	Status	Description of Impact	Sensitivity of Receptor	Magnitude of Impact	Impact Significance
Possible Neolithic site (flint scatter) Site 1	Undesignated	Total loss of heritage asset	Medium	Direct Major Adverse	Medium
Iron Age/ Roman-British enclosure and settlement (geophysical survey and evaluation) Site 2	Undesignated	Total loss of heritage asset	Medium	Direct Major Adverse	Medium
Iron Age enclosure (excavation) Site 3	Undesignated	Minor effect on heritage asset	Low	Direct Minor Adverse	Low
As yet unidentified heritage assets	Undesignated	Total loss of heritage asset	Unknown	Unknown	Unknown
Rothley Conservation Area	Designated conservation Area (1972)	None	High	Negligible	Negligible
Rothley Ridgeway Conservation Area	Designated Conservation Area (2010)	None	High	Negligible	Negligible
Birstall Conservation Area (Outside study area)	Designated Conservation Area (1984)	None	High	Negligible	Negligible
Thurcaston Conservation Area	Designated Conservation Area (1988)	None	High	Negligible	Negligible
Listed Buildings outside Conservation Areas	Statutory Listed and Locally Listed	None	High	Negligible	Negligible

11.10 **Cumulative Impacts (if any)**

No cumulative impacts have been identified.

11.11 **Mitigation, Enhancement and Residual Effects**

Mitigation Strategy

11.11.1 Potential impacts can be offset by mitigation strategies devised in response to the sensitivity of the Archaeological and Cultural Assets. The typical range of archaeological responses is shown below.

Table 11.5 Hierarchy of Response

Process	Method	Objective
Evaluation	Sample excavation test pits, trial trenches	To evaluate how well the archaeological evidence, identified above, is preserved. And to confirm that the blank areas in the geophysical and field artefact surveys are genuine
	Visualisations and photomontages	To quantify the magnitude of impact on setting by visual representation
Mitigation	Full excavation, preservation in situ or a combination of these	To identify a means of mitigating the effects of development on archaeological evidence. The first principle of NPPF is preservation in situ for significant sites, for less significant sites preservation by record is acceptable
	Mitigation by Design	To reduce the visual effects of development through design to the point at which they do not constitute harm for the purposes of NPPF and Core Strategy Policy

Below Ground Archaeological Assets

11.11.2 None of the known undesignated heritage assets is of greater than regional significance and there would be no requirement for physical preservation in situ. Proportionate and targeted trial trenching is proposed to be undertaken at the pre-or post-planning stage prior to any enabling works to confirm the geophysical and fieldwalking results. The final method of investigation will be agreed in consultation with Charnwood Borough Council as part of the planning application process. The area of the hybrid planning application the subject of detailed proposals will incorporate a scheme of trial trenching prior to determination and/or implementation leading to preservation by record.

The detailed information gained from these techniques will inform the Project Design – prospectively a programme of limited excavation to achieve preservation by record – an approach that is consistent with local practice and evident at a range of sites in this area of interest.

The residual impact of development of undesignated heritage assets will be Direct Minor Adverse

Designated Heritage Assets

11.11.3 There are no important designated assets on site;

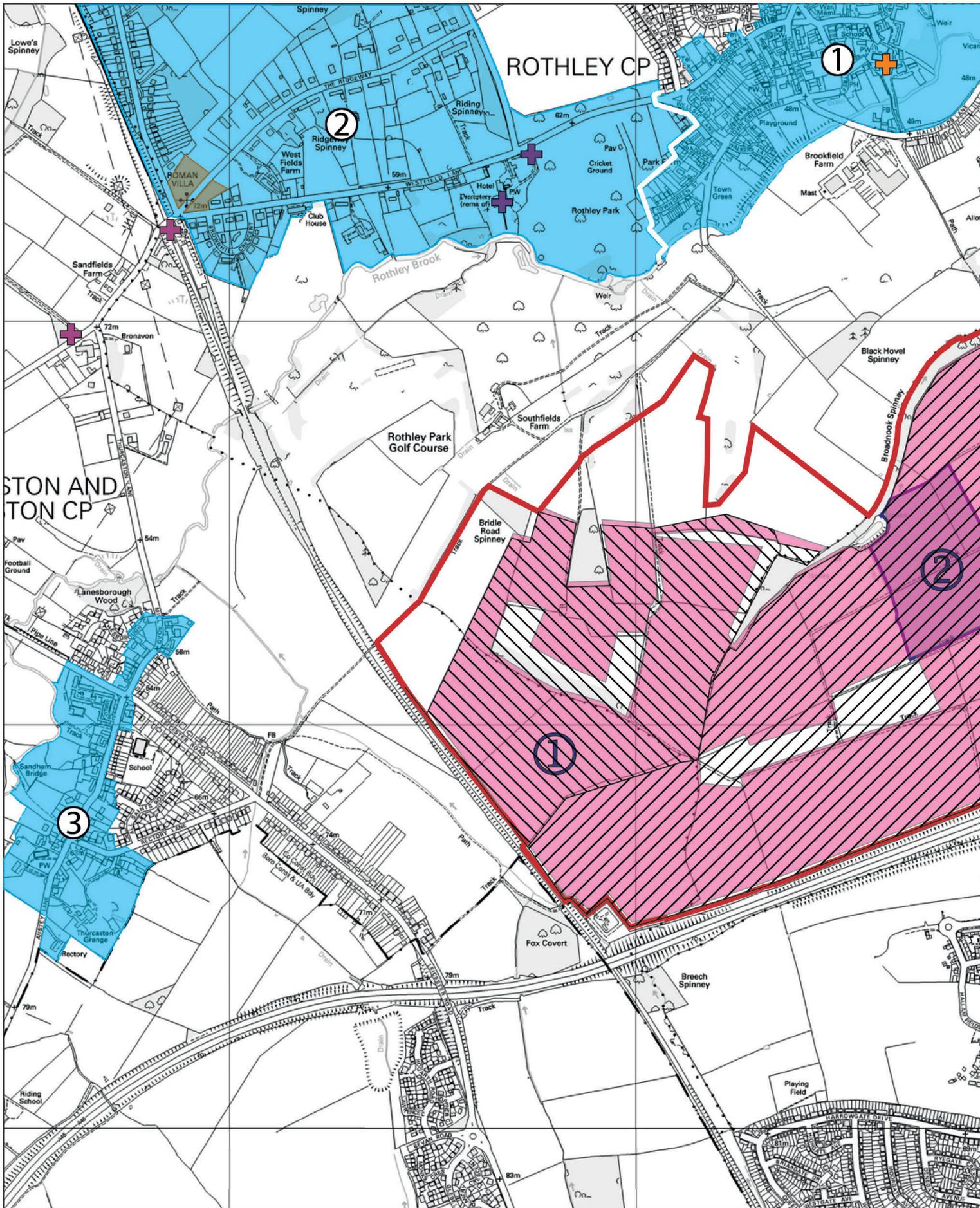
- Nearby Conservation Areas and other designated heritage assets including Listed Buildings and Structures will experience no impacts from development;
- The masterplan will not impact on intervisibility between the Site and designated heritage assets, nor will there be an impact on intervisibility between heritage assets;
- The Significance of the physical presence of the identified heritage assets and their settings will not be affected.
- The proposals will have a negligible effect on the appreciation of architecture and the historic legibility of the respective Conservation Areas;
- The potential impact on designated heritage assets will be Negligible and no mitigation is therefore considered necessary.

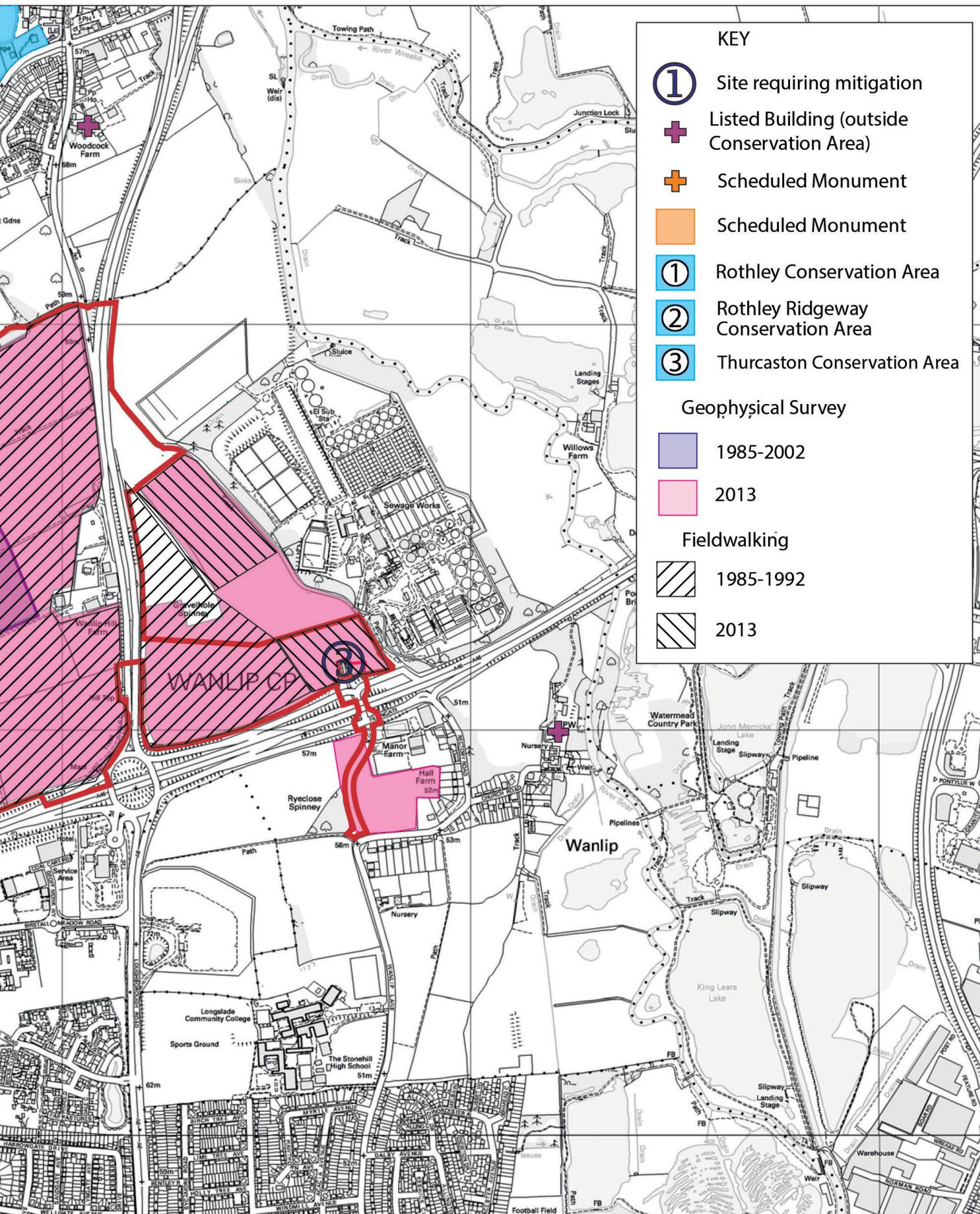
Table 11.6 Heritage and Archaeological Assets – Residual Impacts after Mitigation

Cultural Asset	Status	Description of Impact	Sensitivity of Receptor	Mitigation	Magnitude of Impact	Impact Significance
Possible Neolithic site (flint scatter) Site 1	Undesignated	Total loss of heritage asset	Medium	Trial trenching leading to preservation by record	Minor	Minor Adverse
Iron Age/ Romano-British enclosure and settlement (geophysical survey and evaluation) Site 2	Undesignated	Total loss of heritage asset	Medium	Trial trenching leading to preservation by record	Minor	Minor Adverse
Iron Age enclosure Site 3	Undesignated	Limited Impact on heritage asset	Low	Trial trenching and evaluation	Low	Negligible
As yet unidentified heritage assets	Undesignated	Total loss of heritage asset	Unknown	Unknown	Unknown	Unknown
Rothley Conservation Area	Designated Conservation Area	None	High	None	Negligible	Negligible
Rothley Ridgeway Conservation Area	Designated Conservation Area	None	High	None	Negligible	Negligible
Birstall Conservation Area	Designated Conservation Area	None	High	None	Negligible	Negligible
Thurcaston Conservation Area	Designated Conservation Area	None	High	None	Negligible	Negligible
Listed Buildings outside Conservation Area	Statutory Listed and Locally Listed	None	High	None	Negligible	Negligible

11.12 Residual Effects

- 11.12.1 When the archaeological fieldwork and post – excavation work has been completed, preservation by record will have been achieved. As the records and finds from this work will be archived at a suitable institution the residual impact will be **negligible**. The potential impact on designated heritage assets will be **negligible**.
- 11.12.2 The application proposals are policy compliant when judged against the guidance, advice and provisions of the National Planning Policy Framework and the Charnwood Local Plan Core Strategy.





KEY

- 1 Site requiring mitigation
- + Listed Building (outside Conservation Area)
- + Scheduled Monument
- Scheduled Monument
- 1 Rothley Conservation Area
- 2 Rothley Ridgeway Conservation Area
- 3 Thurcaston Conservation Area

Geophysical Survey

- 1985-2002
- 2013

Fieldwalking

- 1985-1992
- 2013

12

Drainage and Flood Risk



Broadnook Garden Suburb

Environmental Statement

12.0 Drainage and Flood Risk

12.1 Introduction

- 12.1.1 The Broadnook Garden Suburb proposal North of Birstall is described in Chapter 3 and 6 of the Environmental Statement (ES).
- 12.1.2 This chapter, prepared by Brookbanks Consulting, presents information related to groundwater (hydrogeology), surface water (hydrology) and flood risk as part of the Environmental Impact Assessment (EIA). Potential environmental impacts associated with issues assessed in this chapter interact with other parts of the EIA – for example Ecology and Biodiversity (Chapter 8). This Chapter should also be read in conjunction with the site-specific Flood Risk Assessment (FRA) and its associated document “Storm Water Technical Advice”. Both documents are included in ES Volume 2 as technical appendices and support the outline and detailed components of the hybrid planning application
- 12.1.3 A baseline position for hydrology and hydrogeology has been established from a variety of sources. Receptors of potential environmental effects associated with surface and sub-surface hydrology from the proposed development have been identified.
- 12.1.4 The assessment includes mitigation measures and evaluates residual effects. It covers both construction and operational phases of the Garden Suburb proposals.

12.2 Assessment Methodology

- 12.2.1 The ES Scoping Report (see **Appendix I**) defined a study area for the assessment.
- 12.2.2 The red-line application boundary includes land both sides of the A6 within the study area. The Broadnook Framework Plan and Parameter Plans define the disposition of land uses and primary infrastructure. (See ES Chapter 6)
- 12.2.3 Whilst the red-line application area includes land and new uses west and east of the A6 built development is confined to the west within the north-west quadrant formed by the A6 and A46 primary roads and Great Central Railway.
- 12.2.4 The application site and Parameter Plans confirm that very significant areas (some 52% of the overall Framework Plan Area) are given over to multi-purpose “green infrastructure” which is a key element of the proposed garden suburb character.
- 12.2.5 This chapter has been prepared in support of the planning application for the proposed development as shown on the Broadnook Framework Plan and associated Parameter Plans and to ensure robust delivery of proposals, if approved.
- 12.2.6 The site-specific Flood Risk Assessment (FRA) which informs the EIA has been prepared in accordance with the National Planning Policy Framework and associated Technical Guidance. It includes details of the existing drainage of the site and presents a framework surface water drainage scheme to accommodate the overall new development and supports detailed proposals for a prospective first phase.
- 12.2.7 A desk-based study involving a review of available information has been complemented by site visits and consultation and dialogue with stakeholders – including statutory bodies and interested parties;
- Environment Agency (in respect of flood risk and drainage matters)
 - Severn Trent Water (foul water issues)
 - Leicestershire County Council (lead flood authority)
 - Charnwood Borough Council (potential Adopting Body and planning authority)
- 12.2.8 A detailed topographical survey has been completed to identify ground levels and features within the assessment boundary.
- 12.2.9 Geological and hydrogeological information for the site has been sourced from the site ground conditions appraisal and associated Envirocheck report, British Geological Survey and Environmental statutory registers (refer to Chapter 10 and Appendices).
- 12.2.10 The format of this chapter follows a conventional study pattern – by setting out an appraisal of baseline conditions followed by a description of the proposed development and the identification of potential environmental effects due to the proposed development. The significance of each potential effect is considered and any mitigation and/or enhancement measures identified. If any additional investigation or assessment is necessary or desirable this is also stated.

- 12.2.11 Methods of assessment follow current guidance and recommendations as set out in statutory documents and recognised publications.
- 12.2.12 The potential effects and magnitude of effects on each receptor have been assessed using the criteria in Tables 12.1 and 12.2 below informed by the baseline assessment, stakeholder consultation and professional experience/judgement.
- 12.2.13 In order to assess the impact significance of the proposed development on identified receptors, the characteristics of each identified impact at the construction and operational stages have been considered in accordance with;
- i the **sensitivity** of the receiving environment
 - ii **direction** – positive, negative or neutral impact
 - iii **extent** – amount or level of impact
 - iv **magnitude** – extent (area in hectares, linear metres)
 - v **duration** – in time or related to species life-cycles
 - vi **reversibility** – permanent or temporary impact
 - vii **timing and frequency** – e.g. related to breeding seasons
 - viii **cumulative impacts** – from combined sources
- 12.2.14 Therefore the significance of effects has been determined from the importance of the receptor, the magnitude of the impact and, where appropriate, the likelihood of the effect occurring using the effect significance matrices below;

Table 12.1 Magnitude of Effect

Magnitude	Criteria
Major (or substantial)	Loss of Attribute
Moderate	Losses on integrity or partial loss of attribute
Minor (or slight)	Minor impact / minor loss of attribute
Negligible	Insignificant loss of attribute that does not affect use or integrity

Table 12.2 Significance of Effect

Magnitude	Importance			
	Very High	High	Medium	Low
Major (or substantial)	Severe	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Not Significant
Minor (or slight)	Minor/ Moderate	Minor	Not Significant	Not Significant
Negligible	Not Significant	Not Significant	Not Significant	Not Significant

12.2.15 If required, mitigation measures have been developed for each identified impact informed by best practice and professional judgement. The magnitude of effects following the application of any identified mitigation measures is the residual impact. This is then assessed with reference to the extent, magnitude and duration of the effect and performance against established environmental quality standards – with reference to Tables 12.1 and 12.2.

12.3 Planning Context

National Context

12.3.1. Where relevant, the assessment takes into account a wide range of legislative and guidance documents that govern the protection of water resources in the UK.

12.3.2 These include;

- National Planning Policy Framework (NPPF) (“The Framework”) (2012)
- The Flood and Water Management Act (2010)
- Water Resources Act (1991)
- Water Framework Directive (2000)
- Water Act (2003)
- Environment Act 1995 (as amended)
- Land Drainage Act 1991 (amended 1994)
- UK Water Supply Regulations 2001
- The EC Groundwater Directive 80/68/EC and Groundwater Regulations 1998
- Groundwater Protection Policy and Practice (Environment Agency) 2006

12.3.3 Non-statutory guidance material includes a range of CIRIA (Construction Industry Research and Information Association) reports;

- B104 Design of Flood Storage Reservoirs (1993)
- C142 Control of Pollution from Highway Drainage Discharges (1994)
- C156 Infiltration Drainage – Manual of Good Practice (1996)
- C522 Sustainable Urban Drainage Systems Design Manual for England and Wales (2000)
- C532 Control of Water Pollution from Construction Sites – A Guide to Good Practice (2001)
- C609 Sustainable Drainage Systems – Hydraulic Structural and Water Quality Advice (2004)
- C697 The SUDS Manual (2008)
- WO45a Best Evaluation Tool (Sustainable Drainage)

12.3.4 **The National Planning Policy Framework (NPPF) (“The Framework”)** was published in March 2012 and replaced a range of Planning Policy Guidance and Statements. NPPF is supported by Technical Guidance. The Framework recognises the challenge of climate change and flooding. It advises;

“Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas of highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Local Plans should be supported by Strategic Flood Risk Assessment... Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by;

- *applying the Sequential Test*
- *safeguarding land from development that is required for current and future flood management*
- *using opportunities offered by new development to reduce the causes and impacts of flooding*

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding... The Strategic Flood Risk Assessment will provide the basis for applying this test.*

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific flood risk assessment following the Sequential Test...

For individual developments on sites allocated in development plans through the Sequential Test, applicants need not apply the Sequential Test...

(NPPF paras 100 – 103)

12.3.5 Government’s policies and guidance on conserving and enhancing the natural environment are also included in the NPPF. In preparing proposals for development the interaction between drainage, the water environment and nett potential for gain in green infrastructure and biodiversity is an important consideration.

* The Framework and its Technical Guidance categorises “flood zones” into three levels of risk:

Flood Zone		Annual Probability of Flooding
Zone 1:	Low Probability	<0.1%
Zone 2:	Medium Probability	0.1 – 1.0%
Zone 3a/3b:	High Probability	> 1.0%

- 12.3.6 In reviewing its **Borough of Charnwood Local Plan 1991 – 2006** (adopted 2004), the Borough Council has followed the recommended plan-making methodology. As part of its evidence base for the **new Local Plan Core Strategy 2011 – 2028** the Council commissioned **ENTEC** to undertake a **Strategic Flood Risk Assessment (SFRA)** of the Borough in **2008**. This Study assessed flood risk issues across the Borough and examined a number of potential locations for development including a large area (significantly greater than the application site) described as “North of Birstall”.
- 12.3.7 The 2008 SFRA confirms that an area of land drains northwards to the Rothley Brook. The Brook is associated with some flooding problems identified downstream at Rothley before joining the River Soar. An un-named watercourse passes through Broadnook Spinney. The area east of the A6 drains eastwards directly to the River Soar. The Rothley Brook and River Soar are classified as Main Rivers. Detailed hydraulic models have been produced and maintained for the Environment Agency for both watercourses to supplement the Flood Map.
- 12.3.8 The 2008 SFRA confirmed that an important issue is the use of SUDS (sustainable urban drainage techniques) and storage options to prevent any increase in flood risk in the downstream areas of existing development adjacent to watercourses.
- 12.3.9 The 2008 SFRA confirms that the Broadnook development proposals and associated new infrastructure are wholly within **Flood Zone 1** (the preferred location for new development being of the lowest flood probability) and entirely outside the extreme flood plain of the River Soar. The main requirement therefore is the management of surface water run-off through appropriate SUDS and by ensuring that secondary flooding sources are adequately addressed at the planning, design and construction stages. The 2008 SFRA concludes in respect of North of Birstall;
- “In terms of flood risk this site can be considered suitable to be moved forward for development, due to its location in Flood Zone 1 with no access constraint”*
- 12.3.10 The 2008 SFRA informed the definition of the Borough Council’s preferred planning strategy for Charnwood set out in its Core Strategy document for a plan period to 2028.
- 12.3.11 The Core Strategy was submitted to the Secretary of State in December 2013 and an Examination commenced in early 2014. Temporarily suspended to enable housing requirements to be clarified, the Examination was resumed in late 2014. To ensure an updated evidence base the Borough Council commissioned **JBA Consulting** to undertake a **“Charnwood Strategic Flood Risk Assessment Update”** – the final document is dated **June 2014**. In this document flood risk is assessed for all strategic development options and in detail for the preferred strategy including North of Birstall. It includes guidance for the requirements for a site-specific Flood Risk Assessment for these sites.
- 12.3.12 The 2014 SFRA re-emphasises that the preference when allocating land is, wherever possible, to place all new development on land in **Flood Zone 1** – land assessed as having a less than 1 in 1000 annual probability of flooding in any year (<0.1%).
- 12.3.13 An extended area “North of Birstall” is examined. The application proposals are confirmed as **wholly** within Flood Zone 1, the only strategic priority in the Charnwood Core Strategy to have that status.

12.3.14 The Framework and its associated Planning Practice Guidance (March 2014) provide “Flood Risk Vulnerability” classifications and ‘compatible’ Flood Zones. Residential and educational development is classified as “more vulnerable” but is recommended to lie outside any land with a predicted (that is high probability) 1 in 100 year flood (Zone 3a/3b). In this application all land is confirmed as within Flood Zone 1 (low probability) – outside the 1 in 1000 year events (0.1%). The site is therefore wholly appropriate for all proposed land uses.

12.3.15 The Broadnook proposal therefore in principle will meet the primary recommendations of the SFRA. The SFRA requirements are to;

- protect flood plains from inappropriate development;
- ensure no increase in flood risk;
- where possible provide flood risk betterment;
- ensure development is safe;
- ensure the natural watercourse system which provides drainage of land is not adversely affected;
- provide a minimum 8m width access strip to watercourses for maintenance and introduce appropriate landscape for open space and biodiversity benefits;
- deliver surface water drainage by site-relevant sustainable drainage techniques

12.3.16 Relevant baseline mapping from the Charnwood 2008 and 2014 SFRAs is included at **Appendix 12.1**.

12.3.17 The SFRA considerations include;

- floodplain
- hazard
- climate change
- surface water
- depth
- groundwater
- velocity
- watercourses

12.3.18 For the “water environment” the recently adopted **Charnwood Local Plan Core Strategy** sets out its priorities in the following way;

“We expect developments to incorporate sustainable drainage systems that, as a minimum, maintain a Greenfield run-off rate and protect and enhance water quality in accordance with the Water Framework Directive. Where possible sustainable drainage systems should help reduce the risk of flooding in the area and benefit biodiversity”

(Charnwood Core Strategy para 7.54)

12.3.19 **Policy CS16 of the Strategy** - “Sustainable Construction and Energy” - formalises the position;

“We will adapt to and mitigate against the effects of climate change by encouraging sustainable design and construction and the provision of renewable energy, where it does not make development unviable. We will do this by;

- *Encouraging residential development to meet the equivalent of Code for Sustainable Homes Level 5 for water efficiency (80 litres/person/day);*
- *Encouraging non-residential development in excess of 1,000m² gross floorspace to achieve the equivalent of BREEAM 3 credits for water consumption as a minimum;*
- ***Directing development to locations within the Borough at the lowest risk from flooding, applying the Sequential Test...***
- ***Supporting developments which take opportunities to reduce flood risk elsewhere; and***
- ***Requiring developments to manage surface water run-off with no nett increase in the rate of surface water run-off for Greenfield sites...***

12.3.20 The **interaction of water resources, landscape and biodiversity** is again reinforced in the Borough Council’s supplementary planning documents. For example its “**Leading in Design**” SPD encourages reduced water and energy use and emphasises;

“Features of wildlife and ecological value, such as existing key habitats, important species, buffer areas, wildlife corridors (greenways) and other landscape features of major importance should be retained and sensitively incorporated into developments. Site and setting analysis should be used to identify such features. Major developments and other proposals, where it is appropriate, should enhance the ecological quality and functioning of the site and surrounding ecological network by restoring and connecting existing wildlife habitats and creating new ones”

12.3.21 There is support too for the use of sustainable drainage in order to reduce water pollution and flood risk – by controlling rainwater at source, the use of infiltration and filter drains (where ground conditions facilitate this), swales and basin ponds and wetlands, prior to discharge to a natural watercourse.

12.3.22 The iterative masterplanning exercise for the Broadnook Garden Suburb proposal has taken full account of these interactive considerations and the hybrid planning application supports an overall set of interactive and beneficial proposals and includes detailed design of multi-functional green infrastructure incorporating sustainable drainage.

12.4 **Scoping of the Environmental Impact Assessment**

- 12.4.1 On behalf of the joint applicants a request for a formal Scoping Opinion was submitted to the Borough Council in February 2014 in accordance with Regulation 13 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011.
- 12.4.2 The Scoping Report identified that key issues are flood risk, management of surface water run-off through appropriate sustainable drainage and a surface water strategy.
- 12.4.3 The Scope for Drainage and Flood Risk, in summary, is;
1. To review available data from Environment Agency, Leicestershire County Council, Charnwood Borough Council and Severn Trent Water
 2. To define any current sources of flood risk at the site and surrounding area and any flood risk issues/constraints arising from the development proposals
 3. To prepare and discuss a surface water drainage strategy for the development proposals, identifying necessary mitigation and opportunities for betterment
 4. To identify practical sustainable drainage proposals accounting for ground conditions
- 12.4.4 Environment Agency responded to the Borough Council's consultation on the Scoping Report in a letter dated 3 April 2014. In April 2014 the Borough Council confirmed that the contents of the Scoping Report were considered appropriate for Environmental Impact Assessment.
- 12.4.5 This chapter of the Broadnook Environmental Statement has been prepared therefore in accordance with that background

12.5 Baseline Conditions

Existing Land Use

- 12.5.1 The application site consists of approximately X hectares of greenfield land predominantly used for intensive arable agriculture with a number of hedgerows, trees, copses and spinneys visible in the wider landscape. A small number of disparate buildings are sited at the eastern edge of the A6/A46 north-west quadrant, alongside the A6.
- 12.5.2 These comprise an extended former farmhouse and traditional out-buildings – known as Wanlip Hill Farm; a modern residence next door, three functional utilitarian commercial buildings and an external display area for garden buildings with an associated office.

Site Topography

- 12.5.3 The assessment site includes relatively higher ground and covers the northern half of a localised plateau (85m-80m AOD) including part of the western (80m-65m AOD), northern (80m-60m AOD) and eastern slopes (75m-65m AOD). The topography (shown in **Appendix 12.1**) falls in three directions – towards the Great Central Railway to the west, towards Rothley Brook to the north and to the River Soar to the north-east (where an extensive floodplain is generally at the significantly lower level range of 57m-53m AOD).

Site Soils, Geology and Hydrogeology

- 12.5.4 A desk study supported by fieldwork has been carried out by Geo Environmental Group (GEG) and used to complete Infiltration Testing (Refer **Appendices 10.2** and **10.5**). These exercises note that the British Geological Survey Geological Sheet for this area indicates bedrock of Edwalton Mudstone with overlying superficial deposits of diamicton.
- 12.5.5 Consultation with Environment Agency confirms that the majority of the site is underlain by a non-aquifer of negligible leaching potential with small parcels of minor-aquifer formation with high leaching potential in areas east of the A6 (these eastern areas are not proposed for built development).
- 12.5.6 Non-aquifers are formations of negligible permeability, usually regarded as containing insignificant quantities of groundwater.
- 12.5.7 The infiltration tests undertaken by GEG conclude that infiltration of water to ground in the area west of A6 is insufficient as a means of surface water drainage.
- 12.5.8 The Environment Agency Maps show that there are no Source Protection Zones within the site or adjacent (i.e. within 1km) of the site boundaries.

Baseline Hydrology

- 12.5.9 The Department for Communities and Local Government (DCLG) published **Planning Practice Guidance** in March 2014, a web based resource containing information similar to that contained in the Planning Policy Statement Practice Guide. The online Planning

Practice Guidance provides direction on flood risk issues in development and planning.

- 12.5.10 The “*Flood Risk and Coastal Change*” Planning Practice Guidance advises on how the plan-making and application processes should take account of the risks associated with flooding. The following table defines the level of flood risk;

Table 12.3 Flood Zones (from Planning Practice Guidance: Flood Risk and Coastal Change)

Flood Zone	Flood Zone Classification	Description
Flood Zone 1	Low Probability	This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year (<0.1%)
Flood Zone 2	Medium Probability	This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year
Flood Zone 3a	High Probability	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year
Flood Zone 3b	Functional Floodplain	The zone comprises land where water has to flow or be stored in times of flood

- 12.5.11 All development sites located within Flood Zones 2 or 3 and/or are over 1 hectare in size must be accompanied by a site-specific Flood Risk Assessment (FRA) undertaken as part of the planning application process.
- 12.5.12 As part of its obligations under the Water Resources Act 1991 the Environment Agency (EA) has carried out surveys of its existing flood defences and has published a series of nationwide Flood Hazard and Flood Risk Maps based upon information from historic flood events and basic hydraulic modelling. More recently EA has published the Flood Map on its website – based on improved hydraulic modelling and detailed local data. The Flood Map indicates areas which may be affected by a 1 in 100 year fluvial flood or a 1 in 200 year tidal/coastal flood i.e. Zone 3.
- 12.5.13 The Flood Map for the North of Birstall area confirms that the proposed development is entirely within Flood Zone 1 (low probability) – which is defined as land having a less than 1 in 1000 annual probability of river flooding. The extent of the indicative floodplain beyond the application site is shown at **Appendix 12.3** – Environment Agency Data and **Appendix 12.4** – the location of the Application Site in relation to Flood Zone.
- 12.5.14 The Flood Risk Assessment which accompanies the application also finds that the land lies in an area that has a Low Probability of flooding from other sources such as ground water, sewers and artificial water bodies.

12.5.15 There are three watercourses in the vicinity of the site – the River Soar and Rothley Brook have Main River status and there is an unnamed watercourse in Broadnook Spinney.

12.6 Existing Drainage

Surface Water Drainage

12.6.1 The site is currently an undeveloped greenfield site and therefore with a natural drainage regime. The site is presently not serviced by a positive storm water drainage network. Surface water run-off over the site is conveyed overland in line with the natural topography and at a greenfield run-off rate and volume. The conveyance of water is therefore in both an easterly/north easterly direction towards the River Soar and in a northerly direction towards Rothley Brook.

12.6.2 The River Soar is a significant tributary of the River Trent. From its source, south-east of Hinckley, the river follows a northerly course towards its confluence with the River Trent near Ratcliffe on Soar, south-west of Nottingham.

12.6.3 Rothley Brook is an important tributary of the River Soar and is also classified by Environment Agency as Main River. This brook is associated with some flooding issues identified downstream at Rothley and flood defence infrastructure exists along a length of the brook to the north of the application site. As the Charnwood Strategic Flood Risk Assessment anticipates, an important issue in devising a sustainable drainage system for the application proposals is to examine the prospect for betterment in the drainage regime associated with Rothley Brook.

Water Quality

12.6.4 The Environment Agency monitors 40,000km of rivers across England. In 2009 EA adopted the EU Water Framework Directive (WFD) classification of water quality – it is based on a range of measures and results are based strongly on the poorest indicator. For surface waters there are two separate classifications – chemical and ecological – and for a water body to be in overall good status both elements must be at least good.

12.6.5 Ecological classification includes concentrations of specific pollutants, hydro morphological quality, as well as the condition of biological elements. Ecological status is determined on a scale of high, good, moderate, poor or bad.

12.6.6 Chemical status is assessed by compliance with environmental standards for chemicals that are listed in the Environmental Quality Standards Directive 2008/105/EC and include hazardous substances and a range of pollutants. Chemical status is recorded as good or fail and is determined by the worst scoring chemical.

12.6.7 To improve the quality of water bodies the Framework Directive promotes a new approach to water management through river basin planning. It seeks to improve the ecological health of inland and coastal waters and certainly to prevent any further deterioration. A target is for all inland and coastal waters to achieve “good” status by the end of 2016.

- 12.6.8 Each reach of the rivers is monitored and given a river quality grade, based on the chemical quality of the water. The rivers are then graded from A to E with A representing a river with very good water quality and E denoting very poor water quality.
- 12.6.9 Current information supplied by Environment Agency identifies the reach of the River Soar to the east of the application site as “Moderate” in terms of ecological quality and at the time of the assessment the chemical quality was not required. EA also identifies Rothley Brook (tributary of the River Soar and a “Main River”) to be “Good” with regard to ecological quality and at the time of the assessment chemical quality was also not required.

Foul Water Drainage

- 12.6.10 Severn Trent Water (STW) has advised on the location and capacity of its network at and in the vicinity of the application site. Foul sewers operated by STW transfer flows from a large area in north Leicester to the Wanlip Works. A network of foul sewers are present within the area of Wanlip and Birstall to the south of the Broadnook proposal and at Rothley to the north.
- 12.6.11 To the west of the A6 a 1800mm trunk foul sewer runs west to east connecting to the Wanlip Works. The sewer is very deep – some 27 metres below the surface.
- 12.6.12 To the south east of the A6/A46 Junction a further deep 2400mm trunk foul sewer runs from the greater Birstall area.
- 12.6.13 To the east of the A6 a 450mm rising main runs north to south connecting into the 1800mm pipeline.
- 12.6.14 Discussion with Severn Trent Water has identified a suitable point of connection for foul drainage at the Wanlip Works which is situated on the eastern boundary of the overall application site.

12.7 Assessment of Effects

12.7.1 This section summarises potential effects of the proposed development during the construction phase and the operational phase. These effects are assessed in relation to identified development 'receptors' and their importance and scale. They include River Soar, Rothley Brook, Broadnook Spinney watercourse, ponds, ditches, site workers, existing and development residents and visitors. Consideration is then given to the implementation of mitigation and enhancement measures.

Construction Effects

Alteration of the Drainage Regime

12.7.2 The Construction Phase will involve operations which could give rise to impacts on surface water quality. For example;

- earthworks, ground modelling and excavations
- handling and storage of materials, stockpiling, spillage
- site preparation and working, temporary infrastructure and accesses, movement and operation of construction plant and vehicles
- installation of services and utilities
- formation of foundations and construction of buildings
- setting out of open spaces, parks, landscaping and public realm

12.7.3 These construction activities can result in;

- physical contamination via dust, sediments and muds
- impacts on surface water quality in surrounding receptors
- changes in ground level and excavations creating new pollutant pathways
- compaction of soil and changes in localised run-off

and include;

concrete and cement products – production may be on site or brought in. Waste water may be generated.

oils and fuels – there is potential for spillage or leakage from construction machinery or traffic which could have a large impact on any nearby watercourses and groundwater

suspended solids – CIRIA guidance note C532 “*Control of Water Pollution from Construction Sites*” suggests the most common instances of water pollution arise from suspended solids, the source of which can include;

- plant and wheel washing
- build up of mud and dust on site roads
- exposed ground or stock piles
- excavations and foundations
- incidental drainage from site activities or pumping of polluted surface water

12.7.4 Seasonal weather and rainfall events can also adversely affect watercourses and the drainage regime.

12.7.5 It is judged that an increase in storm water runoff could occur from the site to the nearby watercourses. The sensitivity of the watercourses is considered to be high and the magnitude of change, prior to mitigation, is predicted to be high due to increased runoff which could affect the volumetric capacity of the watercourses. Therefore there is potential for a direct, short term major adverse significance prior to the implementation of mitigation measures.

Potential Contamination of Water Resources

12.7.6 A major construction project can include the use of paints, solvents, cleaning agents and some chemicals – all with degrees of toxicity. Any spillage has potential for adverse impact. Hydrocarbons can enter a watercourse and lead to the build-up of a film on the surface water reducing oxygen content with a potential effect on the aquatic ecosystem.

12.7.7 Direct or indirect use of plant and machinery will at times involve removal of topsoil. Surface water run-off could erode this or the exposed ground and transport sediment to watercourses. Run-off flows and volumes can increase and sediments and/or contaminated water transported to nearby watercourses.

12.7.8 Construction activities can for short periods affect the rate of infiltration. Ground can be compacted and silts from eroded subsoils could reach groundwater, surface water and watercourses.

12.7.9 The sensitivity of the nearby watercourses which could be affected is considered to be moderate and the magnitude of change prior to mitigation is considered to be moderate. Therefore there is potential for a short term moderate adverse significance without the implementation of mitigation measures.

Earthworks

12.7.10 It is anticipated that the development will necessitate earthworks comprising of shallow to deep excavations to construct building foundations, sewers and utility trenches. These excavations may lead to deterioration of ground water quality as direct pathways to the groundwater could occur.

12.7.11 The sensitivity of groundwater on-site is considered to be moderate and the magnitude of change prior to mitigation is considered to be moderate. Therefore there is potential for a short term effect of moderate adverse significance prior to the implementation of mitigation measures.

Operational Effects

Alteration of the Drainage Regime

12.7.12 As stated the Flood Risk Assessment which accompanies the application confirms that the development proposal is wholly within Flood Zone 1 (low probability) – land assessed as having a less than 1 in 1000 annual probability of fluvial flooding in any year.

12.7.13 However, without mitigation, the development will increase the impermeable area on the site leading to an increase in peak surface water run-off rates and the total run-off volumes.

12.7.14 **Potential operational effects include;**

- direct and indirect flooding of surrounding watercourses, the wider catchment area and flood risk downstream and to adjacent land and property
- direct flooding of the development due to inadequate flooding resilience and management of residual flood risk and the drainage system and infrastructure. Any new watercourses will need to be appropriately managed to avoid any blockages and to ensure enduring drainage efficiency
- direct contamination or deterioration of surface water quality due to everyday operations in a mixed-use development which includes employment and commercial uses – spillage of contaminants, flushing of pollutants from impermeable surfaces, leakages of fuel oils for example and the associated collection of surface water drainage from hardstanding areas
- direct and indirect contamination of surface water, soil and potential groundwater contamination due to surcharging of the foul water network or the discharge of untreated foul flows

12.7.15 It is the intention to mimic the existing natural drainage regime within the site. The built development catchments on site will increase the volume and rates of run off directly to the nearby watercourses. Prior to mitigation, the increase in surface water run-off could potentially cause both on-site ponding and downstream flooding.

12.7.16 The sensitivity of the nearby watercourses is moderate and the magnitude of change prior to mitigation is considered to be high. There is potential for a direct, permanent, long term major adverse significance prior to the implementation of mitigation measures.

Foul Drainage

12.7.17 It is the intention to install a foul drainage sewer system on-site to collect and discharge the foul water generated by the development. If mitigation is not implemented then there would be a direct, permanent, long term major adverse significance.

12.8 Design, Mitigation and Enhancement

Construction Phase

Alteration of the Drainage Regime

- 12.8.1 To prevent localised flooding associated with extreme rainfall events during the construction phase a temporary localised run-off management system will be employed by the contractor. This will comprise temporary surface water run off facilities such as storage tanks, ditches or ponds and provide onsite attenuation for surface water flows and thereby reducing flood risk.

Potential Contamination of Water Resources

- 12.8.2 In line with established good practice Charnwood Borough Council as local planning authority will require a **Construction Environmental Management Plan (CEMP)** to be prepared and approved. The CEMP will define the methods of construction and site control in order to avoid, minimise and mitigate any adverse effects – including those related to the water environment.

- (i) The principal contractors will take full regard of the relevant **Environment Agency Pollution Prevention Guidelines (PPG)** in preparation of the CEMP and during the operation of the site
- (ii) All construction works will be designed in accordance with the latest relevant EA guidelines and the ADAS Technical Note on Workmanship and Materials for Drainage Schemes (1995)
- (iii) Method Statements will be agreed with the EA to ensure compliance with PPG prior to the commencement of construction works to ensure that surface water run-off quality is managed during the construction process. All works will be completed in accordance with Environment Agency documents including PPG6 **“Working at Construction and Demolition Sites”** (SEPA, EA NIEA 1996) and PPG 21 **“Pollution Incident Response Planning”** (SEPA, EA NIEA 2009) together with current best practice
- (iv) Contractors carrying out earthworks will develop risk assessments and method statements to cover all aspects that could cause damage to structures, mobilise quantities of soil/sediment or block open watercourses. Earth moving operations will be carried out in accordance with BS6031 **“Code of Practice for Earthworks”** (2009)
- (v) DEFRA’s **“Construction Code of Practice for Sustainable Use of Soils on Construction Sites”** (2009) provides guidance on the use, management and movement of soil on site to prevent pollution of watercourses. Works will comply.
- (vi) Working practices will also comply with;
 - MAFF’s **“Good Practice Guide for Handling Soils”** (2000) which provides advice on soil handling including stripping, stockpiling and reinstatement
 - CIRIA C650 **“Environmental Good Practice on Site”** and C532 **“Control of Water Pollution on Construction Sites”**

- (vii) Soil handling and temporary storage will be minimised as part of construction programming
- (viii) The contractor will avoid the storage of plant, machinery fuel/materials and soil stockpiles alongside watercourses where avoidable
- (xi) Refuelling of plant, storage of fuels and chemicals and overnight storage of mobile plant will take place within designated contractors compound areas – which will contain appropriate storage and security facilities and spill kits will be provided

12.8.3 In terms of construction elements;

concrete and cement products

- any waste water from washing down of ready-mix lorries or production of concrete will take place in a designated area where waste water is unable to enter the groundwater and the surface water regime without first being treated

oils and fuels

- to prevent the leakage of oils and fuel from plant and machinery all machines will be checked on a regular basis for signs of wear and tear
- vehicle washdown areas will be bunded and run-off routed through oil interceptors. Should oils and/or fuels be stored in bulk quantities this will comply with EA PPG Notes 2 and 7. Regular testing of storage tanks and pipes and all refuelling activities will take place over an impermeable area drained via an oil separator
- should a spillage incident such as leakage occur then emergency clean up and containment services will be employed using specialist equipment and expertise

suspended solids

- the discharge of suspended solids to watercourses or groundwater will be avoided by prohibiting any temporary construction discharge without the prior approval of Environment Agency. Discharges of waters resulting from construction activities will generally be directed to foul sewers, subject to the approval of the drainage authority
- given the site topography, earthworks will be limited but where undertaken will be required to provide gravity surface water drainage. These works will be completed in a manner that protects the water quality environment and ecological interest of the watercourses. The nature of these works and associated implementation methods will be agreed with EA in advance and all works will accord with the recommendations of EA PPG for ***“Works in, Near or Liable to Affect Watercourses”***
- during the setting up of site activities a designated wheel washing facility will be established and all vehicles will pass through before leaving the site

- one of the main sources of solids is from erosion of exposed soil including the erosion of stockpiles. Large areas of soil can be covered or contained where necessary
- during construction phases haul roads will be kept clear of mud deposits. Haul roads will be damped down during dry and windy periods to minimise dust. A road sweeper can be employed to ensure public roads are kept clear
- pedestrian routes will be set up and maintained in good order

hazardous materials and pollutants

- disposal of materials such as detergents and paints will be carried out in bunded/contained designated storage areas. Any substances not acceptable for disposal via the sewerage system will be stored in compliance with the relevant guidelines and removed by a registered waste disposal operator

foul drainage

- construction staff facilities will be connected to public sewers where possible and controlled by sewer connection notices to the Water Undertaker
- otherwise foul water from temporary facilities will be contained in sealed storage containers and disposed of off-site to minimise risk of surface or groundwater contamination

hydrology

- construction techniques identified above will be utilised to ensure that water quality is protected
- delivery, storage and usage procedures together with sediment interceptors where necessary will prevent contamination

Operational Phase

Alteration of the Drainage Regime

- 12.8.4 The extent of impermeable area will increase significantly following development. Increases in surface water run-off from positively drained hard areas need to be mitigated mindful of pre-development conditions. Both the maximum rate of run-off and the total direct discharge to adjacent watercourses need to be controlled. This is addressed within the Flood Risk Assessment.
- 12.8.5 An outline surface water management scheme has been prepared based on the principles of sustainable drainage (SUDs). The site has been divided into a number of drainage areas based on natural drainage pathways correlated with phased development. The ground conditions investigations confirm that the disposal of surface water by infiltration will not be feasible and therefore the illustrative surface water drainage scheme will manage run-off through the provision of attenuation storage. A demonstration scheme is provided by full detailed proposals for the first phase as part of the hybrid application.

- 12.8.6 The proposed development has been designed therefore to avoid significant hydrological effects resulting from changes in the catchment characteristics and provides for site run-off controlled to the baseline rate assessed using the Institute of Hydrology (IoH) 124 Methodology.
- 12.8.7 In accordance with legislative requirements the water detention/attenuation proposals have been assessed for the potential effects of climate change. The 1 in 100 year (1% AEP) return events have been modelled for 30% climate change (including peak rainfall intensity).
- 12.8.8 Calculation for the climate change scenarios are contained in FRA Appendix D. Climate change assessments show each attenuation feature will perform robustly by retaining the additional flows within the system without overflow.
- 12.8.9 On undeveloped and ungauged catchments of less than 0.5km² it is appropriate to complete baseline site discharge assessments using the nationally accepted IoH 124 methodology for small rural catchments. Local policy is to employ IoH 124 in a manner set out by CIRIA C697 *“The SUDS Manual”* (2008). This methodology requires that for catchments less than 50ha the IoH assessment is actually completed for a 50ha area with the results linearly interpolated to determine the flow rate value based on the ratio of development to 50ha.
- 12.8.10 Section 4 of the FRA calculates the greenfield run-off rates post development and shows the proposed sustainable drainage system will significantly reduce these rates. The systems have been designed to control the stormwater run-off from the whole site to circa 61% below the baseline greenfield rate as calculated using the IoH methodology. The site will therefore deliver a valuable reduction in peak storm discharges to the wider catchment across the area. Mindful that the Rothley Brook corridor has experienced some flooding problems this reduction is a **significant betterment**.
- 12.8.11 The surface water drainage strategy at FRA Section 4 accounts for the projected impacts of climate change over the design life of the development. The **sustainable drainage features** that will be part of the drainage scheme are described by CIRIA 6687 *“Planning for SUDS – Making It Happen”*. They are shown on the application drawings and include;
- **wet ponds or attenuation/retention ponds**
- 12.8.12 These ponds can provide both stormwater attenuation and run-off treatment. They can be designed so that a standing level of water is maintained under normal circumstances but have sufficient spare capacity for attenuation of surface water. These ponds will be designed to support aquatic vegetation e.g. using reed beds especially in locations where outfalls discharge. This vegetation provides biological treatment as well as producing improved biodiversity and ecological enhancement.
- 12.8.13 Water that is stored in the ponds is slowly released allowing sediments to settle in designed features – and again vegetation in these areas provides biological treatment.
- **swales**

- 12.8.14 Swales are shallow vegetated channels which convey and/or retain surface water run-off along their length. They offer an additional attenuation volume and potential for infiltration to ground subject to ground conditions. The vegetation within the channel of the swale filters particulates within the surface water run-off and helps to enhance biodiversity.
- 12.8.15 These features therefore not only prevent any adverse impact on surface water drainage but also reduce pollution loading and engender benefits to landscape, green corridors and open spaces, ecology and biodiversity.
- 12.8.16 The FRA and associated document “Storm Water Technical Guidance” outlines a proposed storm water management system providing a SUDS management train, incorporating source control and detention systems. The network will convey and attenuate storm water discharges from the proposed development to the points of discharge on the western, northern and north-eastern boundaries.
- 12.8.17 The SUDS scheme will incorporate permeable paving (where applicable) along with attenuation features. There will be five basins, three of which lie on the northern edge and one in the western and southern sections of the site. These form part of the site’s significant Green Infrastructure framework and will achieve both drainage and ecological benefits.
- 12.8.18 The framework SUDS scheme has been the subject of discussion with the key stakeholders and has had regard to sustainable methods that are readily accepted for adoption by the relevant authorities in discharging their maintenance responsibilities. The SUDS system is currently expected to be maintained by way of an appropriate management scheme operated by the relevant local authority. The below ground drainage system will be adopted and maintained by the drainage authority, Severn Trent Water. Maintenance will ensure that the storm water system remains effective and functional for the lifetime of the proposed garden suburb and protect the catchment from increased flood risk.
- 12.8.19 It is proposed therefore that the development will employ a multi-tier SUDS water management train, providing source control measures where appropriate and implemented as close as possible to source together with more strategic elements. The FRA documents outline the way in which this network will convey and attenuate storm water discharges from the proposed development to the points of discharge at the western and north/north eastern boundaries of the site.
- 12.8.20 Implementing a tiered water management train will allow the development, in general terms, to provide three stages of water treatment thereby minimising flood risk in any design exceedance situation and reducing pollutant loads within stormwater run-off by passive treatment thus ensuring the development proposals will have no adverse effect on the wider hydrology.
- 12.8.21 Water quality in the surrounding area is recorded as moderate to good. National and European legislation will ensure that water quality is improved over time by the implementation of more stringent controls. If the potential impact of “operational” development is to be avoided, surface water needs to be treated to improve water quality prior to discharge from the site.

- 12.8.22 Direct contamination of surface and ground water can arise for example from accidental spillages of chemicals utilised in commercial and industrial development. Environmental legislation in this area of interest is rigorously applied through statutory regulation and implementation of full means of control. In these circumstances products that present most risk are controlled with measures such as double lined tanks, bunded areas and protected cells. To protect the immediate ground and surface water adjacent to such installations fully hard covered areas will discharge to drainage systems that provide for emergency isolation of any spillage.
- 12.8.23 Surface water run-off from development sites can routinely contain a series of contaminants, including petrochemical compounds, some heavy metals and suspended soils, being predominant in industrial and commercial service yards and large car parks. In residential development the small volumes of fuel oils washed from cars represents a far lower pollution risk to surface or ground water quality but nonetheless needs to be mitigated. The direct discharge of 'operational' development drainage to adjacent watercourses can potentially lead to a degradation of water quality with associated ecological effects.
- 12.8.24 Typical chemical concentrations are;

Table 12.4 Mean Pollutant Concentrations

water source	Mean Pollutant Concentration (mg/l)					
	Solids	BOD	COD	NH ₄	Pb	Oils
rainfall	8-80	1-15	2.5-32	-	0.024-10.4	-
typical residential areas	187	8.5	80	0.6	0.14	5.1

- 12.8.25 In mitigation of the risk of silts, chemicals and oil products being conveyed to surface and ground water, it is proposed to implement measures from current best practice surface water management guidance. All service yards, parking areas, roadways and garaging within new development usually have concrete or bituminously hard paved surfaces to avoid the direct spillage of materials to ground. Where appropriate, preference will be given to permeable paving systems that result in a significant removal of contaminants at source.

- 12.8.26 Water discharged from such areas will be collected efficiently and receive passive treatment to improve water quality as part of a sustainable drainage system. The system for the collection, conveyance, treatment and disposal of surface water will be designed in accordance with latest guidance in order to avoid the risk of leaching potentially contaminated materials to the soil and ground water. This approach is recommended in the relevant Environment Agency Pollution Prevention Guidance documents including;
- SEPA, EA, EHS, PPG1 **“General Guide to the Prevention of Pollution”** (1997)
- DTI, CIRIA C609 **“Sustainable Drainage Systems: Hydraulic, Structured and Water Quality Advice”** (2004)
- SEPA, EA, EHS PPG3 **“Pollution Prevention Guidelines – Use and Design of Oil Separators in Surface Water Drainage Systems”** (2006)
- 12.8.27 Water will be collected and conveyed in main drainage that is adopted by Severn Trent Water or an alternative water company. Flows will then be conveyed and detained in a network of detention/attenuation features prior to discharge to the ordinary watercourses.
- 12.8.28 The drainage proposals contained within the Flood Risk Assessment demonstrate compliance with current guidance by providing appropriate sustainable drainage features that encourage passive treatment of discharged flows and which improve water quality by removing the low level silts, oils and metal associated with ‘urban’ run-off. Final design will provide for appropriate geometry and planting to maximise this benefit. The detention features will provide open channel outfalls to the ordinary watercourse receptors. The storm water management features will be constructed and operational by phase and prior to the first occupation of dwellings in that phase. The phase one proposals demonstrate the potential.
- 12.8.29 Guidance published in CIRIA C522 **“Sustainable Urban Drainage Systems – Design Manual for England and Wales”** (2001) recommends that surface waters from development of a primarily residential nature should have at least one stage of treatment through an appropriately sized sustainable drainage feature. Similarly at least one treatment stage should be provided on a non-trunk road. Two levels of treatment are recommended for higher risk commercial and industrial areas. In any prospective higher polluting areas two stages of treatment will be employed by implementing a management train approach of pre-treatment prior to discharge to the ordinary watercourses across the garden suburb area.
- 12.8.30 Recent published research and procedures outlined in CIRIA C609 (as above) shows that the inclusion of a treatment train as part of a sustainable urban drainage system provides the most effective method of removing polluting materials from surface water. Removal of between 80-95% of the suspended solids, heavy metals and oils can be achieved. Corresponding reductions in Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) can also be achieved. Water quality assessments completed in accordance with CIRIA C609 are contained in the Flood Risk Assessment.

12.8.31 In summary therefore the proposed stormwater management measures proposed at Broadnook Garden Suburb will seek to achieve;

- a nett enhancement in ecological status/potential of water bodies
- the overall objective of good ecological status/potential for the water bodies
- Water Framework Directive objectives in the water bodies
- “good” groundwater status and avoid any deterioration of that status
- the implementation of mitigation measures which define the hydro morphological designation of heavily modified waterbodies

Foul Drainage

12.8.32 When assessing potential effects of foul drainage associated with the operational phase of the proposed development it is clearly important to ensure that the proposed system is designed to convey foul waters safely from the site to a suitable treatment facility without overloading existing sewerage systems. Furthermore it is also important for the treatment facility to have capacity to receive the discharge without impact on the water quality standards in the receiving watercourse.

12.8.33 In the baseline conditions the garden suburb site is not connected to the foul sewerage network. However DETR Circular 3/99 and Building Regulations confirm that it is appropriate for a positive drainage solution to be delivered in conjunction with the relevant water company. Severn Trent Water has been consulted regarding the location and capacity of its existing network. Due to the relatively close proximity of the Wanlip treatment works, a direct connection of appropriate capacity is proposed to be made from the garden suburb to discharge site-wide foul water flows. A suitable point of connection to the works has been confirmed by Severn Trent and the company has also confirmed that the treatment works has sufficient capacity to accommodate the flows generated.

12.8.34 Water Companies have a statutory obligation under the Water Industry Act 1991 (amended 2003) to provide appropriate capital investment in strategic infrastructure to meet development growth. This investment planning is managed and regulated by OFWAT through the Asset Management Plan (AMP) process.

12.9 Residual Effects following Mitigation and Enhancement

Construction Effects

12.9.1 **Construction Effect 1:** • **Direct and indirect contamination of surface water due to mobilisation of soils, construction materials and methods, spillage from plant and vehicles.**

12.9.2 It is assessed that the proposed development could result in short term, temporary and localised negative environmental effect but this will be of low significance in view of strict adherence to a Construction Environmental Management Plan.

12.9.3 **Construction Effect 2:** • **Direct flooding and change to baseline drainage hydrology due to construction related disturbance of the ground.**

12.9.4 It is assessed that implementation of appropriate and agreed working practices will ensure that no flooding or hydrological environmental effects arise from construction activities.

Operational Effects

12.9.5 **Operational Effect 1:** • **Direct and indirect flooding of surrounding watercourses, the wider catchment area, adjacent land and property due to increases in surface water run-off from positively drained hard areas.**

12.9.6 It is assessed that the proposed surface water management strategy, based on appropriate sustainable drainage measures will result in a **significant betterment in terms of flood risk and will promote biodiversity and ecological enhancement**. In the short and longer term a **significant positive effect** will be secured.

12.9.7 In terms of **cumulative effects** it is anticipated that regulatory control will ensure that all developments completed elsewhere in the catchment will be required to implement sustainable drainage measures and controls on drainage discharge rates in accordance with current standards as minimum. In such circumstances the environmental effects from cumulative development will be **nil**.

12.9.8 **Operational Effect 2:** • **Direct flooding of the proposed development due to inadequate flooding resilience and management of residual flood risk.**

- 12.9.9 It is assessed that in view of the range of measures identified in Section 3 of the Flood Risk Assessment and the implementation of best practice principles the environmental effect will be **nil**.
- 12.9.10 In terms of **cumulative effects** it is expected that regulatory control will ensure that mitigation measures are implemented at all other developments in the catchment compliant with NPPF and Local Plan Policy in terms of flooding resilience and residual flood risk management. This will **ensure no significant adverse environmental effects** result from cumulative effects. If these developments were to be taken forward without suitable mitigation to prevent detriment to the water environment there is no mechanism by which the proposed development could act cumulatively with nearby proposals to worsen the environmental impact.
- 12.9.11 **Operational Effect 3:** • **Direct contamination or deterioration of surface water quality due to leakages of fuel oils, general spillages and other contaminants from within the development and the associated collection of surface water drainage from hard standing areas.**
- 12.9.12 It is assessed that as a result of the planned storm water management proposals based on sustainable drainage good practice the environmental effect will be **insignificant**.
- 12.9.13 In terms of **cumulative effects** regulatory control of other developments within the catchment will ensure that equivalent mechanisms are implemented at each site level and will ensure that effects are **insignificant**.
- 12.9.14 **Operational Effect 4:** • **Direct and indirect contamination of surface water, soil and potential groundwater contamination due to surcharging of the foul water network or the discharge of untreated foul flows.**
- 12.9.15 It is assessed that in view of Severn Trent Water's confirmation that capacity and suitable connection is achievable at the Wanlip works the environmental effects of the proposed development are **nil**.
- 12.9.16 In terms of **cumulative effects** development proposals across the strategic drainage catchment will contribute to and ensure improvements of the foul water network in terms of flow and treatment capacity and therefore ensure that **no significant cumulative environmental effects** will occur.

12.10 Statement of Effects

12.10.1 After undertaking an Environmental Impact Assessment on the water environment associated with the proposed Garden Suburb development it is concluded that any potential impacts likely to arise as part of the **construction or operational phases** of development would either be **negligible or beneficial** once mitigation measures have been incorporated and implemented;

1. In terms of fluvial flood risk, the site lies wholly within Flood Zone 1 – being an area of low probability of flooding outside both the 1 in 100 (1% AEP) and 1 in 1000 (0.1% AEP) year flood events
2. Assessments completed within the Flood Risk Assessment also find the land to be in an area that has a Low Probability of flooding from other sources and mechanisms including ground water, sewer and artificial water bodies
3. The Flood Risk Assessment concludes that the site is suitable for development from a flood risk perspective
4. The implementation of appropriate, sustainable development proposals coupled with comprehensive mitigation measures will ensure that **the proposed Garden Suburb Development does not result in a significant adverse environmental effect during either construction or operation phases**
5. Section 4 of the Flood Risk Assessment calculates that the greenfield run-off rates post development, by incorporating the proposed sustainable drainage system will be significantly reduced by 61%. This reduction is **a significant betterment**
6. The prospective benefits are demonstrated by a detailed first phase as part of the hybrid application
7. The following table summarises the water related impacts;

Table 12.1 Matrix of Operational Effects

Potential Operational Impacts	Significance					Impact Negative, neutral or positive impact
	Nil	Insignificant	Low	Significant	High	
Flooding	•					neutral
Storm Water				•		positive effect
Foul Water	•					neutral
Water Quality			•			positive effect

13

Community, Economic and Social Effects



Broadnook Garden Suburb

Environmental Statement

13.0 Community, Economic and Social Effects

Introduction

This chapter assesses the likely socio-economic impacts of the proposed development North of Birstall (the Broadnook Garden Suburb). It primarily examines the potential impacts on population, health and education provision, employment, community facilities, recreational facilities and housing. Measures for the mitigation of any impacts that have been included in the proposals to ensure that the future needs of the new community can be met are also identified.

Assessment Approach and Methodology

The assessment:

- establishes a baseline position in terms of local socio-economic characteristics of the Charnwood population;
- identifies the extent and quality of existing and any planned facilities in the proximity of the site;
- calculates the additional population produced by the proposals based on average occupancy rates derived from the 2011 Census;
- calculates the likely employment generation from the mixed employment and commercial uses and community facilities planned for the site. Guidance from English Partnerships and others on employment densities and induced/indirect employment numbers is used in this connection;
- examines the additional demands on key services and facilities created by the Broadnook proposal, accounting for any cumulative impacts associated with other known developments;
- considers the ability of any existing facilities to serve the additional demand and the prospect of the proposal being able to support the provision of relevant and viable facilities and services.

Planning Policy

The relevant national and local planning policies are set out in Chapter 4. The following includes a brief summary of national guidance in relation to socio-economic considerations and a more extensive and development-specific context provided by the Charnwood Local Plan 2011-2028 Core Strategy. The Local Plan development plan document is up-to-date having been adopted by the Charnwood Borough Council in November 2015. It has been confirmed as a “sound “ Plan – justified, effective, positively prepared and consistent with national planning policy. As such it has been prepared by the Borough Council with the benefit of a robust evidence base accounting for studies, strategies and information on social, community and economic issues relevant to the Borough as a whole, to South Charnwood where Broadnook is situated and as part of the perspective and potential regarding Charnwood Borough’s interaction with the Principle Urban Area of Leicester. These studies have informed and underpinned Local Plan Policy CS20. This provides a clear and specific context for the social, economic and community needs and facilities at Broadnook to be clarified, defined and addressed.

National Planning Policy

- identifies economic, social and environmental dimensions to sustainable development;
- encourages an integrated approach to considering the location of housing, economic uses and community facilities and services;
- promotes “healthy communities” noting the importance of the provision of community facilities and other local services, access to high quality open space and opportunities for sport and recreation;
- supports a range of suitable sites to meet the scale and type of retail, leisure, commercial, office, tourism, cultural, community and residential development identified by the Local Plan.

The Charnwood Local Plan Core Strategy

In advancing the policies and provisions of the recently adopted Core Strategy the Borough Council has considered its strategic priorities and up to date needs and requirements having regard to;

- population and demographic changes;
- potential effects on local labour and housing markets;
- economic activity and employment;
- existing social and community infrastructure;
- housing market conditions.

The Core Strategy policies account for a range of studies, assessments and strategies including;

- Leicester and Leicestershire Housing Requirements. G L Hearn 2011
- Service Centre Capacity Assessment. CBC 2011
- Leicester and Leicestershire Strategic Housing Market Assessment. 2008, 2014
- Leicester and Leicestershire Employment Land Study. PACEC 2012
- Leicester and Leicestershire Economic Assessment 2011
- Economic Growth Plan. LLEP 2012
- Charnwood Regeneration Strategy 2012
- Employment Land Review. BE 2014

The development strategy for Charnwood is based on “urban concentration”. The priority for growth is in South Charnwood at the edge of Leicester to take advantage of existing infrastructure with strong links to the City for jobs, services and community facilities including higher order services, shops and leisure.

The Core Strategy says;

“The southern part of Charnwood sits on the edge of Leicester and forms an integral part of the way the City functions and grows. The villages and towns on the edge of Leicester, including Birstall and Thurmaston, play a significant role in Leicester’s economy. The people that live in these communities very often work in the City and also benefit from good access to, and support, the City’s shops, services and leisure facilities.

Leicester City has expanded to its limits. We recognise the economic and social relationship between our community and the City. We want to contribute to the future prosperity of the City whilst protecting our communities’ identity.

Our priority location for growth is within and adjoining the Leicester Principal Urban Area. We will provide for the majority of this growth in two sustainable urban extensions, providing homes and jobs with facilities and services and an employment focused Regeneration Corridor...”

The provisions and conclusions of the Local Plan have therefore been determined by the Borough Council in the context of the social, economic and environmental considerations for South Charnwood. The North of Birstall (Broadnook) Policy CS20 provides a bespoke and prescriptive position. As an up to date plan, all Core Strategy policies can be afforded full weight.

The Plan establishes **strategic objectives** for the Borough which are shared with the **Charnwood Sustainable Community Strategy**. They include;

- to secure the provision of accessible facilities and services to meet the needs of all local people;
- to promote health and well-being, by ensuring that residents have access to health care, local parks, greenspaces and natural environment, the countryside and facilities for sport and recreation, creative and community activities;
- to promote stronger, cohesive and balanced communities;
- to develop integrated transport schemes;
- to create distinctive and quality places for local people through higher design standards;
- to ensure that there is a network of vibrant 'local' centres so residents have access to a range of shops, services and facilities;
- to meet needs for homes including affordable housing;
- to provide all communities in Charnwood with access to quality jobs and improved standards of life by creating opportunities for new high quality employment sites;
- to encourage the local economy towards a higher share of higher value, higher quality innovative industries.

Set against these overall objectives, as emphasised in the Planning Statement which accompanies the planning application and reinforced in ES Chapters 4-6 the Core Strategy acknowledges for North of Birstall;

“... This location is well connected to the City with high frequency bus links, an existing Park and Ride and a national cycle route. It also provides an attractive location for both new homes and businesses which will support housing delivery and bring investment into our Borough. This location is also able to accommodate a sustainable urban extension which meets the day-today needs of its community with a good range of jobs, services and facilities”

The new Local Plan establishes a Vision for North of Birstall and sets out garden suburb principles. They express the aspiration of;

- benefits of excellent access to the City for work and leisure with the benefits of the countryside such as green open space, fresh air, tranquillity and beautiful character;
- a comprehensively planned scheme offering an excellent quality of life for the new community;
- a range of homes, jobs, community facilities and shops which meet the day-to-day needs of the people who live there;
- community uses which will provide a focus of civic pride.

Policy CS20 and its explanatory text provide a clear framework for the social, economic and community elements of the Broadnook proposal. The following table summarises the requirements/expectations and the Broadnook response as defined, explained and supported by the application proposals.

1. Homes

Core Strategy Expectations	Broadnook Proposal
<ul style="list-style-type: none"> • a significant contribution to strategic needs by 2028; • a mix of housing types, sizes and tenures including some smaller properties and bungalows if possible; • affordable housing having regard to market conditions, economic viability and other infrastructure requirements; • extra care housing to meet the needs of an ageing population; • a site for showpeople. 	<p>The application document, plans and drawings explain the way in which the Broadnook responds to these issues.</p>

2. Jobs

Core Strategy Expectations	Broadnook Proposal
<ul style="list-style-type: none"> • up to 15 hectares of general employment land; • an appropriate mix of business uses, responding to the needs of the local economy and maximising the opportunity to work locally; • provision for new and developing businesses; • people at Broadnook and those living nearby have the opportunity to live close to work; • given excellent connections and relationship with Leicester City the site can contribute to wider employment requirements. 	<p>The planning application documents explain the way in which these expectations are met.</p> <p>A mixed range of employment uses are proposed with excellent accessibility and transport choice credentials.</p>

3. Shops and Facilities

<ul style="list-style-type: none"> • access on site to a wide range of services and facilities; • provision of an accessible Local Centre delivered in a timely fashion and including, as a minimum, local shops and a small supermarket, small scale employment, a range of non-retail and community facilities and services including a community centre and new or expanded health facilities. 	<p>The planning application sets out and explains the disposition and content of a high quality Local Centre – the Broadnook Centre – at the heart of the new community and served by Central New Walk.</p>
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4. Access and Travel

<ul style="list-style-type: none"> • good connections for new residents to employment, schools, shops, leisure facilities, open spaces; • good connections with Leicester City Centre, Watermead Park, Charnwood Forest, Loughborough and Birstall District Centre; • a new A6 Junction with a two-way link to Loughborough Road; • good public transport provision and connections with local employment opportunities, Birstall, Leicester City Centre and Loughborough. 	<p>The proposals explain how these objectives will be achieved and the advantages generated by the proposals.</p> <p>The public transport strategy is based on high quality and frequency bus services – Arriva 126/127 and Centrebus 22A and 22B which make all connections listed.</p>
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5. Environment

- good access to a high quality network and multi-functional set of open spaces, sport and recreational facilities which benefit the residents of the new community and existing residents of the local area;
- maximising the opportunity for access to the wider Green Infrastructure network for recreation and leisure and access to the wider countryside.

The Broadnook character and environmental quality is created from extensive green infrastructure of all types and character.

A generous, spacious and attractive environment will make a significant contribution to a healthy new community.

The Broadnook Garden Suburb proposals respond positively to the Core Strategy policy requirements and expectations. An assessment of effects is therefore based on the Borough Council's Core Strategy position i.e the conclusions reached during the plan-making process.

The assessment seeks to quantify impacts where possible based on proportionate evidence. Some issues are inevitably evaluated on a qualitative/subjective basis.

The impacts of the proposals are judged against the following;

major positive/negative effect	- the garden suburb proposals bring about a significant improvement or deterioration in the quality of the socio-economic environment
moderate positive/negative effect	- a noticeable improvement or deterioration
minor positive/negative effect	- a minor improvement or deterioration
negligible/neutral effect	- the impact of the garden suburb proposals will have no noticeable effect on the quality of the socio-economic environment

To assess potential impacts associated with the proposals, their scope by comparison with the baseline conditions is considered along with factors associated with construction and operational circumstances accounting for the planning policy objectives and priorities highlighted above.

Baseline Conditions

(i) area of impact

Broadnook is a new, self-contained community and at one level the assessment of social, economic and issues very much relates to that new community itself mindful of Policy CS20 requirements. In turn there is the relationship of the new community with neighbouring established villages and also any wider social, economic and community effects for south Charnwood and Leicester City.

(ii) population trends

Charnwood's population has risen from 153,462 recorded in the 2001 Census to 166,100 in 2011 – an 8.23% increase – which is above the national increase of 7.9% and slightly below the East Midlands' regional position of 8.65%.

Charnwood's population structure is largely similar to the regional and national picture with a slightly greater proportion in the 15-24 age range and those of a working age.

The average household size in Charnwood Borough is 2.49, above the regional and national averages.

(iii) economic activity and unemployment

Charnwood experienced 12.9% employment growth in the decade to 2011 whilst employment in Leicester City declined by 0.5%. In May 2013 claimant unemployment was 2.1% of the resident workforce in Charnwood and 5.6% in Leicester City (cf. East Midlands 3.5% and 3.8% national) 22% of the claimant unemployed experienced long-term unemployment in Charnwood with 31% in Leicester City (cf. East Midlands 26.4% national 27.3%).

Local economic activity rates for the 16-64 aged workforce are comparable for Charnwood (73%) and Leicester City (72.8%), both slightly below the regional (77.7%) and national (76.9%) figures.

A degree of caution is appropriate with the Charnwood statistics in view of an above-average proportion of full-time students in the local area.

In terms of employment sectors Charnwood has a similar occupational breakdown to the national profile; it is an area of reasonable skills and relatively higher proportion of those with a degree or higher qualification. Leicester City has a strong manufacturing sector and its role as a regional service Centre and strong industrial location is noted. More recent Employment Land Studies support the conclusion that business and professional services are important growth sectors.

(iv) **journeys to work**

There are significant commuting patterns in Charnwood Borough bearing in mind the relationship of the Borough to nearby urban centres and communication corridors. Some 20,000 people travel into the Borough to work, making up about a third of all jobs. Some 32,000 commute out of Charnwood – about 44% of all employed residents. The significant majority of these movements is related to jobs in Leicester.

The nett flow of nearly 12,000 workers is equivalent to about 15% of all resident workers. The A6 north-south corridor is a key movement corridor and the location of the Broadnook site suggests important potential for improving sustainable travel patterns.

(v) **existing employment land**

In the key transport choice corridor between Leicester and Loughborough, which also includes the major Service Centre settlements of Rothley, Mountsorrel, Sileby, Barrow-upon-Soar and Quorn there is a very little employment land available for new, expanding or relocating businesses. This group of villages traditionally included a range of factory premises employing significant numbers of local people in manufacturing, hosiery and shoemaking enterprises. Not only have most of these sites been redeveloped for housing but the settlements have been subject to high levels of peripheral expansion. The home-job balance has been distinctly affected resulting in high levels of commuting as quantified above. At the same time low levels of new employment land results in limited opportunities for investment. An additional and inter-related issue is the shortage of land for employment uses within the Leicester City boundary, particularly that of a high quality and suitable for modern business needs.

These factors represent important background to the policies of the Charnwood Core Strategy and the North of Birstall strategic priority.

(vi) **affordable housing**

For Charnwood Borough as a whole the Core Strategy, based on the Strategic Housing Market Assessment (SHMA) identifies a shortfall in affordable housing. The study identifies two and three bed houses as the main affordable type to address housing need in the area. The Core Strategy sets targets for affordable housing provision for new residential developments, recognising that delivery will account for market conditions, viability and other infrastructure requirements.

(vii) **education**

The new population at Broadnook will have an effect on local education provision as recognised by Policy CS20. Leicestershire is the local education authority for the area. The existing primary schools in the vicinity of Broadnook include;

- Rothley C of E Primary School, a new facility which is at full capacity;
- Birstall Highcliffe and Birstall Riverside which are also at full capacity.

A new one-form entry primary school is proposed to be built at Hallam Fields, an expansion area to the north of Birstall currently being completed. The new school is proposed to be open for the academic year commencing in September 2017 and will contribute to the overall Birstall primary school places demand including Hallam Fields. It is assumed that there are no surplus places at primary level in the area. In any event a new Broadnook Primary is required by planning policy as a key element in providing a heart to a new community.

At secondary level the Broadnook site is in close proximity to the Cedars Academy at Birstall formed from the merger of Stonehill High School and Longslade Community College. To the north of the location Rawlins Academy at Quorn provides a further destination. There is surplus capacity at these schools to accommodate secondary age group (11-19) students from the Broadnook community.

(viii) **health provision**

Charnwood Borough is part of a wider area administered by the NHS West Leicestershire Clinical Commissioning Group.

There are two GP practices at Birstall and another two at Mountsorrel. There is no surgery at Rothley. There has been significant planned and unplanned growth at the villages in the Soar Valley over the past decade or so with a number of planning consents still to be implemented. Strong concerns in the locality have been expressed about health care capacity. Policy CS20 requires a positive contribution from or as part of the Broadnook proposal in the form of new (i.e. part of the Broadnook Centre) or expanded facilities.

There are dental practices at Birstall and Rothley.

(ix) **community facilities**

The existing villages in the vicinity of Broadnook – Wanlip, Birstall, Rothley and Thurcaston – are longstanding communities with a range of facilities – community halls, places of worship, libraries for instances – which are commensurate with their location, settlement size and structure.

The straightforward proposal for Broadnook, confirmed by Policy CS20 is for new community facilities to be provided to serve a new community as part of the new local centre – providing a range of services and facilities to meet the needs of the new population and to foster community spirit and development.

(x) **open space, sport and recreation and play facilities**

Again the demands for new space and facilities for active and passive sport and recreation for all age groups will arise from the ongoing and phased delivery of the self-contained Broadnook proposal. There is no existing public access to the site which is intensively farmed. The new community will require a range of attractive green spaces for amenity and leisure purposes in line with the Borough Council's Open Space Strategy and its standards which are subject of Core Strategy policy. The garden suburb style and character is an important interactive theme in this regard.

(xi) **shopping and services**

The main retail centre in the County is the regional scale Leicester City Centre. Loughborough Town Centre is the Borough's main shopping offer. The Charnwood Retail and Town Centre Study (2013) identifies around 500 occupied retail units in Loughborough's town centre with a strong comparisons goods mix, a number of national retailers and a lively market.

The Study also includes an assessment of the Borough's District Centres which, in South Charnwood comprise;

• Anstey	which includes some 47 retail units, a good balance of convenience, comparison and service units and a Co-op supermarket. Service uses endorse the health of the centre
• Birstall	a large centre with 76 retail units anchored by a Co-op supermarket. This district centre has a strong retail offer across the sectors and a large range and number of services
• Syston	is the largest district centre in Charnwood with over 100 units. Tesco Metro and the Co-op are anchor supermarkets and Aldi has a store adjoining the centre. A wide range and diversity of comparison goods retailers and services support a strong centre
• Sileby	is a district centre with about 40 retail units including convenience floorspace centred on a Tesco Express and supported by a group of independent traders
• Thurmsaston	has a district centre to the north of the village constituted from national representatives including Asda, Marks and Spencer Food, McDonalds, Starbucks and Pizza Hut. This centre is trading very strongly

The Charnwood Retail and Town Centre Study acknowledges the generally good health and trading circumstances at each of these district centres and supports the prospect of additional retail floorspace to serve the new population at the sustainable urban extensions related to the Leicester Principal Urban Area including Broadnook.

Assessment of Impacts, Mitigation and Residual Effects

The assessment of impacts and likely significant effects considers both the construction and operational phases of the Broadnook Garden Suburb proposals.

Construction

A core effect during the construction phase of the development is the creation of construction employment – a significant number of full-time and part-time construction jobs.

Research produced by the Home Builders Federation and National Housing Federation suggests;

(a) **employment**

approximately 1.5 jobs per dwelling and a further 0.9 jobs within the supply chain represents a person-years estimate on strategic scale proposals of this nature. Utilising an average ratio of construction cost turnover to jobs (£120k for each job on a construction cost of £178 million) and a build period of 15 years up to approximately 125 Full Time Equivalent construction jobs per annum is estimated.

The Broadnook proposals are being implemented by locally based housebuilders and it is reasonable to expect a proportion of these construction jobs to be taken up by the local workforce, particularly in view of local training and recruitment policies. The National Housing Federation also estimates that induced employment can be estimated by utilising a 0.4 multiplier – thus an additional 70 FTE jobs will arise per annum during the construction period.

(b) **induced and indirect benefits**

The CBI Report “Unfreezing the Housing Market” concluded that for every £1 spent on housing construction some £2.85 worth of economic activity is generated through direct and indirect multiplier effects. Indirect positive impacts are also associated with the supply of materials from local suppliers.

It is expected that the impact on additional employment provision locally during the construction phase will be of a **moderate positive** significance. No mitigation is required.

(c) **local services and facilities**

During the construction phase – up to 15 years – construction workers will make use of local services increasing the demand, for example, for day-to-day convenience goods, food and drink, accommodation and leisure uses. It is estimated that this impact will result in a **minor positive** effect with no mitigation required.

Operational Phase

(i) **direct employment**

At a household size of 2.5 persons per dwelling the Broadnook proposals generate a population of some 4125 people. Assuming 56% will be economically active (the Charnwood average) then the proposed development will generate some 2265 economically active persons. It is likely that a number of future residents will relocate from nearby Charnwood settlements and from Leicester and therefore will be in employment already. An overall nett figure of around 1375 people seeking employment opportunities represents a reasonably generous assumption on potential impacts.

The Broadnook proposal includes approximately 15 hectares of employment land creating mixed Class B uses. The mixed land uses at Broadnook Centre also generate a range of high quality job opportunities.

Broadnook job generation is, in part, estimated from consideration of the ratio between Use Class floorspace and job numbers – drawn from published studies such as Homes and Communities Agency (HCA) “Employment Density Guide” (2010).

The estimated number of jobs generated for each use or facility is as follows;

Use Class	Proposed Use	Floorspace (sq.m)	Average Employment Density	Jobs Generated (FTE)
B1(a)	Offices	7,500	1 job per 15 sq.m	500
B1(b) and B1(c)	Research and Development / Light Industry	17,500	1 job per 40 sq.m (blended)	438
B2	Manufacturing	10,000	1 job per 34 sq.m	294
B8	Warehousing	15,000	1 job per 70 sq.m	214
A1	Supermarket	1,600	1 job per 20 sq.m	80
A1-A5	Other shops, Services, Catering	2,200	1 job per 20 sq.m	110
C2	Care Home	Estimate		50
	Community Resource/ Garden Suburb Trust	Estimate		10
	Health Care	Estimate		12
	Primary School	Estimate		30
	Grounds and Green Infrastructure Maintenance	Estimate		10
			Total:	1,748 (Full Time Equivalent)

There will be a mix of full-time and part-time employment spanning a number of sectors in response to the diverse mix of uses and facilities proposed. A range of opportunities will be created for varied skills levels – including management, health and education personnel, skilled and semi-skilled jobs in industrial and warehousing uses and clerical, administrative and sales staff.

The amount of local services, retail and mixed employment uses at Broadnook Centre generated by the new community's demands is designed largely to meet those requirements but also to contribute to wider employment needs.

The nett additional employment effects are likely to vary over the life cycle of the development. Early phases may involve a relatively larger element of local firms relocating to the proposed high quality, highly accessible new opportunity. Equally the employment area will attract inward investment both from within and outside the Borough and County which will generate additional employment through multiplier effects, the local supply chains and retail expenditure growth.

(ii) **indirect and induced employment**

In addition to direct employment impacts indirect jobs will be supported from increased demands for local services and facilities arising from the increased population and new businesses. Spending on goods, supplies and services and of the business, retail, community and education occupiers will advantage firms and suppliers in the surrounding areas including the spending of wages - Employees and firms will generate induced employment.

The English Partnerships Additionality Guide (2004) provides guidance on how the indirect Multiplier effects on employment can be assessed. A composite multiplier of 1.2 for supply linkages at the local level has been applied. This results in a further 350 spin-off jobs being supported in local services and other firms in the area through indirect employment.

The provision of approximately 2100 direct and indirect jobs associated with the Broadnook proposals confirms a good level of alignment with the economically active proportion of the new population and a good balance between homes and jobs. These new jobs could be easily filled by Broadnook residents and local people.

The proposals will not create any additional pressure on the local labour market, will offer a positive contribution to local and wider employment needs and will generate positive economic impacts over the baseline.

= Therefore for both direct and indirect employment, the impact of the proposed development is assessed as being a **major positive** effect. The proposals provide a sustainable economic development.

(iii) **impact on commuting**

Given the high levels of nett commuting by Charnwood residents into Leicester the provision of new sources of employment at Broadnook will offer an advantage in reducing that activity. As a counterbalance some Broadnook residents will commute to work elsewhere although the majority would travel to Leicester, Loughborough or elsewhere in Charnwood in line with the established pattern. The majority of commuting trips are expected to be relatively short journeys and many can be made by utilising the excellent public transport connections including Birstall Park and Ride which are already in place. Overall the impact of the proposed development is assessed as **minor positive**

(iv) **population and housing**

The additional population figure of 4125 would assume that all residents of the new homes would be people not already resident in the area. In reality some will be existing local residents moving to trade up or down, or occupying affordable or specialist units (e.g. retirement or extra care). Of course existing residents relocating will release existing dwellings adding to the total population. To assess full “impacts” the assumption is made that the full population increase is additional to the local area – and the implication for other requirements such as education, health and community infrastructure is considered accordingly.

The main impact on the local housing market will be the contribution of a significant stock of new dwellings of mixed size, type and tenure, including affordable housing and enhancing housing choice. Broadnook contributes at least 1,345 of at least 5,500 new homes to the priority location for growth – the Leicester Principal Urban Area – identified by the Charnwood Core Strategy. This represents 25% of the identified requirement in this area to 2028.

New homes which accommodate economically active workers will deliver economic outputs. Experian Labour Market statistics provide Gross Value Added (GVA) output data related to workforce jobs at a District level. Within Charnwood the GVA per worker is approximately £40,000 per year. Based on 2265 economically active workers the Broadnook community could generate about £90.6 million in GVA per annum. The new population will also generate retail expenditure on convenience and comparison goods and this is examined in the Retail Assessment.

Further financial contributions will arise from New Homes Bonus, Council Tax and Section 106 contributions.

On this basis the impacts on housing are assessed as **major positive** accounting for the recognised strategic importance of the proposal in meeting the objectively assessed needs and dwelling targets in the Charnwood Core Strategy.

(v) **education facilities**

The new Broadnook community will generate a demand for school places. Actual school requirements to accommodate the potential level of additional pupils has to account for any existing surplus capacity in the area, the education authority's proposals (if any) and the potential for some pupils to attend independent schools or travel to schools outside the local area.

In terms of primary provision there does not appear to be any spare capacity in primary schools in the vicinity of the site. The proposal provides for a new primary school as a key facility and community focal point at the heart of the Broadnook Centre. A two-form entry school is proposed (with an early years nursery facility) that would deliver 420 pupil capacity whilst the increase in primary pupils generated by the new population will be of about 375. There is therefore a nett benefit for the locality in terms of primary provision.

There is spare capacity in nearby secondary schools for the Broadnook related requirements and therefore mitigation is not required.

On the basis of the inherent mitigation and enhancement measures arising from the new primary school impact on education is assessed as **minor positive**.

(vi) **health care**

The new population will generate GP and dental care requirements. Mindful of the lack of GP services at Rothley and consistent with Policy CS20 (which acknowledges the suitability of new or expanded facilities) the application proposes a new health care building as part of the Broadnook Centre which, as a preliminary concept, will provide mitigation and enhancement. The Broadnook Centre will also provide scope for additional dental service provision.

Overall on the basis of the preferred Broadnook solution set out above the impact on healthcare provision is assessed as **moderate positive**.

(vii) **community facilities**

The new population will generate an impact on and a requirement for community facilities including social and meeting spaces, library provision, a place of worship, emergency services and administrative offices for governance and stewardship. Again the Core Strategy Policy reflected in the application proposal is for Broadnook needs to be met by the provision of a community resource centre the preliminary proposals for which are described and explained in the application drawings and documents.

On the basis of the nature and content of the new provision the impact of the proposals on community facilities is assessed as **minor positive**.

(viii) **open space, sports and recreation**

Increased demands on open space and recreation provision will arise from the new Broadnook population. Requirements for such provision have their basis in the Borough Council's Open Space, Sport and Recreation Study of 2010 and the ensuing Open Space Strategy of 2013.

The Council's newly adopted Core Strategy establishes quantity standards expressed in hectares per 1,000 population based on the above documents and applies these to open space categories.

The following table identifies the categories, the requirement per category and the provisions of the Broadnook proposal;

	open space type	quantity standard ha/1000 population	Broadnook requirements (based on 4,000 population)	Broadnook proposal - proposed provision	
1	parks	0.32	1.28	13.12	975%
2	natural open space	2.00	8.00	35.30	441%
3	amenity green space	0.46	1.84	17.80	967%
4	facilities for children/ young people	N/A		6.00	
5	outdoor sports facilities	2.60	10.40	10.40	100%
6	allotments	0.33	1.32	1.32	100%
7	woodland			5.60	
			22.84 ha	89.54 ha	392%

The Council's standards will be met or exceeded in all categories and the overall level of provision is some four times the Council's base figure. It reflects the commitment to the garden suburb character, concepts and principles and the provision of extensive parkland, major greenspace and woodland enabling major nett gains in green infrastructure and nature conservation. The proposals respond very positively to the ambition to upgrade the Urban Fringe Green Infrastructure Enhancement Zone and to enable a strong landscape-scale connection between Charnwood Forest, Rivers Soar/Wreake corridors and Watermead Park. Access to extensive areas of countryside will be facilitated and the anticipated beautiful character will be created.

With this provision there will be direct and permanent impacts on sport, recreation and green space facilities in the area providing for new, accessible formal and informal facilities of **major positive** significance.

(ix) **retail impact**

The proposed retail element of the proposed Broadnook Centre has the potential for impact on nearby shopping facilities. However the new provision is planned to be at a scale which meets the needs of the Broadnook resident population rather than a wider catchment in order to minimise impacts.

The position has been assessed by the Retail Statement which accompanies the application. The Statement concludes that the local centre and small supermarket proposed are fully policy compliant. Given the significant outflow of available expenditure from south Charnwood residents to retail operations in areas located outside the area it is expected that £9.6 million of trade will be clawed back. The study establishes that the surrounding District and Local Centres are generally in good health. The assessment places particular emphasis on the convenience retail provision at Birstall District Centre due to the proximity to the proposal and concludes that impacts are not significant.

The retail facilities will engender a range of complimentary facilities to be combined at the Broadnook Centre such that the new residents will have easy access to a good range of facilities.

District and Local Centres will not be harmed and any trade diversion will be offset by expenditure growth. In view of the nett benefits to the south Charnwood economy the proposals are considered to be of **moderately positive** significance.

cumulative impact

The Scoping response from the Borough Council requests the consideration of potential cumulative impacts with other developments. The Council's development strategy in its Core Strategy has been adopted since that request was made and takes account of and plans for the potential impacts from the limited number of other developments in the vicinity on services and facilities. Broadnook proposals are compliant with adopted Policy CS20 and significant adverse impacts are not anticipated. The balance of advantage is very much in favour of the proposals as the following summary below sets out;

development strategy – wider socio-economic effects

The development is aligned with national and local planning policy. It represents an important private sector investment in Charnwood providing significant social, economic and environmental advantages. There is however an associated dimension which is of further significance to existing communities in south Charnwood. Over the past 5-10 years pressure for additional housing development has been focused on the larger of the villages in this area (the Service Centres) in the absence of an approved alternative strategy based on sustainable urban extensions. Hence unplanned growth (the result of ad hoc decisions by the Borough Council and Inspectors at appeal) at Rothley, Mountsorrel, Anstey and Sileby has been significant. This has been increasingly of concern to local residents partly because of the extra pressure on existing social and physical infrastructure including education, social, health and community facilities. In turn the additional housing and population growth has not been matched by a range of new local job opportunities given the lack of identified sites and projects to do so.

An important advantage of planned growth, in the form of the proposals adopted by the Borough Council in the Core Strategy, including the key priorities of North East of Leicester and North of Birstall is that further growth is concentrated in those locations served by new infrastructure and relieving pressure on the significantly expanded existing communities.

This strategy has social, community and economic benefits to the existing communities which is considered to be of **major positive** significance.

Mitigation and Enhancement

The economic impacts of the proposals including new investment and employment will be positive and do not give rise to the need for mitigation measures. Potential adverse impacts – for example on education, health, recreation – will be mitigated by the provision of bespoke new facilities as part of the proposed Broadnook development. As a new self-contained community the facilities will provide for day-to-day needs and comprise a nett gain on a range of issues as described.

Residual Effects

Construction

Accounting for local job recruitment, training measures and the range and extent of new high quality housing, employment and commercial land and buildings in an important location the residual impact will be **moderate positive**.

After Completion

A range of mitigation measures are proposed involving the provision of facilities and green infrastructure to address, mitigate and compensate for potential negative impacts. In summary the effects are considered to be;

Summary of impacts upon baseline position (with mitigation)

Issue	Impact	Magnitude
Employment	Positive	Major
Commuting	Positive	Minor
Population and Housing	Positive	Major
Education	Positive	Minor
Health	Positive	Moderate
Community Facilities	Positive	Minor
Open Space, Sports, Recreation	Positive	Major
Retail	Positive	Moderate

The Broadnook Garden Suburb provides new homes, jobs and facilities to meet identified needs in an eminently sustainable way and at a location with emphatic sustainability advantages. A new community will be well served with appropriately beneficial new employment, education, health, community and recreation facilities alongside the new housing. The socio-economic impacts are expected to be **positive**.

14

Air Quality



Broadnook

Garden Suburb

Environmental Statement

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14.0 Air Quality Assessment

14.1 Introduction

- 14.1.1 This chapter of the Environmental Statement, prepared by Brookbanks Consulting, assesses the potential air quality issues and impacts associated with the proposed Broadnook Garden Suburb development North of Birstall.
- 14.1.2 The following assessment stages have been undertaken;
1. identification of relevant legislation and policy
 2. baseline evaluation
 3. assessment of potential air quality impacts during the construction phase
 4. assessment of potential air quality impacts during the operational phase
 5. definition of mitigation measures if required
 6. conclusions and statement of effects
- 14.1.3 The construction phase assessment considers the potential effects of dust and PM₁₀ (particulates) releases from site activities and materials movement. The qualitative risk assessment is based on the Institute of Air Quality Management (IAQM) document ***“Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance”*** (January 2012). The assessment also considers the suitability of the site for primarily residential development with regards to exposure of future occupants to elevated pollution concentrations.
- 14.1.4 For both the construction and operational phases of the development the type, source and significance of potential impacts are identified and the measures that should be employed to minimise any identified impacts and exposure to elevated pollution levels are described.
- 14.1.5 A glossary of common air quality terminology is provided at **Appendix 14A**.

14.2 Legislation and Policy

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

- 14.2.1 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007¹, pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.
- 14.2.2 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene (C₆H₆), 1,3-butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀, PM₂₅), sulphur dioxide (SO₂), ozone (O₃) and polycyclic aromatic hydrocarbons (PAHs).
- 14.2.3 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.
- 14.2.4 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.
- 14.2.5 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO₂, the short-term standard is for a 1-hour averaging period, whereas for PM₁₀ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).
- 14.2.6 The current statutory standards and objectives are set out in the table presented in **Appendix 14B**.
- 14.2.7 Of the pollutants included in the AQS, NO₂ and PM₁₀ will be the most relevant to this project as these are the primary pollutants associated with road traffic.
- 14.2.8 Examples of where the Air Quality Standards and Objectives should/should not apply are included in the table below, taken from the Local Air Quality Management Technical Guidance document (2009)

¹ Air Quality Strategy for England, Scotland, Wales & Northern Ireland July 2007

Figure 14.1 Application of Air Quality Standards and Objectives

Averaging Period	Objectives Should Apply At	Objectives Should Generally Not Apply At
Annual Mean	<p>All background locations where members of the public might be regularly exposed.</p> <p>Building façades of residential properties, schools, hospitals, libraries etc.</p>	<p>Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence.</p> <p>Gardens or residential properties.</p> <p>Kerbside sites, or any other location where public exposure is expected to be short term.</p>
24 hour (daily mean)	All locations where the annual mean objectives would apply together with Hotels.	Kerbside sites, or any other location where public exposure is expected to be short term
8 hour mean	Gardens of residential properties – i.e. parts of the garden where relevant public exposure is likely e.g. where there is seating or play areas. It is unlikely that relevant public exposure will occur at the extremities of the garden boundary, or in front gardens although local judgement should always be applied.	
1 hour mean	<p>All locations where the annual mean and 24 and 8 hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets).</p> <p>Those parts of car parks and railway stations etc. which are not fully enclosed where members of the public might reasonably be expected to spend one hour or more.</p> <p>Any outdoor locations to which the public might reasonably be expected to spend one hour or longer.</p>	Kerbside sites where public would be expected to have regular access
15 min. mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

Local Air Quality Management (LAQM)

- 14.2.9 Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews have to consider present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.
- 14.2.10 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part of its District as an Air Quality Management Area (AQMA).
- 14.2.11 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.
- 14.2.12 The Department of Environment, Food and Rural Affairs (DEFRA)² has published technical guidance for use by local authorities in their Review and Assessment work. This guidance, referred to in this chapter as LAQM.TG(09), has been used where appropriate in the assessment.

National Planning Policy Framework

- 14.2.13 Published on 27 March 2012, the National Planning Policy Framework (NPPF)³ sets out the Government's planning policies for England and how these are expected to be applied. It brings together and summarises a set of Planning Policy Statements and Planning Policy Guidance which previously guided planning policy-making and decision-taking. These included Planning Policy Statement 23: Planning and Pollution Control⁴, which provided planning guidance for local authorities with regards to air quality.
- 14.2.14 At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.
- 14.2.15 Current planning law requires that applications for planning permission are determined in accordance with the relevant up-to-date development plan (i.e. Local Plan or Neighbourhood Plan). The NPPF should be taken into account in the preparation of development plans or in the absence of any up-to-date Local Plan, and therefore the policies set out within the Framework are a material consideration in planning decisions.
- 14.2.6 The NPPF identifies 12 core planning principles that should underpin both plan-making and decision-taking, including a requirement for planning to *"contribute to conserving and enhancing the natural environment and reducing pollution"*.
- 14.2.17 Under Policy 11: "Conserving and Enhancing the Natural Environment" the Framework requires the planning system to *"prevent both new and existing developments from contributing to or being put at unacceptable risk or being adversely affected by unacceptable levels of air pollution"*.

14.2.18 In dealing specifically with air quality the Framework states that *“planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan”*

14.2.19 **National Planning Practice Guidance** was published by the Department for Communities and Local Government (DCLG) in March 2014 to support and guide the application of the NPPF policies and principles. It states;

“When deciding whether air quality is relevant to a planning application, local planning authorities should consider whether the development would;

- *significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or results in construction sites that would generate large HGV flows over a period of a year or more.*
- *expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*
- *give rise to potentially significant impact (such as dust) during construction for nearby sensitive locations”*

Control of Dust and Particulates Associated with Construction

14.2.20 Section 79 of the Environmental Protection Act (1990) states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as;

“Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance”

“Any accumulation or deposit which is prejudicial to health or a nuisance”

² Department for Environment, Food and Rural Affairs (DEFRA) (2009) Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG (09)

³ DCLG Department for Communities and Local Government: National Planning Policy Framework (March 2012)

⁴ ODPM Office of the Deputy Prime Minister: Planning Policy Statement 23: Planning and Pollution Control (October 2004)

- 14.2.21 Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.
- 14.2.22 In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase - potential sources being the clearance, earthworks, construction and landscaping processes.
- 14.2.23 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

Odour Regulatory Standards and Guidelines

- 14.2.24 Currently in the UK there are no statutory numerical standards for assessing the acceptability of predicted odour impacts from quantitative odour impact assessments. On this basis, odour impact criteria are typically based upon guideline documents (predominantly based on research from outside of the UK), case law and research which differ depending on the regime i.e. planning (to avoid significant detriment to amenity) or permitting (to avoid unacceptable pollution).
- 14.2.25 The numerical limits applied have largely been derived from the findings of a limited number of epidemiological assessments where modelled odour impacts have been compared to the findings of quality of life surveys; a dose-effect study. These dose-effect studies have only been undertaken for a limited number of odour types; however they have been used as the foundation for the setting of acceptable odour standards in many countries.
- 14.2.26 The actual acceptable level of impact will be dependent on the nature (offensiveness) of the odour and the broad sensitivity of the population. To account for this, differing numerical limits are often set not only depending on the offensiveness of the odour but also the broad sensitivity of the environment.

UK Guidance

- 14.2.27 UK guidance identifies a range of odour impact criteria depending on the nature of the odour (i.e. its pleasantness/unpleasantness) and the likelihood of causing unacceptable impacts based on the 98th percentile of predicted hourly average concentrations over a year. It is therefore evident that such criteria apply only to locations where an individual's exposure is likely to occur for prolonged periods of time i.e. residential properties. Where exposure is more transient (i.e. roads, footpaths etc.) the direct application of such criteria should be treated with caution and further consideration should be given to how the duration and frequency of exposure of the individual will influence the acceptability of the predicted impact.

DEFRA Odour Guidance for Local Authorities

- 14.2.28 This DEFRA guidance⁵ provides further general principles and factors that may be important in assessing when, or if, a specific odour source is likely to constitute a statutory nuisance.
- 14.2.29 The “FIDOL” factors within this guidance are defined as Frequency, Intensity (and therefore concentration), Duration, relative Offensiveness (hedonic tone/character) and Location, along with any aggravating characteristics. **Figure 14.2** below outlines the “FIDOL” factors that are useful in determining potential odour impact or offensiveness.

Figure 14.2 Factors Relating Odour Impacts to Statutory Nuisance

Factors	Factors determining Statutory Nuisance	Comments
Frequency	How often an individual is exposed to odour	Even a pleasant odour can be perceived as a nuisance if exposure is frequent. At low concentrations a rapidly fluctuating odour is more noticeable than a steady background odour, i.e. this is an aggravating factor
Intensity	Level of Odour	Factors are equivalent
Duration	Duration of Exposure	Factors are equivalent
Offensiveness	Type of odour	Some odours are universally considered offensive, such as decaying animal matter. Other odours may be offensive only to those who suffer unwanted exposure, e.g. coffee roasting
Location (the type of land use and nature of human activities in the vicinity of the odour source)	The characteristics of the neighbourhood where the odour occurs	Factors are essentially equivalent
Tolerance and expectation of the receptor	The sensitivity of the complainant	Statutory nuisance uses the concept of the response of the average reasonable person

⁵ DEFRA (March 2010) Odour Guidance for Local Authorities HMSO London

Section 79 of the Environmental Protection Act

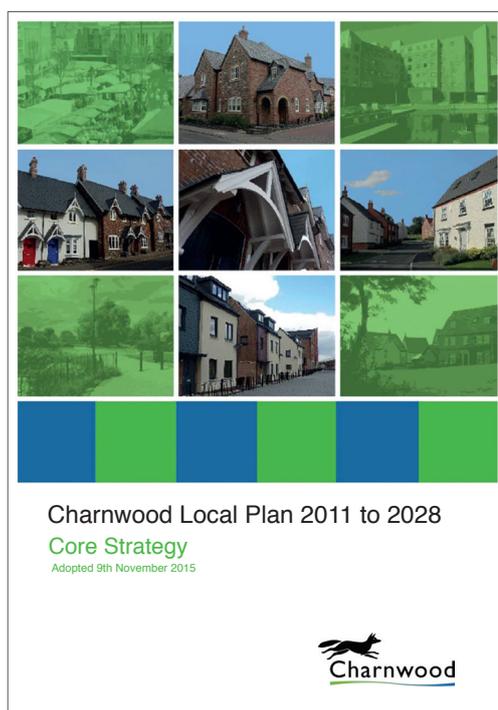
- 14.2.30 Under Section 79 of the Environmental Protection Act (EPA) 1990, (as amended), Councils have powers to deal with certain nuisances (these are deemed to be Statutory Nuisances). However, for the Council to be able to act, the nuisance must be coming from private land or property. These powers apply not only to control existing nuisance, but also where nuisance is expected to occur or recur. Statutory Nuisance cannot easily be defined but is often described as an unreasonable interference with the enjoyment of one's property. It must occur regularly and must continue for a time that makes it unreasonable.
- 13.2.31 The EPA sets out numerous definitions of what constitutes statutory nuisance, as identified below;
- a) any premises in such a state as to be prejudicial to health or a nuisance;
 - b) smoke emitted from premises so as to be prejudicial to health or a nuisance;
 - c) fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;
 - d) any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;
 - e) any accumulation or deposit which is prejudicial to health or a nuisance;
 - f) any animal kept in such a place or manner as to be prejudicial to health or a nuisance;
 - fa) any insects emanating from relevant industrial, trade or business premises and being prejudicial to health or a nuisance;
 - fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance;
 - g) noise emitted from premises so as to be prejudicial to health or a nuisance;
 - ga) noise that is prejudicial or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street;
 - h) any other matter declared by any enactment to be a statutory nuisance.
- 14.2.32 Section 79 also identifies that it is the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under Section 80 and where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint.
- 14.2.33 As explained at 14.2.21 above failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

IAQM Odour Guidance

- 14.2.34 On 20 May 2014 the Institute of Air Quality Management published guidance on the assessment of odour in the planning regime.
- 14.2.35 The guidance is for assessing odour impacts for planning purposes. It provides background information relating to requirements for odour impact assessments and suitable impact criteria and draws from other sources of information such as that described in EPOR H4.

Charnwood Local Plan 2004

- 14.2.36 The Local Plan was adopted in January 2004⁶ and set out policies to govern development allocations within the Borough up to 2006. A number of development management policies were saved in 2007 and remained part of the development plan to inform decisions on planning applications until the new Charnwood Local Plan was adopted in November 2015. Former policy EV/39 was previously taken into account in the formulation of the Broadnook proposals.



⁶ Charnwood Borough Council: Borough of Charnwood Local Plan 1991-2006 Written Statement (2004)

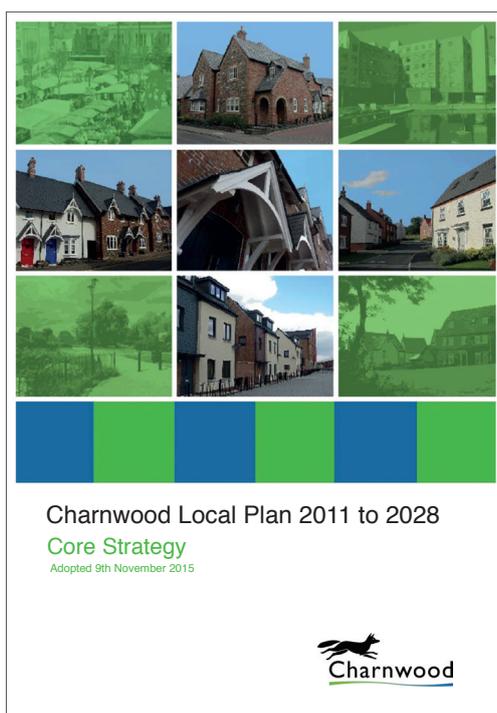
Charnwood Local Plan Core Strategy 2011 – 2028

14.2.37 The Charnwood Local Plan 2011-2028 was adopted by the Borough Council on 9 November 2015.

14.2.38 Policy EV/39 of the former 2004 Local Plan has been superseded by Policy CS2 "High Quality Design" and CS16 "Sustainable Construction and Energy" of the new Core Strategy. Policy CS16 states;

"We will adapt and mitigate against the effects of climate change by encouraging sustainable design and construction and the provision of renewable energy, where it does not make development unviable. We will do this by;

- *supporting new development that protects environmental resources including local air quality and our most versatile agricultural land"*



14.3 Methodology

Scope of Assessment

- 14.3.1 The scope of the assessment has been determined in the following way;
- as part of a formal request for a Scoping Opinion from Charnwood Borough Council (CBC) (issued in April 2014) in order to define the nature and extent of environmental impact assessment;
 - consultation with CBC Air Quality Officer (AQO);
 - review of air quality data for the area surrounding the site and background pollutant maps;
 - review of the traffic flow data, which has been used as an input to the air quality modelling assessment.
- 14.3.2 The development proposals will provide new residential, employment and commercial uses, sports facilities and associated infrastructure and green spaces; therefore there is the potential for impacts on local air quality during both the construction and operational phase of the proposed development.
- 14.3.3 The site is located to the west of a sewage treatment works. The potential impact of odour from the treatment works on the proposed development site has been considered within the assessment.
- 14.3.4 Details of the assessment methodology and the specific issues considered are provided below

Construction Phase Methodology

Construction Traffic

- 14.3.5 During construction of the Proposed Development, lorries will require access to the Site to deliver and remove materials; earthmoving plant and other mobile machinery will work on site and generators and cranes will also be in operation. These machines produce exhaust emissions; of particular concern are emissions of NO₂ and PM₁₀.
- 14.3.6 No information has been provided on the number of vehicles that will be generated during the construction period, however, based on the size of the development proposals it is anticipated that there will be of the order of 100 additional HGV vehicles generated on the adjacent road network per day.
- 14.3.7 The Environmental Protection UK (EPUK) air quality guidance⁷ sets out criteria to assist in establishing when an air quality assessment will be required. These criteria indicate that significant impacts on air quality are likely to occur where a development results in greater than 200 HGV movements per day during a construction period of a year or more. It is therefore anticipated that construction traffic generated by the proposed development would result in a **negligible** impact on local NO₂ and PM₁₀ concentrations and has not been considered any further in this assessment.

Construction Dust

- 14.3.8 To assess the potential impacts associated with dust and PM₁₀ releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the Institute of Air Quality Management⁸ has been undertaken.
- 14.3.9 This approach divides construction activities into the following four categories;
- demolition;
 - earthworks;
 - construction; and
 - trackout
- 14.3.10 The assessment methodology requires consideration of dust effects arising from three potential impacts;
- annoyance due to dust soiling;
 - harm to ecological receptors; and
 - the risk of health effects due to a significant increase in exposure to PM₁₀
- 14.3.11 The three impacts are assessed taking into account the sensitivity of the area likely to experience these effects, with the results of the assessment being used to define appropriate mitigation measures to prevent any significant effects at nearby receptors.
- 14.3.12 The IAQM guidance sets out the assessment into a number of steps. The first is an initial screening assessment to determine if there are any sensitive receptors (both human and ecological) within 350m of the site boundary or within 100m of the proposed construction haulage routes, thus determining the requirement for a more detailed evaluation. The exact route of the construction vehicles is not known at this stage. There are however existing sensitive receptors located within 350m of the site boundary and it is necessary to proceed to the next step.
- 14.3.13 Step 2 of the methodology assesses the risk of dust impacts for each construction activity and takes account of;
- the scale and nature of the works, which determines the potential dust emission magnitude (step 2); and
 - the sensitivity of the area (step 2b)

⁷ EPUK (April 2010) Development Control: Planning for Air Quality (2010 update)

⁸ Institute of Air Quality Management (January 2012) Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance

- 14.3.14 Risks are described in terms of there being a low, medium or high risk of dust effects for each of the four separate potential activities. This assessment is based on both IAQM criteria and professional judgement.
- 14.3.15 The outcome of the above two steps are then combined (step 2c) to identify the risk of dust impacts, which are described in terms of there being low, medium or high risk of dust effects for each of the four activity groups and assuming no mitigation measures are in place.
- 14.3.16 Based on the identified risk, appropriate mitigation measures are identified as set out in the IAQM guidance.
- 14.3.17 All construction sites are different and the potential for dust impacts are dependent on a number of local factors. The methodology set out in the IAQM guidance is therefore considered as a framework for assessing dust impacts and a certain level of professional judgement is required in determining the effects from each site. The sensitivity of the application location is considered to be low in view of its rural setting. There are two dwellings on site at the eastern boundary and another on the edge of the application boundary. A **Construction Environmental Management Plan** (CEMP) will ensure that construction best practice will be undertaken in this area.
- 14.3.18 The significance of identified effects is evaluated post mitigation using professional judgement and assuming that the mitigation measures identified and set out within the assessment are implemented by way of a **Dust Management Plan** (DMP).

Operational Phase Methodology

Impacts from Sewage Treatment Works

- 14.3.19 A qualitative assessment of potential impacts from odour arising from the sewage treatment works has been undertaken. This has included a review of local meteorological data, details of complaints data held by CBC and consideration of separation distances between proposed sensitive receptors and the sewage treatment works.

Operational Traffic Impact

- 14.3.20 The prediction of local air quality has been undertaken using the ADMS Roads dispersion model (Version 3.2). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process. ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used world-wide for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and Department for the Environment Food and Rural Affairs (DEFRA).

- 14.3.21 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user.

The dispersion model uses input data that details the following parameters;

- assessment area;
- traffic flow data;
- vehicle emission factors;
- spatial co-ordinates of emissions;
- street width;
- meteorological data;
- “roughness length”; and
- “Monin-Obukhor length”.

Meteorological data from East Midlands Airport for 2012 has been used for the assessment.

- 14.3.22 The model has been used to predict road specific concentrations of oxides of nitrogen (NO_x) and Particulate Matter (PM₁₀). The predicted concentration of NO_x have been converted to NO₂ using the LAQM calculator on the DEFRA air quality website⁹.
- 14.3.23 Traffic data for use in the assessment has been provided by the application’s Transport Consultant Lawrence Walker Ltd. Base traffic flows have been provided for 2014 for the road links in close proximity to the Site. In addition, traffic flows along the A6 Loughborough Road, south of the A46, have been taken from the Department of Transport (DfT) traffic count data available on its website (<http://www.dft.gov.uk/traffic-counts/>) to allow verification of the model results with local monitoring data.
- 14.3.24 A base year of 2012 has been used in the assessment. The 2014 base data provided by the transport consultant and the 2012 data taken from the DfT website has been used for the 2012 base scenario.

The base traffic has been factored forward to 2026 to provide the future year base scenario. The predicted traffic generated by the proposed development has then been added to the 2026 base scenario to provide the ‘with development’ scenario.

- 14.3.25 Based on the traffic data provided the following scenarios have been assessed;
- 2012 Base – for verification of the model only;
 - 2026 Base;
 - 2026 base + proposed development

⁹ <http://uk-air.defra.gov.uk>

- 14.3.26 A summary of the traffic data used in the assessment can be found in **Appendix 14.3**. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage HGV for the assessment years considered.
- 14.3.27 The emission factors released by DEFRA in July 2014, provided in the emissions factor toolkit EFT2014_6.0.1 and built into the ADMS model (Version 3.2) have been used to predict existing traffic related emissions in 2012 and 2019.
- 14.3.28 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background NO₂ and PM₁₀ concentrations have been taken from the 2011 DEFRA background maps. The maps provide an estimate of background concentrations between 2011 and 2030. The data used for the modelling assessment for the 2012 Base are set out in **Figure 14.12**.
- 14.3.29 Emission factors and background data used in the prediction of future air quality concentrations predict a gradual decline in pollution levels over time due to improved emissions from new vehicles and the gradual renewal of the vehicle fleet. However, recent monitoring carried out in urban areas throughout the UK have found that NO₂ concentrations are not declining as rapidly as previously thought and in some locations concentrations have increased. Monitoring carried out by Charnwood Borough Council shows no significant upward or downward trend in NO₂ concentrations since 2008. As a cautious approach, concentrations of NO₂ and PM₁₀ in 2026 have been predicted using 2012 background data and emission factors.
- 14.3.30 It is recommended, following guidance set out in Local Air Quality Management Technical Guidance, DEFRA (2009) LAQM.TG(09), that the model results are compared with measured data to determine whether the model results need adjusting to more accurately reflect local air quality. This process is known as verification.
- 14.3.31 LAQM.TG(09) recommends that model predictions should be within 25% (preferably 10%) of monitored concentrations for the model to be predicting with any degree of accuracy. The two monitoring sites located adjacent to the A6 in Birstall have been used to verify the model results. The results of the comparison are presented below in **Figure 14.3**.

Figure 14.3 Comparison of Modelled and Monitored NO₂ and PM₁₀ Concentration (µg/m³)

Monitoring Locations	Measured Concentrations	Modelled Concentrations	% Difference
Loughborough Road (Birstall)	35.9	24.5	-31.8
A6 (Birstall)	34.2	24.0	-29.8

- 14.3.32 The comparison of monitored and modelled concentrations indicates that the model is under-predicting annual mean NO₂ concentrations by an average of 31%. It is therefore considered necessary to adjust the model results to better represent local concentrations. The results of the modelling assessment have been adjusted using the methodology given in LAQM.TG(09). Full details of the verification and calculation of adjustment factors are provided in **Appendix 14D**.
- 14.3.33 Following application of the calculated adjustment factors the model results are showing no overall tendency to under or over predict at the monitoring locations and the predicted annual mean NO₂ at each site is within the preferred 10% of monitored concentrations.
- 14.3.34 There is no suitable monitoring of PM₁₀ data to allow verification of the PM₁₀ model results. However, LAQM.TG(09) suggests applying the NO₂ adjustment factor to modelled road-PM₁₀ where no appropriate verification against PM₁₀ data can be carried out. Therefore, the adjustment applied to predicted NO₂ concentrations has also been applied to the modelled PM₁₀ concentrations.
- 14.3.35 LAQM.TG(09) does not provide a method for the conversion of annual mean NO₂ concentrations to 1-hour mean NO₂ concentrations. However, research¹⁰ has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m³. Care has been taken to ensure that locations where the 1-hour mean objective is relevant are included in the assessment.
- 14.3.36 Quantitative assessment of the impacts on local air quality from road traffic emissions associated with the operation of the development have been completed against the current statutory standards and objectives set out in **Appendix 14B** for NO₂ and PM₁₀.

Significance Criteria

- 14.3.37 The guidance issued by EPUK & IAQM¹¹ relates to Air Quality considerations within the planning process and sets criteria which identify the need for an Air Quality Assessment, the type of Air Quality assessment required, and the significance of any predicted impact.

¹⁰ P Lauren and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites (July 2003)

¹¹ EPUK (April 2010) Development Control: Planning for Air Quality (2010 Update)

14.3.38 The guidance suggests expressing the magnitude of incremental change in concentrations as a proportion of an Air Quality Assessment Level (AQAL) such as the air quality objectives set out in Appendix B. The significance of impact is then identified based on the incremental change in the context of the new total concentrations and its relationship with the assessment criteria, noting whether the impact is adverse or beneficial based on a positive or negative change in concentrations. The criteria suggested for assigning significance is set out in **Figure 14.4** below.

Long term average concentration at receptor in assessment year	% Change in Concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Minor	Moderate
75% or less of AQAL	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Minor	Moderate	Moderate	Major
103-109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major

Figure 14.4: Impact Descriptors for Individual Receptors

AQAL – Air Quality Assessment Level which in this assessment refers to the Air Quality Objectives set out in Appendix B.

The percentage change in concentration should be rounded to a whole number.

The table should only be used with annual mean concentrations.

The descriptors are for individual receptors only: overall significance should be based on professional judgement.

When defining the concentrations as a percentage of the AQAL use the 'without scheme' concentration where there is a decrease in pollutant concentrations and the 'with scheme' concentrations for an increase.

The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value i.e. well below, the degree of harm is likely to be small. As exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year, it is impossible to define the new total concentrations without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

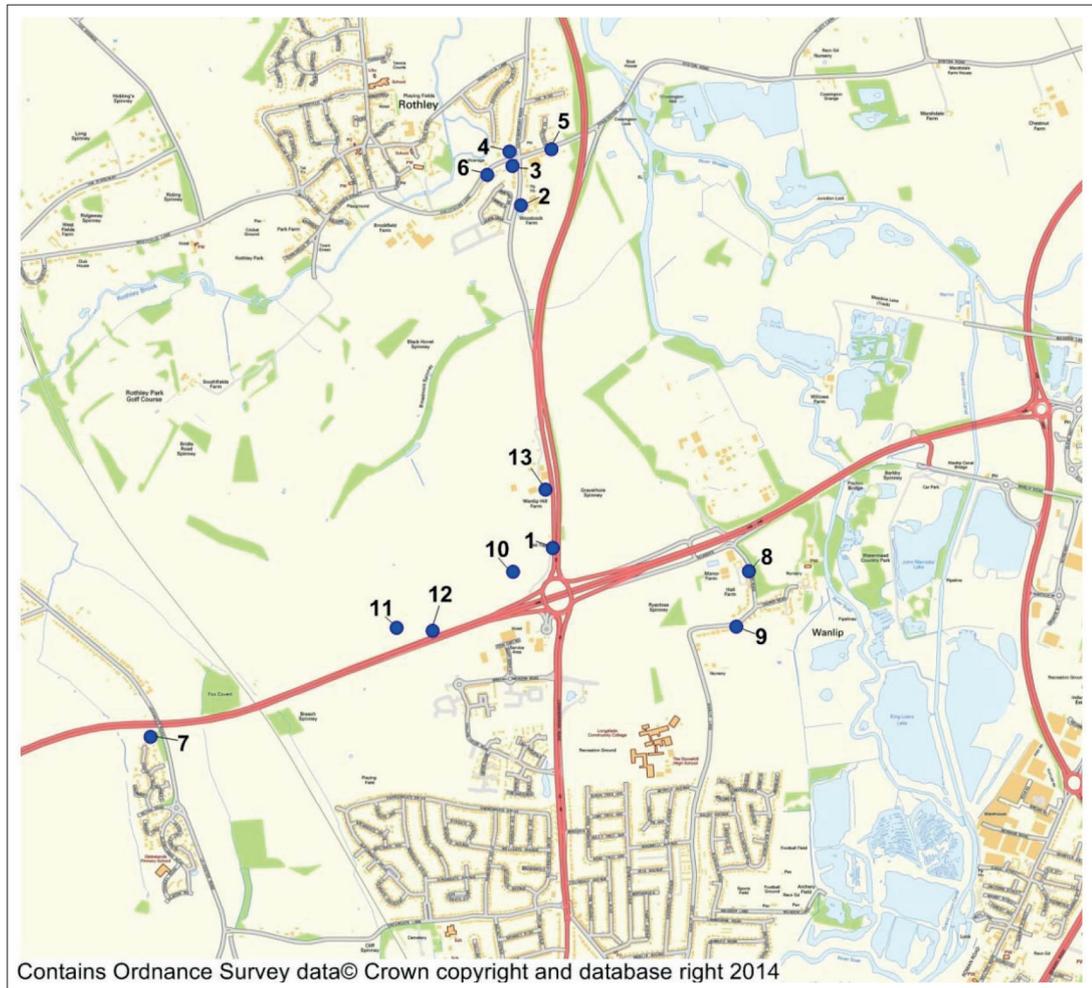
Sensitive Receptors

- 14.3.43 LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations “*where members of the public are regularly present*” should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.
- 14.3.44 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standards (i.e. 15 minute mean or 1 hour mean) may be relevant. In a school, or adjacent to a private dwelling, however - where exposure may be for longer periods - comparison with long-term standards (such as 24 hour mean or annual mean) may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.
- 14.3.45 For the completion of this assessment, consideration of the potential impacts of the proposed development on local air quality has been undertaken by predicting pollutant concentrations at 9 existing sensitive receptors. The receptors selected represent worst-case exposure to local traffic emissions.
- 14.3.46 In addition, concentrations of NO₂ and PM₁₀ have been predicted at receptors representing the development site including at locations of proposed residential properties within the Site to assess the suitability of the site for residential development.
- 14.3.47 Details of the receptors are provided below in **Figure 14.7** and their locations presented in **Figure 14.8**.

Figure 14.7 Location of Receptors used in Modelling Assessment

Receptor Number	Receptor Name / Location	OS Grid Reference
1	Hill Top – residential property on A6	459148, 311078
2	Woodcock Farm	459022, 312512
3	Residential on Loughborough Road	458991, 312666
4	Residential on Loughborough Road	458987, 312698
5	Cossington Lane	459143, 312725
6	Hallfields Lane	458896, 312626
7	Hogarth Road	457499, 310273
8	Rectory Road	459951, 311017
9	Rectory Road	459911, 310745
10	Proposed Residential	459037, 310979
11	Proposed Residential	458515, 310730
12	Site Boundary	458662, 310725
13	Site Boundary – two residential properties	459131, 311311

Figure 14.8 Location of Receptors used in Modelling Assessment



14.4 Baseline Conditions

Charnwood Borough Council (CBC) Local Air Quality Management Review and Assessment of Air Quality

14.4.1 Charnwood Borough Council has carried out detailed assessments of air quality throughout the Borough and as a result has declared four Air Quality Management Areas (AQMA) due to exceedances of the NO₂, PM₁₀ and sulphur dioxide (SO₂) objectives at sensitive receptors. The four locations are:

AQMA 1: Incorporating the major roads in the centre of Loughborough and declared for likely exceedances of the annual mean NO₂ objective;

AQMA 2: Great Central Railway in Loughborough, declared for likely exceedances of the fifteen minute mean SO₂ objectives in the vicinity of the Railway's depot and main station

AQMA 3: Syston, declared for likely exceedances of the annual mean NO₂ objective; and

AQMA 4: Mountsorrel Quarry declared for likely exceedance of the 24-hour PM₁₀ objective.

14.4.2 The AQMAs in Loughborough are located over 8km to the north-west of the Site. Therefore the proposals are unlikely to have a significant impact on air quality within these AQMAs.

14.4.3 The Mountsorrel AQMA has been declared due to emissions of PM₁₀ from the large quarry to the north-west of the village. The development proposals are also considered unlikely to impact on air quality within this AQMA.

14.4.4 The Syston AQMA is located approximately 2.5km to the east of the application site, covering an area through the centre of the town. Traffic generated by the development has the potential to impact air quality within the Syston AQMA.

14.4.5 The Borough Council's review and assessment has not identified any exceedance of the air quality objectives in the immediate vicinity of the development site.

Automatic Local Monitoring

14.4.6 Charnwood Borough Council currently operates four automatic monitors within the Borough. One of these sites is at Mountsorrel and monitors PM₁₀ concentrations in close proximity to the Quarry. Data recorded at this site is not considered relevant to this assessment and therefore has not been included in the baseline assessment.

14.4.7 Two of the sites are located in Loughborough, both monitoring NO₂ and one also monitoring PM₁₀. As the sites are over 8km from the Site NO₂ data from these locations is not considered relevant to this assessment. However, as PM₁₀ concentrations are only recorded at this one location within the Borough a review of this data has been included in the baseline assessment to provide an indication of potential concentrations of PM₁₀ in the vicinity of the application site.

- 14.4.8 The final monitoring site is located in Syston and records concentrations of NO₂. Details of this site and data recorded over the last five years is set out below in **Figures 14.9** and **14.10**.

Figure 14.9 Details of Automatic Monitoring Site

Site ID	Location	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to nearest road	Location representative of worst-case exposure?
34-36	Melton Road (Syston)	Roadside	462540, 311428	NO ₂	Y	3m	N

Figure 14.10 Automatic Monitoring Data (µg/m³)

Site ID	Location	2008	2009	2010	2011	2012
34-36	Melton Road	34.4	32.5	34.4	30.6	34.4

- 14.4.9 The Melton Road automatic monitoring site recorded annual mean NO₂ concentrations below the 40 µg/m³ objective between 2008 and 2012. Concentrations have shown little change over the five year period with a slight decline in concentrations recorded in 2009 and 2011 followed by an increase back up to concentrations recorded in 2008.
- 14.4.10 The Loughborough monitoring site on Durham Road is a background monitoring site providing an indication of background PM₁₀ concentrations in the Borough. During 2012 the site recorded an annual mean concentration of 10.2 µg/m³. This was considerably lower than concentrations recorded in previous years (2008 to 2011) which ranged from 16.9 – 19.1 µg/m³. Concentrations gradually increased at the site between 2008 – 2011 which ranged from 16.9 – 19.1 µg/m³. Concentrations gradually increased at the monitoring site between 2008 – 2011 followed by a decline in concentrations in 2012. However, during all five monitoring years concentrations were ‘well below’ the objective of 40 µg/m³.
- 14.4.11 The Loughborough site has recorded exceedance of the 24-hour objective limit during the five year monitoring period, with up to 8 exceedances recorded in any one year. The objective allows for up to 35 exceedances of the objective in any given year therefore the objective has not been breached at this location.

Non-automatic Local Monitoring

- 14.4.12 NO₂ is measured extensively across the Borough using diffusion tubes (there are 45 in a variety of roadside, kerbside and background locations). There are no monitoring sites adjacent to the development site but there are a number located to the south and south-east in Birstall, Thurmaston and Syston. Details of the sites and concentrations recorded between 2008 and 2012 are presented below in **Figure 14.11**.

- 14.4.13 Diffusion tubes are known to be less accurate than automatic monitoring sites. For this reason all diffusion tube data is bias corrected using correction factors derived from triplicate co-locations studies. Historically, the diffusion tube data collected by Charnwood has been bias corrected using the factors derived from the co-location studies carried out at the three automatic monitoring sites in the Borough. Those tubes located in the south of the Borough have been corrected using the factor derived from the Syston automatic monitoring location. However, during 2012 there were a number of instrument failures and therefore no correction factor could be derived. All the 2012 monitoring data was therefore corrected with a factor derived from the national bias adjustment factors available in the National Diffusion Bias Adjustment Spreadsheet¹².
- 14.4.14 The monitoring data shows annual mean NO₂ concentrations to be below the objective at all the monitoring locations presented, with the exception of two sites in Thurmaston which recorded an exceedance of the objective during 2010. However, concentrations subsequently declined during 2011 and remained below the objective into 2012. 2010 is known to have been a worst-case year for air quality which is confirmed by an increase in concentrations recorded at the majority of monitoring sites presented.
- 14.4.15 The monitoring data shows no significant trend in concentrations over the five year monitoring period. Some locations have recorded an overall decrease in concentrations while others have recorded an overall increase. However, at all locations NO₂ concentrations have remained below the annual mean objective in 2012 at roadside locations, including within the Syston AQMA.
- 14.4.16 The closest and most representative monitoring sites to the development site are the two located adjacent to the A6 in Birstall (Loughborough Road and A6) NO₂ concentrations along the eastern boundary of the main application site which lies adjacent to the A6 Loughborough Road are expected to be similar to those recorded at the two Birstall monitoring sites. It is expected that concentrations will decline rapidly away from the road falling to background levels within 100-200m of the roadside. It is expected that NO₂ concentrations across the Site would meet the air quality objectives.

Figure 14.11 NO₂ Diffusion Tube Monitoring (bias corrected µg/m³)

Site ID	Location	Site Type	OS Grid Ref	2008	2009	2010	2011	2012
	Melton Rd Town Centre (Syston)	Roadside	462777, 311692	33.3	35.7	34.8	30.4	31.1
	1123 Melton Road (Syston)	Roadside	462351, 311213	30.6	30.4	32.4	26.0	29.2
	1116 Melton Rd (Syston)	Roadside	462373, 311254	32.7	35.4	37.2	29.0	30.7
	Loughborough Rd (Birstall)	Roadside	459233, 309590	30.7	32.3	34.4	30.9	35.9
	A6 (Birstall)	Roadside	459178, 309890	36.4	37.6	39.7	30.6	34.2
	High St (Syston)	Roadside	462369, 311809	30.0	31.6	32.5	26.7	33.8
	Syston AQMS	Roadside	462540, 311428	34.5	35.9	34.5	30.7	34.5
	43 Humberstone Lane (Thurmaston)	Roadside	460861, 308824			46.4	30.0	35.5
	38 Humberstone Lane (Thurmaston)	Roadside	460908, 308775	-	27.9	28.7	23.7	27.3
	22 Humberstone Lane (Thurmaston)	Roadside	460835, 308784	-	30.6	32.1	25.5	30.7
	21 Humberstone Lane (Thurmaston)	Roadside	460821, 308757	37.4	39.8	40.3	32.5	37.4

¹² <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

DEFRA Background Maps

14.4.17 Additional information on background concentrations in the vicinity of the Development Site has been obtained from the DEFRA background pollutant maps. Average background concentrations from the following grid squares, which represent the proposed development site and road network included in the modelling assessment, are provided in **Figure 14.12**:

- 458500, 311500
- 459500, 311500
- 458500, 310500
- 459500, 310500
- 458500, 312500
- 459500, 312500
- 460500, 311500

14.4.18 New 2011 background maps have recently been published by DEFRA. These maps provide background concentrations for 2011 up to 2030. Data for 2012 (the existing base scenario) and 2026 (the anticipated “opening year”) are presented here.

Figure 14.12: Estimated Annual Mean Background Concentrations from DEFRA Maps ($\mu\text{g}/\text{m}^3$)

Pollutant	2011	2026
NO ₂	27.8	20.1
NO _x	19.2	13.5
PM ₁₀	19.0	17.4

14.4.19 The data presented in **Figure 14.12** shows that during 2012 and 2026 estimated annual mean background concentrations of NO₂ and PM₁₀ are ‘well below’ the annual mean objective of 40 $\mu\text{g}/\text{m}^3$ in the vicinity of the development site.

14.5 Assessment of Impacts, Mitigation and Residual Effects

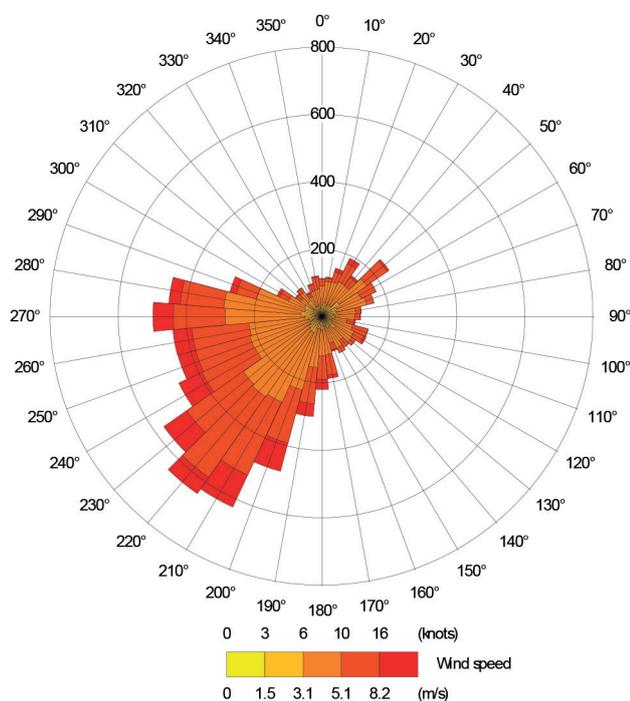
Construction Phase Impact

Site and Surroundings

- 14.5.1 The Site is mainly agricultural fields located predominantly to the west of the A6. There are a small number of industrial/commercial buildings located adjacent to the A6 that may require demolition prior to the commencement of any earthwork or construction activities in this part of the development site and depending on phasing. In addition there are three residential properties. In this area other residential uses are located over 0.8km away. Impacts associated with dust emissions during the demolition phase are therefore considered to be related to these three properties and are considered further below.
- 14.5.2 The development site is located to the north of Birstall in a semi-rural location. Two residential properties lie within the site and another adjacent to it at the eastern boundary with the A6. The next nearest properties are located to the south along Rectory Road, Wanlip, approximately 190m from the site boundary. There are also a number of existing and proposed properties to the west along Leicester Road, Thurcaston, approximately 300m from the site boundary. As there are a number of properties located within 350m of the site boundary an assessment of impacts on human receptors has been undertaken.
- 14.5.3 Dust emissions from construction activities are unlikely to result in significant impacts on ecologically sensitive receptors beyond 50m from the site boundary. There are no ecologically sensitive receptors within 0.5km of the development site. The sensitivity of the surrounding area in relation to ecological receptors is therefore considered to be low and impacts as a result of dust emissions from the site, **negligible**. Impacts on ecologically sensitive receptors have therefore not been considered any further within the assessment of the construction phase.
- 14.5.4 There is no monitoring of PM₁₀ carried out by the Borough Council in the vicinity of the development site. However, based on the data recorded at the Loughborough background monitoring site and data estimated within the DEFRA background maps, background PM₁₀ concentrations in the vicinity of the Site are expected to be in the region of 19 µg/m³. Concentrations are expected to be slightly higher closest to the A6 and A46 but it is considered unlikely that concentrations in these locations would exceed 24 µg/m³.
- 14.5.5 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited would depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

- 14.5.6 A windrose from East Midlands Meteorological Station (2010) is provided below in **Figure 14.13**, which shows that the prevailing wind is from the south-west. Notionally property located to the north-east of the application site would therefore be most likely to experience significant impacts as a result of dust generated during the construction process. However, the closest receptors to the north-east are over 350m from the site boundary and therefore significant impacts are unlikely to be experienced in this direction.

Figure 14.13 Windrose from East Midlands Airport (2012)



Potential Dust Emission Magnitude

- 14.5.7 The dust emission magnitude is based on the scale of anticipated works at the Site and can be defined as small, medium or large for each of the three activities; earthworks, construction and trackout. A summary of the dust emission magnitude for each activity is set out in **Figure 14.14**.

Earthworks

- 14.5.8 Earthworks are those activities involved in preparing the Site for construction such as excavation of material, haulage, tipping, stockpiling and levelling.
- 14.5.9 The Site covers an area of approximately 179ha and the proposals are to provide new housing and employment uses, a Local Centre, outdoor sports facilities and associated green and physical infrastructure. During the earthwork activities it is anticipated that there could be more than 10 earth moving vehicles on the site at any given time. Given the scale of the proposed development, the Site is considered to have a dust emission class of 'large' with regards to earthworks activities.

Construction

- 14.5.10 There are a number of issues that can impact the dust emission class during construction activities including the size of the building(s), materials used for construction, the method of construction and the duration of the build.
- 14.5.11 The proposed development is at the point in the planning process where detailed information is not currently available on the construction process. Based on the current design layout the total building volume proposed for the Site would be more than 100,000m³, and a significant proportion of the construction materials would be brick and concrete, which can be significant sources of dust emissions. The site is therefore considered to have a dust emission class of 'large' with regards to construction activities.

Trackout

- 14.5.12 The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the site as a result of trackout.
- 14.5.13 Given the size of the proposed development it is expected that there would be more than 50 Heavy Duty Vehicles (HDV) accessing the Site each day during construction, with the vehicles travelling at least for part of their journeys on site over unpaved roads of more than 100m in length. The Site is therefore classed as 'large' with regards to trackout activities.

Figure 14.14 Summary of Dust Emissions Magnitude for each Activity

Source	Magnitude
Earthwork	Large
Construction	Large
Trackout	Large

Sensitivity of Surrounding Area

- 14.5.14 The sensitivity of the surrounding area takes account of the following factors;
- the specific sensitivities of receptors in the area;
 - the proximity and number of those receptors;
 - in the case of PM₁₀ the local background concentration; and
 - site-specific factors i.e. whether there is natural shelter such as trees, to reduce the risk of wind-blown dust.

- 14.5.15 The main receptors adjacent to the Site are residential dwellings, including some allotments to the north. Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relationship to both dust soiling and health effects of PM₁₀, There are two receptors within the development area and another at its boundary. The remainder are over 100m from the site boundary. The overall sensitivity of the surrounding area is considered to be 'low' in relation to dust soiling and 'medium' for the three properties on or at the edge of the development site.
- 14.5.16 As detailed above, PM₁₀ concentrations in the vicinity of the site are expected to be less than 24 µg/m³. Based on the proximity of the residential receptors to the site boundary and the local concentrations of PM₁₀ the sensitivity of the surrounding area is considered to be 'low' with regards to human health impacts.
- 14.5.17 In relation to trackout, it is anticipated that construction vehicles accessing the Site would predominantly travel along A6 from the north or south. As a general guidance, significant impacts from trackout may occur up to 500m from large sites, 200m from medium sites and 50m from small sites, as measured from the site exit. Two residential properties are located within 500m of the site access point. Therefore the sensitivity of receptors in relation to dust soiling and human health is considered to be generally 'low' in relation to trackout and 'medium' for the two on-site properties.

Figure 14.15 Summary of Sensitivity of Surrounding Receptors

Source	Sensitivity of Surrounding Area	
	Dust Soiling	Human Health
Earthworks	Low (localised medium)	Low (localised medium)
Construction	Low (localised medium)	Low (localised medium)
Trackout	Low (localised medium)	Low (localised medium)

Defining the Risk of Impacts

- 14.5.18 The dust emission magnitude as set out in **Figure 14.14**, is combined with the sensitivity of the area (**Figure 14.15**) to determine the risk of both dust soiling and human health impacts, assuming no mitigation measures have been applied at site. The risk of impacts associated with each activity is provided in **Figure 14.16** below and has been used to identify specific mitigation measures, which are set out later in this chapter.

Figure 14.16 Summary of Dust Risk Effects to Define Site Specific Mitigation

Source	Sensitivity of Surrounding Area	
	Dust Soiling	Human Health
Earthworks	Low Risk (localised medium)	Low Risk (localised medium)
Construction	Low Risk (localised medium)	Low Risk (localised medium)
Trackout	Low Risk (localised medium)	Low Risk (localised medium)

Operational Phase Impact

Impacts from Sewage Treatment Works

- 14.5.19 Three site visits were undertaken to assess the potential for odour at the development site as a result of the location and operation of the Wanlip sewage treatment works. The site visits were undertaken on 12 July 2014, 18 August 2014 and 11 September 2014 and included a full site walk over. Weather conditions were warm, with low wind speed on all occasions.
- 14.5.20 At no time during the site visits could any odour be detected across the site, including within the area to the east of the A6 which lies closest to the sewage treatment works.
- 14.5.21 CBC Environmental Health team were contacted to obtain details of any odour complaints received from existing residential receptors in the vicinity of the treatment works. This revealed that no complaints have been received by CBC in the last three years. The closest existing receptors are properties approximately 200-250m to the south and south-east and properties approximately 750-800m to the north-west. Based on the masterplan for the Site the closest residential receptor would be over 600m to the west of the sewage treatment works. It is therefore expected that any odour arising from the sewage treatment works is unlikely to result in significant odour impacts at the proposed residential receptors.
- 14.5.22 As shown in **Figure 14.13** the prevailing winds are from the south-west, therefore any odour emissions from the sewage treatment works would impact receptors to the north-east for the majority of the year. An assessment of the meteorological data reveals that for only 9% of the year is the wind in the direction of the development site from the sewage treatment works. Therefore, if there were any odour emissions from the treatment works, the risk of impacts occurring at the proposed receptors could only be for a very limited period of the year.
- 14.5.23 Based on the above analysis it is considered that odour emissions from the sewage treatment works would have a **negligible** impact on properties proposed within the development site.

NO₂ Concentrations

- 14.5.24 Annual mean NO₂ concentrations predicted at the selected existing receptor locations are presented overleaf in **Figure 14.17**. Concentrations predicted at the Development Site are provided in **Figure 14.18**.
- 14.5.25 The modelling assessment shows that predicted annual mean NO₂ concentrations are below the annual mean objective of 40 µg/m³ at all 9 of the existing receptors under the baseline and 'with development' scenarios. The highest concentrations are predicted at receptor 1, Hill Top, which is located directly adjacent to the A6.

- 14.5.26 Traffic generated by the proposed development is predicted to result in a maximum increase in NO₂ concentrations of 0.5 µg/m³, predicted at receptor 2. This equates to a 1% change in the AQAL (**Figure 14.3**). Annual mean NO₂ concentrations are predicted to remain at less than 75% of the AQAL with the development in place which is classed as a **negligible** impact. At receptor 1, where NO₂ concentrations are the highest, the model is predicting a 1% change in the AQAL. As concentrations at this receptor are at 97% of the objective with the development in place this impact is classed as **slight adverse**.
- 15.5.27 At a number of receptor locations, traffic flows are predicted by the Leicester and Leicestershire Integrated Transport Model (LLITM) to decline as a result of the proposed development or to experience limited increases as a result of altered traffic patterns.
- 14.5.28 Annual mean NO₂ concentrations at the Development Site are predicted to be below the annual mean objective (**Figure 14.18**). The highest concentrations are predicted at receptors 12 and 13 which are located directly adjacent to the A46 and A6. However, these do not represent the locations of the proposed new residential properties which will be set back significantly from the two primary roads.
- 14.5.29 Receptors 10 and 11 have been selected to represent the residential properties that would be closest to both the A46 and A6. NO₂ concentrations at both locations are predicted to be at less than 75% of the AQAL.
- 14.5.30 Exceedances of the 1-hour objective for NO₂ are also unlikely, based on the predicted annual mean concentrations. Guidance referred to earlier in the report indicates that exceedance of the 1-hour objective is unlikely where the annual mean concentration is below 60 µg/m³.

Figure 14.17 Predicted Annual Mean NO₂ Concentrations at Existing Receptors (µg/m³)

Receptor Number	2026 Baseline	2026 Base + Development	Change with Development (as a % of the AQAL)	Significance
1	38.5	38.9	1	Slight Adverse
2	25.6	26.1	1	Negligible
3	24.1	24.0	<1	Negligible
4	25.9	25.6	<1	Negligible
5	30.6	27.8	-7	Slight Adverse
6	23.5	23.5	<1	Negligible
7	26.8	26.8	<1	Negligible
8	32.4	32.1	<1	Negligible
9	31.3	30.7	-1	Negligible

Figure 14.18 Predicted Annual Mean NO₂ Concentrations at Proposed Development (µg/m³)

Receptor Number	2026 Base + Development	Significance
10	27.2	Negligible
11	26.8	Negligible
12	36.3	Negligible
13	31.3	Negligible

PM₁₀ Concentrations

- 14.5.31 Annual mean PM₁₀ concentrations predicted at the selected existing receptor locations are presented below in **Figure 14.19** and concentrations predicted at the Development Site are provided in **Figure 14.20**.
- 14.5.32 The modelling assessment shows that predicted annual mean PM₁₀ concentrations are less than 75% of the AQAL at all the selected receptor locations.
- 14.5.33 The proposed development is predicted to result in a maximum change in PM₁₀ concentrations of 0.3 µg/m³ as a result of additional traffic movements on the adjacent road network. This equates to less than 1% change in the AQAL and is therefore of **negligible** significance.
- 14.5.34 Concentrations at the development site are also predicted to be less than 75% of the AQAL therefore the impact on future occupants would be **negligible**.

14.5.35 The number of exceedances of $50 \mu\text{g}/\text{m}^3$, as a 24-hour mean PM_{10} concentration, has been calculated from the annual mean following the approach set out by DEFRA in LAQM.TG(09):

$$A = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$$

where A is the number of exceedances of $50 \mu\text{g}/\text{m}^3$ as a 24-hour mean PM_{10} concentration

14.5.36 Based on the above approach, the maximum number of days $>50 \mu\text{g}/\text{m}^3$ PM_{10} is predicted to be between 4-7 at all existing receptors and at the development site with no change as a result of traffic generated by the proposals. The objective for this pollutant permits up to 35 days per annum and therefore exceedance of this objective is highly unlikely.

Figure 14.19 Predicted Annual Mean PM_{10} Concentrations at Existing Receptors ($\mu\text{g}/\text{m}^3$)

Receptor Number	2026 Baseline	2026 Base + Development	Increase with Development (as a % of the AQAL)	Significance
1	22.4	22.5	<1	Negligible
2	20.1	20.2	<1	Negligible
3	19.8	19.8	<1	Negligible
4	20.0	20.0	<1	Negligible
5	20.8	20.5	<1	Negligible
6	19.7	19.7	<1	Negligible
7	20.1	20.1	<1	Negligible
8	21.2	21.1	<1	Negligible
9	21.0	20.9	<1	Negligible

Figure 14.20 Predicted Annual Mean PM_{10} Concentrations at Proposed Development ($\mu\text{g}/\text{m}^3$)

Receptor Number	2026 Base + Development	Significance
10	20.1	Negligible
11	20.1	Negligible
12	21.8	Negligible
13	21.1	Negligible

Mitigation and Enhancement

Construction Phase

- 14.5.37 The control of dust emissions from construction site activities relies upon robust management control and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impact to nearby properties.
- 14.5.38 Appropriate mitigation measures for the site have been identified following the IAQM guidance and based on the risk effects presented in **Figure 14.14**. It is proposed that the “**highly recommended**” measures set out in **Appendix 14E** are incorporated into a **Construction Environmental Management Plan (CEMP)** and approved by CBC prior to commencement of any work on site.
- 14.5.39 In addition to the ‘highly recommended’ measures, the IAQM guidance also sets out a number of ‘**desirable**’ measures which should also be considered for inclusion within the CEMP. These are also set out in **Appendix 14E**.
- 14.5.40 The primary concerns with respect to dust emissions are related to (i) construction activities in the vicinity of the three existing residential properties at the eastern edge of the site adjacent to A6 and (ii) subsequently as each phase of new housing is brought forward in proximity to earlier completed and occupied phases.
- 14.5.41 During the construction phase the implementation of effective mitigation measures will be necessary to reduce significantly the potential for nuisance dust and particulate matter to be generated. A best practice **Dust Management Plan (DMP)** will be in place for the duration of the construction phase works and this will set out the practical measures to be implemented in the relevant phase.
- 14.5.42 Any dust and air quality complaints will be recorded and appropriate measures taken to identify causes and reduce emissions in a timely fashion. Any exceptional incidents which cause dust and/or emissions and action taken to remedy the position will be logged and information made available to the Borough Council on request.
- 14.5.43 During the earthworks and construction phases measures to be implemented in order to limit dust generation will include;
- material handling methods which minimise generation of airborne dust
 - minimising the duration and extent of such material handling
 - ensuring vehicles involved in these operations are sheeted when loaded
 - dampening down of exposed stored materials and ensuring storage takes place as far as possible from sensitive receptors
 - avoiding activities that generate large amounts of dust during windy conditions
 - protecting surfaces and exposed material from winds until disturbed areas are sealed and stable

14.5.44 Mitigation measures will also be implemented to reduce the prospect of dust being generated through the trackout of mud and dirt on to the public highway and these will include;

- confining vehicles to areas of the site where appropriate dust control measures can be introduced
- limiting vehicle speeds and minimising vehicle movements
- providing easily cleaned hard standing areas for vehicles accessing and leaving the construction phase and also for parking and turning
- providing a wheel wash at the site exit and utilising a road sweeper at appropriate times

14.5.45 These controls and practices are also referred to in mitigating prospective pollution of the water environment (see ES Chapter 12) and there are common objectives which will be defined in the Construction Environmental Management Plan (CEMP) which, following approval by Charnwood Borough Council, will control the construction phases throughout. Final design solutions will be developed with the input of the contractor(s) involved in order to use modern construction techniques and efficiencies, skill and experience and sustainable materials.

14.5.46 Following implementation of the measures recommended for inclusion within the DMP and CEMP the impact of emissions during earthworks, construction and trackout associated with proposed development is classed as **negligible**.

Operational Phase

14.5.47 Traffic generated by the proposed development is predicted to result in a **slight adverse** impact at one receptor. At all other locations the impact would be **negligible**. Furthermore impacts of emissions from the adjacent Wanlip works would be **negligible** and mitigation is not considered necessary.

(i) Existing sensitive receptor locations

14.5.48 A detailed air quality assessment has been undertaken to consider the potential impact of the proposed development on air quality at nine representative existing sensitive receptor locations. The assessment predicts that there will be a “**negligible/not significant**” impact on concentrations of NO₂ and PM₁₀ at all receptors considered in 2015 and in 2026 with the development in place. The predicted NO₂ and PM₁₀ concentrations at all existing receptor locations are below the Air Quality mean objective of 40 µg/m³. In addition the use of current year background and emissions factors is considered conservative as it is likely that there will be some improvement in background air quality and emission factors before 2026.

14.5.49 The proposals include a reduction in traffic speeds on that stretch of the A6 between the existing A6/A46 interchange and the proposed new primary A6 access. The existing unrestricted speed limit will be reduced to 50mph. This will further improve the localised air quality standard along this corridor.

(ii) **Proposed sensitive receptor locations**

14.4.50 The air quality assessment has also predicted pollutant concentrations at two proposed receptor locations within the proposed development site, representative of housing areas closest to traffic emissions.

14.4.51 Predicted NO₂ and PM₁₀ concentrations are well below the annual mean air quality objective of 40 µg/m³ in 2015 and 2026.

Residual Effects

Construction Phase

14.5.52 The greatest potential for dust nuisance problems to occur will generally be within 200m of the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance. However, any potential effects during **construction** will be **temporary** and **short-term** and **insignificant** in air quality terms.

14.5.53 By following the mitigation measures outlined within this application and ensuring their application throughout the full construction period via a **Construction Environmental Management Plan** the impact will be substantially minimised. **Residual impacts** are therefore considered to **be negligible**.

Operational Phase

14.5.54 The impact of the proposed development would generally be **negligible on local air quality** and **slight adverse** in one location. There would be **no significant impacts from odour emissions associated with the treatment works**. **Residual impacts are therefore considered to be negligible**.

14.6 Conclusions - Statement of Effects

- 14.6.1 An air quality impact assessment has been carried out to assess both construction and operational impacts of the proposed implementation of the Broadnook Garden Suburb, North of Birstall.
- 14.6.2 An assessment of the potential impacts during the construction phase has been completed. This has shown that during this phase of the proposed development releases of dust and PM₁₀ are likely to occur as a consequence of site activities. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM₁₀ releases may be effectively mitigated and the resultant impacts are considered to be **negligible**.
- 14.6.3 A qualitative review of the potential for odour impacts to occur at proposed residential receptors within the development site as a result of the treatment works has been undertaken. Following consideration of separation distances, a review of meteorological data and detail of any complaints received by CBC, it is considered unlikely that emissions from the treatment works would have significant impacts on future occupants of the site.
- 14.6.4 The ADMS dispersion model has been used to predict the impact of traffic generated by the proposed development on NO₂ and PM₁₀ concentrations at existing receptors and to predict concentrations across the development site. The assessment has predicted a **negligible** impact on both pollutants at the existing receptors and concentrations across the Site are well below the relevant air quality objectives.
- 14.6.5 **Based on the above information, it is considered that the proposed development will not give rise to significant environmental effects and consequently air quality does not pose a constraint to development of the site as proposed in accordance with established planning policy and guidance.**

Appendix 14A – Air Quality Terminology

Term	Definition
Accuracy	A measure of how well a set of data fits the true value
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard)
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub-groups (see also air quality objective)
Ambient air	Outdoor air in the troposphere, excluding workplace air
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollution that have higher concentrations during the winter months.
AQMA	Air Quality Management Area
DEFRA	Department for Environment, Food and Rural Affairs
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system
LAQM	Local Air Quality Management
NO	Nitrogen monoxide, a.k.a. nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides
O₃	Ozone
Percentile	The percentage of results below a given value
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10 ⁹) units of air, there is one unit of pollutant present
ppm parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every million (10 ⁶) units of air, there is one unit of pollutant present

Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation)
µg/m³ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m ³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant
UKAS	United Kingdom Accreditation Service
Uncertainty	A measure, associated with the result of a measurement, which characterises the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it in recent European legislation
USA	Updating and Screening Assessment
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification)
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations

Appendix 14B – Air Quality Standards and Objectives

Air Quality Objectives currently included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	Applies to	Standard		Objective		EU AQ Daughter Directive
		Concentration	Measured as	Annual exceedances allowed	Target date	
Nitrogen dioxide (NO ₂)	All UK	200 µg/m ³	1 hour mean	18	31.12.2005	As objective. Target: 01.01.2010
	All UK	40 µg/m ³	Annual mean		31.12.2005	As standard. Target: 01.01.2010
	All UK	40 µg/m ³	Annual mean		31.12.2004	As standard. Target: 01.01.2005
Particulate Matter (PM ₁₀) (gravimetric)	All UK	50 µg/m ³	24 hour mean	35	31.12.2004	As objective. Target: 01.01.2005
	Scotland	50 µg/m ³	24 hour mean	7	31.12.2010	As objective. Target: 01.01.2010
	Scotland	18 µg/m ³	Annual mean		31.12.2010	

Appendix 14C – Summary of Traffic Data

Traffic data utilised for the air quality assessment (AADT)

Road Link	Link Description	2012 Base	2026 Base	2026 Base + Development	Speed (km/h)
Link 7 – A6 Loughborough Road	North of A46	31870 (5.4)	39947 (4.2)	40677 (4.7)	48 (32 at junction)
Link 10 – A6 Loughborough Road	Through Rothley	4836 (0.8)	6547 (0.8)	7247 (0.7)	32 (16 at junction)
Link 33 Cossington Lane	Through Rothley	8032 (4.4.)	9221 (3.7)	8605 (0.9)	32 (16 at junction)
Link 34 Hallfields Lane	Through Rothley	6087 (2.6)	4151 (1.3)	4227 (1.2)	32 (16 at junction)
Link 14 A46	West of A6	28028 (10.8)	35184 (8.6)	35565 (8.5)	48 (32 at junction)
Link 22 A46	East of A6	25546 (10.4)	31808 (8.1)	31998 (8.1)	48 (32 at junction)
Link 23 Rectory Road	North of Church Road	7365 (2.6)	8081 (2.3)	7481 (2.5)	32
Link 24 Rectory Road	South of Church Road	6664 (2.5)	7166 (2.3)	6563 (2.5)	32
% HGV are provided in brackets					

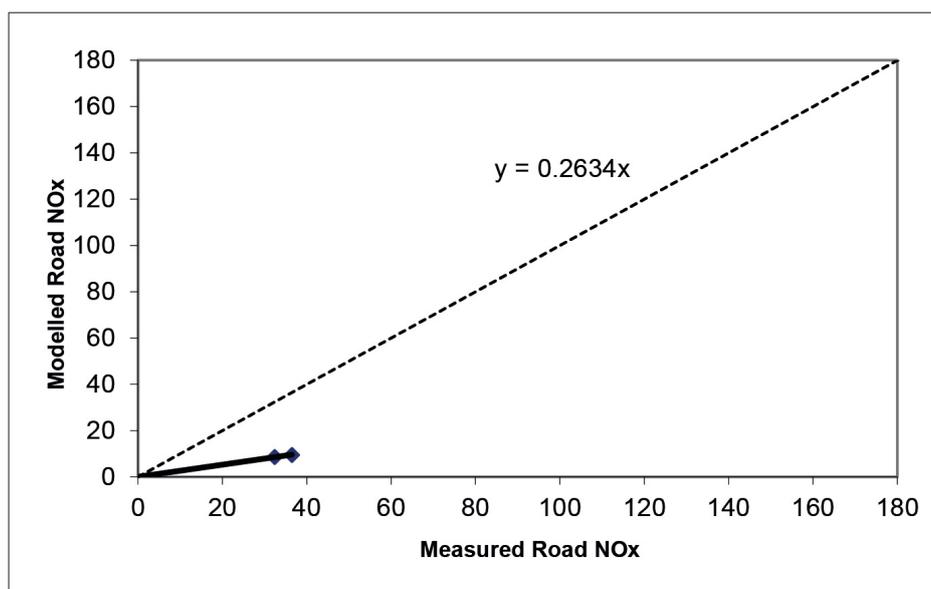
Appendix 14D – Verification of Model Results

Most nitrogen dioxide (NO₂) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions.

The model has been run to predict annual mean road-NO_x concentrations at the two roadside monitoring sites adjacent to the A6 in Birstall.

The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared with the 'measured' road-NO_x (**Figure 14 D1**). The 'measured' road NO_x has been calculated from the measured NO₂ concentrations, by first converting the measured NO₂ into an equivalent measured NO_x using the NO_x from NO₂ DEFRA calculator, then subtracting the background value.

Figure 14 D1 Comparison of Modelled Road NO₂ to measured Road NO_x

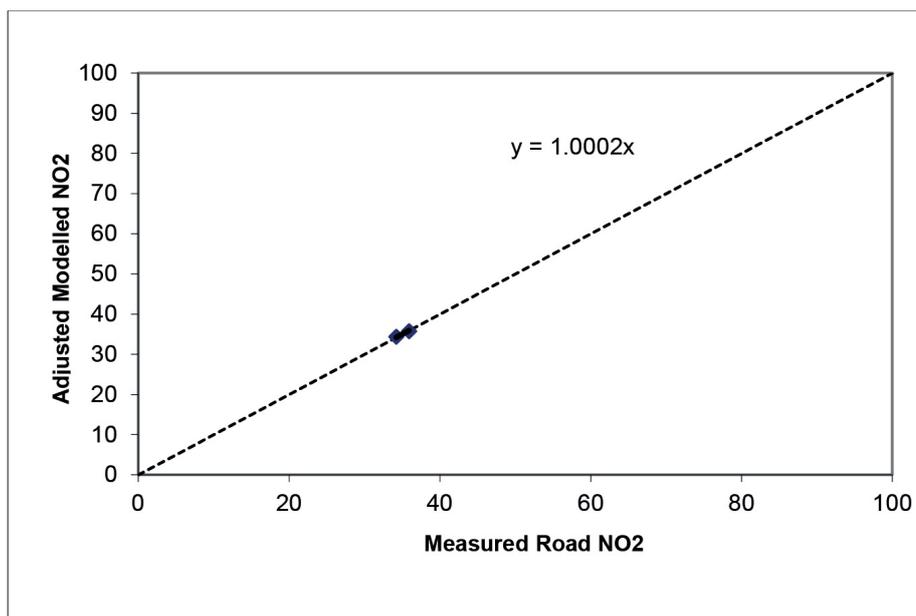


A primary adjustment factor was then determined as the ratio between the measured road-NO_x contribution and the model derived road-NO_x contribution, forced through zero ($1/0.2634 = 3.80$). This factor was then applied to the modelled road-NO_x concentration for each monitoring location to provide an adjusted modelled road-NO_x concentration. The background concentration was then added to these concentrations to determine the adjusted total modelled NO_x concentration.

The road contribution to the total annual mean NO₂ concentration was then calculated using the DEFRA NO_x:NO₂ calculator tool.

The total nitrogen dioxide concentration was then predicted by adding the background NO₂ concentration to this calculated road contribution. **Figure 14 D2** shows the adjusted modelled total NO₂ vs monitored NO₂. There is good agreement with the best fit line forced through zero and therefore no secondary adjustment factor has been calculated.

Figure 14D2 Comparison of Modelled NO₂ with measured NO₂ before Secondary Adjustment



Following application of the calculated adjustment factors the model results are showing no overall tendency to under or over predict at the monitoring locations and the predicted annual mean NO₂ at each site is within the preferred 10% of monitored concentrations (<1% different from monitored concentrations at both monitoring sites).

The adjustment factor of 3.80 has been applied to the modelled NO_x-road concentrations predicted at the selected proposed and existing receptors. The predicted NO₂-road concentrations, calculated using the NO_x-NO₂ converter tool, have subsequently been added to background NO₂ concentrations to provide the final predicted annual mean NO₂ concentrations at each receptor.

This method was also applied to the predicted PM₁₀ concentrations.

Appendix 14E – Construction Mitigation Measures

It is recommended that the **'highly recommended'** measures set out below are incorporated into a Construction Environmental Management Plan (CEMP) and approved by Charnwood Borough Council prior to commencement of any work on site:

- display the name and contact details of the person accountable for air quality and dust issues at the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information at the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off-site and the action taken to resolve the situation in the log book;
- carry out regular site inspections to monitor compliance with CEMP, record inspection results and make inspection log available to CBC when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues onsite when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- avoid site run-off of water or mud;
- ensure all vehicles switch off engines when stationary – no idling vehicles;
- avoid the use of diesel or petrol powered generators and use main electricity or battery powered equipment where practicable.
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;

- ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- avoid bonfires and burning of waste materials.

The following '**desirable**' measures should also be considered for inclusion within the DMP:

- avoid scabbing (roughening of concrete surfaces) if possible;
- undertake daily on-site and off-site inspection, where receptors are nearby, to monitor and record inspection results and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning provided if necessary;
- fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used on site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas;

- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
- record all inspections of haul routes and any subsequent action in a site log book;
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud).

