Lincoln Eastern Bypass

Environmental Statement

Volume 2 – Supporting Information

December 2012

Produced by

Lincolnshire COUNTY COUNCIL
HIGHWAYS ALLIANCE

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10 Noise and Vibration

10.1 Glossary of Acoustic Terminology

10.1.1 **AAWT**: Average Annual Weekday Traffic.

10.1.2 **"A"-Weighting**: A reduction/weighting applied to the low and high frequency components of noise applied to obtain a single number representing the sound pressure level of a noise in a manner approximating to the response of the human ear.

10.1.3 **Acoustic**: Pertaining to sound or to the sense of hearing.

10.1.4 **Ambient Noise**: The total of all noise in the environment, other than the noise from the source of interest.

10.1.5 **Attenuation**: The reduction of sound intensity by various means (e.g., air, humidity, porous materials).

10.1.6 **Background Noise**: the noise in the environment, other than the noise from the source of interest.

10.1.7 **Barrier**: A sound barrier is any solid obstacle, which is relatively opaque to sound that blocks the line of sight from the sound source to receiver. Barriers may be erected specifically to reduce noise, for example: solid fences, earth berms, or freestanding walls.

10.1.8 **CEMP**: Construction Environmental Management Plan

10.1.9 **CRTN**: Calculation of Road Traffic Noise.

10.1.10 **Decibel (dB)**: The decibel is a logarithmic unit of measure of sound pressure. One tenth of the bel.

10.1.11 **DM**: Do Minimum

10.1.12 **DS**: Do Something

10.1.13 **Environmental Noise**: Unwanted sound from various outdoor sources which produce noise. Environmental noise sources include aircraft, cars, trucks, buses, railways, industrial plants, construction activities, etc.

10.1.14 **Façade corrections**: A façade noise level is the noise level 1m in front of the most exposed window or door on the face of a building. The effect of reflection is to produce a slightly higher (+3dB) sound level than it would if the building was not there. This factor needs to be added when predicting noise levels.

10.1.15 **Frequency**: Number of complete oscillation cycles per unit of time. The unit of frequency is the Hertz (Hz).

10.1.16 **Hertz**: A unit of frequency, equivalent to one cycle per second.

10.1.17 **HGV**: Heavy Goods Vehicle

10.1.18 **HRA**: Hot Rolled Asphalt

10.1.19 **Hz**: Hertz

10.1.20 **L_{A10}**: noise level that is exceeded for 10% of the measurement period, and gives an indication of the noisier portion of the climate. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

10.1.21 **L_{A90}**: the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the 'background' noise level.

10.1.22 **L_{Aeq}**: Equivalent A-Weighted Sound Level, defined as the constant sound level that, in a given time period, would convey the same sound energy as the actual time-varying A-weighted sound.

10.1.23 **L_{Amax}**: The maximum sound level of an event, or time period, measured with a sound level meter or analyzer that is frequency weighted and time integrated. The frequency weighting (for example, A, C, unweighted) and time integrating (for example, slow, fast) must be specified.

10.1.24 **LNS**: Low noise road surfacing also referred to as a thin wearing course/surface. The UK Highways Agency advises that a reduction of in the region of 3.5 dB(A) can be achieved by the use of thin wearing course/surface compared to hot rolled asphalt (HRA). The principle effect is to reduce the noise within the mid and higher frequencies associated with the interaction of the vehicle tyres and the road surface. However, it is less effective in attenuating the low frequency noise primarily generated by HGVs.

10.1.25 **Level**: The logarithm of the ratio of a quantity to a reference quantity of the same kind. The base of the logarithm, the reference quantity, and the kind of level must be specified.

10.1.26 **Logarithm**: The exponent that indicates the power to which a number must be raised to produce a given number. For example, for the base 10 logarithm, used in acoustics, 2 is the logarithm of 100.

10.1.27 **NIR**: Noise Insulation Regulations.

10.1.28 **Noise**: Any disagreeable or undesired sound or other disturbance.

10.1.29 **Noise Contours**: Continuous lines of equal noise level usually drawn around a noise source. The lines can be drawn in any increments specified on an appropriate legend. Noise contours are generally used in depicting the noise exposure around airports, highways, and industrial plants.

10.1.30 **Noise Map**: A noise map is a set of noise contours based upon measurements or predictions of noise in the region of interest.

10.1.31 **Noise Survey**: A noise survey is a set of measurements of the sound levels or sound exposures in an environment of interest.

10.1.32 **Propagation**: the passage of a signal from its source to a receiver. Some of the processes involved in propagation are absorption, reflection, and transmission.

10.1.33 **Receiver**: The listener or measuring microphone which detects the sound transmitted by the source.

10.1.34 **SPL**: Sound Pressure Level

10.1.35 **Vibration**: the oscillating, reciprocating, or other periodic motion of a rigid or elastic body or medium forced from a position or state of equilibrium.

10.1.36 **Windshield**: A porous device used to cover the microphone of a sound level measurement system which is designed to minimize the effects of wind on the sound levels being measured. Typically made of open cell polyurethane foam and spherically shaped.

10.2 Guidance and Methodology

The Noise Insulation Regulations 1975 as amended 1988

10.2.1 Under the conditions specified in The Noise Insulation Regulations (NIR), residential properties experiencing an increase in noise levels as a result of road traffic noise may qualify for an offer of noise insulation if all four of the following conditions are satisfied:

10.2.2 The property must be within 300m of the nearest point of the new or altered carriageway;

10.2.3 The Facade Noise Level due to road traffic on any highway (the “Relevant” noise level) for the design year, or for any intervening year if the noise level is higher, must equal or exceed 68dB LA10,18h, (the “Specified” noise level), with levels of 67.5dB LA10,18h rounded upwards;

10.2.4 The “Relevant” noise level for the design year, or for any intervening year if noisier, must be at least 1dB LA10,18h higher than the pre-construction year road traffic noise level (the Prevailing Noise Level); and

10.2.5 Noise from the new or altered road must contribute at least 1dB LA10,18h to the "Relevant" noise level.

10.2.6 The highway authority has a duty under these regulations to offer sound insulation for residential properties with respect to a new road, and discretionary powers in relation to altered roads. Various discretionary powers are also available in relation to façades or parts of façades contiguous with a qualifying façade. The Regulations apply to habitable rooms and so exclude bathrooms, toilets, halls and kitchens that do not include dining areas.

10.2.7 Some residential buildings are not eligible under the regulations. These include houses first occupied after the opening date; this is the date a new road was first opened to public traffic or an altered road was opened following completion of the alteration.

The Design Manual for Roads and Bridges

10.2.8 The DMRB (HD 213/11 Volume 11, Section 3, Part 7 Noise and Vibration) provides advice on the assessment of noise and vibration impacts due to road traffic. It does not provide procedures for calculating noise from road traffic; instead it provides guidance on assessing the potential impact of changes in noise levels on sensitive receptors

Calculation of Road Traffic Noise Memorandum

10.2.9 The Calculation of Road Traffic Noise (CRTN) Memorandum describes the procedures for calculating noise from road traffic. It is necessary to follow these procedures when determining entitlement under the Noise Insulation Regulations. It also provides guidance appropriate for the calculation of road traffic noise for the environmental assessment of road schemes.

10.2.10 The procedures described within CRTN also set out the information requirements in order to feed into the calculation protocol including traffic flow components, the type of ground cover, relevant heights and distances, and barriers/obstructions. These are used in order to calculate the propagation of noise from the road section under consideration to the identified receiver location.

10.2.11 The document further outlines where and how the monitoring of existing traffic conditions should be undertaken.

BS 5228-2:2009 – 'Code of practice for noise and vibration control on construction and open sites'

10.2.12 This standard contains guidance on the prediction of noise levels at sensitive receptors from the operation of fixed and mobile noise sources found on construction and open (quarry and OCCS) sites.

10.2.13 It provides source sound level data for various machinery and tasks associated with the construction phase of a site. It also contains information pertaining to mitigation of noise from construction operations.

10.2.14 The standard, however, does not go as far as specifying acceptable working criteria in the form of noise limits, but Part 1 of the document does provide details of 2 example methodologies that could be implemented for the determination of the significance of construction noise impacts; the "ABC Method" and the "5dB(A) Change Method".

10.2.15 The specifics of the two assessment methods that could be used to derive appropriate construction noise limits for the works are detailed below.

BS5228 Example Method 1 – The ABC Method

10.2.16 The ABC method is based upon threshold noise levels defined by both time and existing ambient noise levels. The method requires the ambient pre construction noise level to be determined and rounded to the nearest 5dB. This ambient noise level is then compared to the total noise level which would contain noise associated with the construction operations. If the total noise level exceeds the appropriate category value then a significant effect is deemed to occur. The threshold/category values and definitions are presented within Table 10-1 below:

Table 10-1 BS5228 Example Method 1 – The ABC Method

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23:00 – 07:00)	45	50	55
Evening and Weekends [D)]	55	60	65
Daytime (07:00 - 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity. NOTE 3 Applied to residential receptors only.			
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values [B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values [C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values [D)] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.			

BS5228 Example Method 2 – 5 dB(A) Change

10.2.17 The second method is the “5 dB(A) change” method. This is based upon the premise that a significant effect is deemed to occur if the total noise (pre construction ambient plus construction noise) exceeds the pre construction ambient noise by 5dB or more.
This method is detailed to be subject to lower cut-off values of 65dB, 55dB and 45dB LAeq,T from construction noise alone, for the daytime, evening and night-time periods respectively.

10.2.18 The criteria further requires that for a significant effect to occur the total noise level must exceed the pre construction ambient noise for a duration of one month or more, unless works of a shorter duration are likely to result in significant impacts.

Control of Pollution Act (CoPA) 1974

10.2.19 The CoPA provides legislation that Local Authorities can implement in order to control the noise from construction sites and prevent the occurrence of disturbance to surrounding residents (Section 60, Part III, Chapter 40 – Control of noise on construction sites).

10.2.20 Furthermore Section 61, Part III of Chapter 40 (Prior consent for work on construction sites) provides a method by which a contractor can seek consent to undertake construction works in advance of their commencement. If consent is given, and the stated method and hours of work complied with, then the LA cannot take action under Section 60.

10.3 Data Sources and Assumptions

10.3.1 The following data sources and assumptions have been used for the purposes of this assessment:

- Proposed Scheme road surfacing modelled as Hot Rolled Asphalt (HRA);
- All buildings at a height of 6 metres;
- Receivers at dwellings positioned 4 metres above ground level, 1 metre from the façade;
- Receivers at other sensitive receptors positioned 1.5 metres above ground level, 1 metre from the façade;
- Intervening ground between any road and a receiver is acoustically 'soft';
- Ground contour data from OS Open Data Landranger Digital Terrain Model (DTM) mapping at 10m contour intervals. Localised topography information at 0.5m contour intervals also supplied by Lincolnshire County Council (LCC) to accurately position the proposed carriageways in vertical height, including any areas in cutting or elevation above the DTM ground level;
- Building outline data from OS MasterMap mapping geodatabases supplied by LCC;
- Address point data used to identify and select residential and non-dwelling receptors from AL2 mapping geodatabases also supplied by LCC;
- All other roads from the proposed scheme have been modelled as 7.0 m wide (one lane in each direction).

10.4 Instrumentation Used and Calibration Certificates

10.4.1 The following equipment was used to undertake the noise survey:

- Two Norsonic Type 118 Integrating-Averaging Sound Level Meters (Serial Numbers 31786 and 31787); and
- A Norsonic Type 1251 Sound Calibrator (Serial Number 32704)

10.4.2 The SLMs were mounted on tripods and the microphone housings were fitted with the appropriate manufacturer's specification windshield. The SLMs were

mounted at a height of approximately 1.5m above ground, in a free-field position. The SLMs were calibrated using an electronic calibrator prior to commencement and upon completion of the surveys. No significant drift in calibration was observed.

10.4.3 The relevant calibration certification for the sound level meters and acoustic calibrator used in the ambient noise monitoring surveys are given on the following pages

Calibration Report

Certificate No.:12007

Norsonic Type: 118 Serial no: 31786

Customer:	**Mouchel Limited**
Address:	**209 - 215 Blackfriars Road, London. SE1 8NL.**
Contact Person:	**Natalia Szczepanczyk BSc(Hons) AMIOA**
Order No:	**4500100963**

Instrument software version: v3.4.6238

Microphone :	GRAS	Type: 40AF	Serial no: 102668	Sens:-25.65dB
Preamplifier	Norsonic	Type: 1206	Serial no: 30878	
Calibrator:	Norsonic	Type: 1251	Serial no: 32704	Level:114.01dB
Wind screen	Norsonic	Type: Nor1451		

This sound level meter has been calibrated as specified in BS 7580. PART 1: 1997. The results are traceable to NPL, UK.

Measurement Results:

Calibration of sound level meter - BS7580 Clause 5.4	Passed
Noise test - BS 7580 Clause 5.5.2	Passed
Level Linearity Test - BS 7580, Clause 5.5.3	Passed
Frequency weightings: A Network BS 7580 Clause 5.5.4	Passed
Frequency weightings: C Network - BS 7580 Clause 5.5.4	Passed
Frequency weightings: Z Network - BS 7580 Clause 5.5.4	Passed
Time weightings F and S - BS7580 Clause 5.5.5	Passed
Peak response - BS7580 Clause 5.5.6	Passed
RMS accuracy - BS7580 Clause 5.5.7	Passed
Time weighting I - BS7580 Clause 5.5.8	Passed
Integrating Test : Time averaging - BS7580 Clause 5.5.9	Passed
Integrating Test : Pulse range - BS7580 Clause 5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 Clause 5.5.11	Passed
Overload SPL Test - BS 7580 Clause 5.5.12	Passed
Overload Leq Test - BS 7580 Clause 5.5.12	Passed
Acoustic tests - BS 7580 Clause 5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 Clause 5.5.4	Passed

Comment:
Correct level with associated calibrator is 113.9dB(A)

Measurement procedure: TP02

Environmental conditions:

Pressure:	Temperature:	Relative humidity
100.372 kPa	21.6 °C	52.3 %RH

Date of calibration: 10/09/2012
Date of issue: 10/09/2012

Supervisor: Darren Batten Tech IOA
Engineer

Campbell Associates
www.campbell-associates.co.uk

Palanivel Marappan B.Eng (Hons), M.Sc

Software version: 8.0d

Calibration Report

Certificate No.:12005

Norsonic Type: 118 Serial no: 31787

Customer: Mouchel Limited
Address: 209 - 215 Blackfriars Road, London. SE1 8NL.
Contact Person: Natalia Szczepanczyk BSc(Hons) AMIOA
Order No: 4500100953

Instrument software version: v3.4.6238

Microphone :	Norsonic	Type: 1225	Serial no: 91775	Sens:-26.44dB
Preamplifier	Norsonic	Type: 1206	Serial no: 30810	
Calibrator:	Norsonic	Type: 1251	Serial no: 32704	Level:114.01dB
Wind screen	Norsonic	Type: Nor1451		

Mains adapter was included Interface cable was included

This sound level meter has been calibrated as specified in BS 7580. PART 1: 1997. The results are traceable to NPL, UK.
Measurement Results:

Calibration of sound level meter - BS7580 Clause 5.4	Passed
Noise test - BS 7580 Clause 5.5.2	Passed
Level Linearity Test - BS 7580, Clause 5.5.3	Passed
Frequency weightings: A Network - BS 7580 Clause 5.5.4	Passed
Frequency weightings: C Network - BS 7580 Clause 5.5.4	Passed
Frequency weightings: Z Network - BS 7580 Clause 5.5.4	Passed
Time weightings F and S - BS7580 Clause 5.5.5	Passed
Peak response - BS7580 Clause 5.5.6	Passed
RMS accuracy - BS7580 Clause 5.5.7	Passed
Time weighting I - BS7580 Clause 5.5.8	Passed
Integrating Test : Time averaging - BS7580 Clause 5.5.9	Passed
Integrating Test : Pulse range - BS7580 Clause 5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 Clause 5.5.11	Passed
Overload SPL Test - BS 7580 Clause 5.5.12	Passed
Overload Leq Test - BS 7580 Clause 5.5.12	Passed
Acoustic tests - BS 7580 Clause 5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 Clause 5.5.4	Passed

Comment:
Correct level with associated calibrator is 113.9dB(A).

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.408 kPa	22.2 °C	51.1 %RH

Date of calibration: 10/09/2012
Date of issue: 10/09/2012
Supervisor: Darren Batten TechIOA
Engineer

Palanivel Marappan B.Eng(Hons), M.Sc

Campbell Associates
www.campbell-associates.co.uk

Software version: 6.0d

Calibration Report

Certificate No.:12003

Manufacturer: **Norsonic**
Type: **1251**
Serial no: **32704**

Customer: **Mouchel Limited**
Department:
Address: **209 - 215 Blackfriars Road, London. SE1 8NL.**
Order No: **4500100963**
Contact Person: **Natalia Szczepanczyk BSc(Hons) AMIOA**

Measurement Results:

	Level: (dB)	P. Stab : (dB)	Frequency: (Hz)	P. Stab : (%)	Distortion: (% TD)
1:	114.01	0.06	1000.02	0.00	0.19
2:	114.01	0.06	1000.02	0.00	0.19
3:	114.00	0.06	1000.02	0.00	0.20
Result (Average):	**114.01**	**0.06**	**1000.02**	**0.00**	**0.19**
Expanded Uncertainty:	0.10	0.02	1.00	0.01	0.10
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated level is relative to 20µPa.

The following correction factors have been applied during the measurement:
Pressure:0.0005 dB/kPa Temperature:0.003 dB/°C Relative humidity: None
Reference microphone: WSM5 - B&K4192-2496459, Volume correction: -0.018 dB
Records:K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2012\NOR1251_32704_M1.rmf
Measurement procedure: TP-01 v7.10
All results quoted are directly traceable to National Physical Laboratory, London

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.403 ± 0.041 kPa	21.8 ± 0.4 °C	52.1 ± 2.4 %RH

Date of calibration: 10/09/2012
Date of issue: 10/09/2012

Supervisor : Darren Batten TechIOA
Engineer :

Campbell Associates
www.campbell-associates.co.uk

Palanivel Marappan B.Eng(Hons), M.Sc
Software version: 6.0b

10.5 1030171-LEB-EIA-NOI-001

Legend

- Noise Monitoring Location

A	First issue	WN	WN	AR	12/11/12

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1st Approval by: A Rasheed | Date: 12/11/12

Drawn/Designed by: W Neale | CAD Drawing Creation Created By: W Neale | Date: 12/11/12

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Highways Alliance

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(01522) 782070

1030171-LEB-EIA-NOI-001
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Rev.
Revision

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Description:

Noise Monitoring Locations

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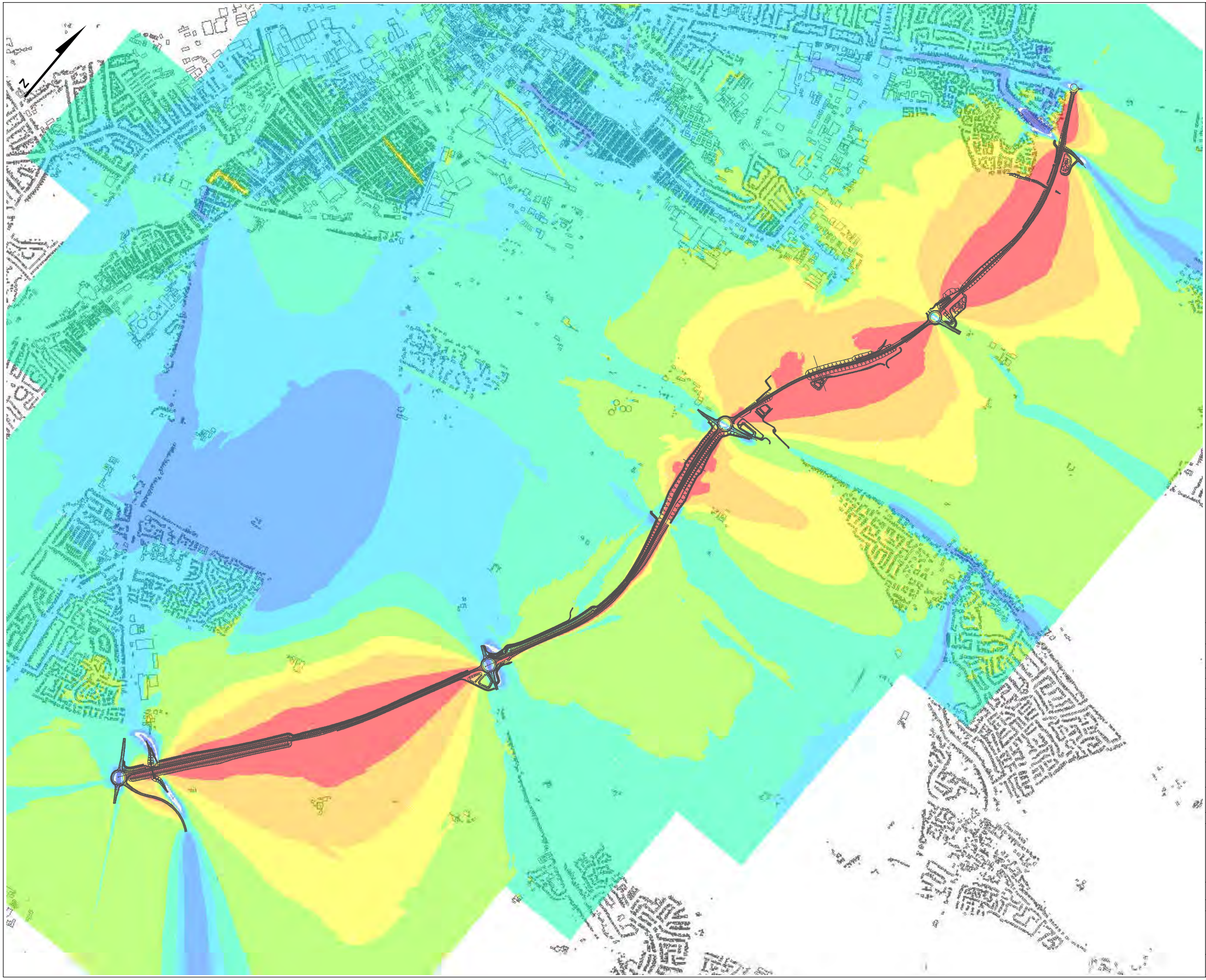
10.6 1030171-LEB-EIA-NOI-002



Legend

Short Term Change
in Noise Level, LA10, 18hr

- 10 dB >>
- 5 - 10 dB
- 3 - 5 dB
- 1 - 3 dB
- 0 - 1 dB
- -1 - 0 dB
- -3 - -1 dB
- -5 - -3 dB
- -10 - -5 dB

Revision	Description:	Drawn By:	CAD By:	Approved By:	Approval Date
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Amendment Details

Drawing 1st Approval

1st Approval by: A Rasheed | Date: 12/11/12

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W Neale	W Neale	12/11/12

Scale@A3: 1:20,000

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1030171-LEB-EIA-NOI-002 (Drawing Number) | Rev. (Revision)

Project: Lincoln Eastern Bypass

Description:

Short Term Change in Noise Level

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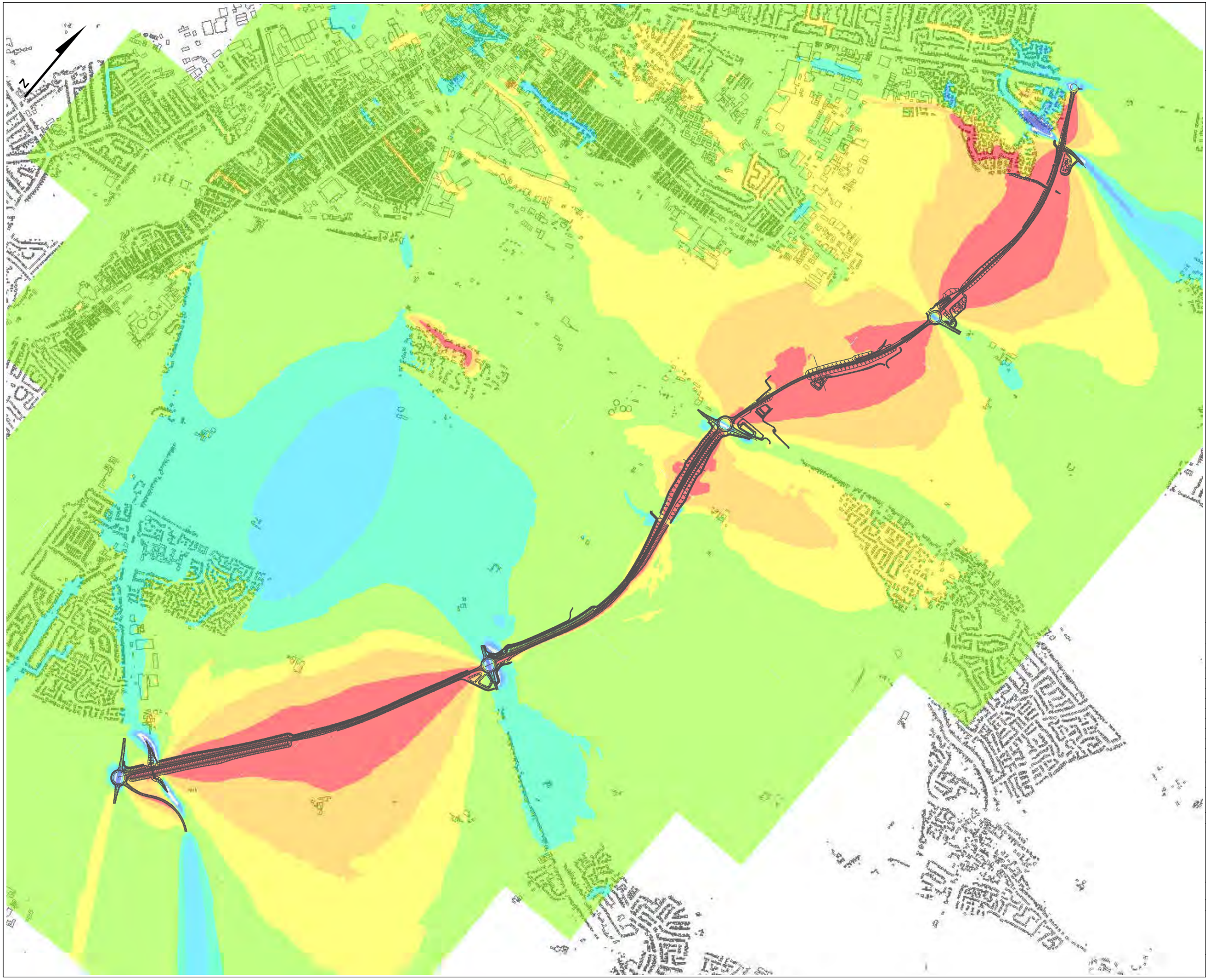
10.7 1030171-LEB-EIA-NOI-003



Legend

Long Term Change
in Noise Level, LA10, 18hr

- 10 dB >>
- 5 - 10 dB
- 3 - 5 dB
- 1 - 3 dB
- 0 - 1 dB
- -1 - 0 dB
- -3 - -1 dB
- -5 - -3 dB
- -10 - -5 dB

Revision	Description	Drawn By:	CAD By:	Approved By:	Approval Date
A	First issue	WN	WN	AR	12/11/12

Amendment Details

Drawing 1st Approval

1st Approval by: A Rasheed | Date: 12/11/12

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W Neale	W Neale	12/11/12

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Revision

Project: Lincoln Eastern Bypass

Description:

Long Term Change in Noise Level

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11 Air Quality

11.1 Legislative Background and Guidance

Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002

11.1.1 The UK Government and the devolved administrations published the latest Air Quality Strategy for England, Scotland, Wales and Northern Ireland in July 2007 (Defra, 2007a) defining both the standards and objectives for each of a range of air pollutants.

11.1.2 The 'standards' are set as concentrations below which health effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidences of the effects of a particular air pollutant.

11.1.3 The 'objectives' set out the extent to which the UK Government and EU expect the standards to be achieved by a certain date and maintained thereafter. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives are prescribed within the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Air Quality Strategy, 2007), prepared by Defra in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland. Air Quality Objectives which are relevant to the current study (NO_2 and PM_{10}) for the protection of human health are outlined in Table 11-1 and Table 11-2 provides a brief summary of the health effects of NO_2 and PM_{10}.

Table 11-1: National air quality objectives and European Directive limit values for NO_2 and PM_{10} for the protection of human health

Pollutant	UK Objectives	Measured as	Date to be achieved by and maintained thereafter	EU objectives	Date to be achieved by and maintained thereafter
NO_2	200 µg/m^3, not to be exceeded more than 18 times a year	1 Hour Mean	31 December 2005	200 µg/m^3, not to be exceeded more than 18 times a year	1 January 2010
	40 µg/m^3	Annual Mean	31 December 2005	40 µg/m^3	

Pollutant	UK Objectives	Measured as	Date to be achieved by and maintained thereafter	EU objectives	Date to be achieved by and maintained thereafter
PM_{10}	50 µg/m^3, not to be exceeded more than 35 times a year	24 Hour Mean	31 December 2004	50 µg/m^3, not to be exceeded more than 35 times a year	1 January 2005
	40 µg/m^3	Annual Mean	31 December 2004	40 µg/m^3	

Table 11-2: Summary of Health Effects of NO_2 and PM_{10}

Pollutant	Main Health Effects
Nitrogen Dioxide (NO_2)	Short-term exposure to high concentrations may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. Asthmatics will be particularly at risk (Defra, 2007a).
Particulate Matter (PM_{10})	Particulate matter can affect our health. The available evidence suggests that it is the fine components of PM_{10}, which have an aerodynamic diameter of 10 µm or less and are formed by combustion, that are the main cause of the harmful effects of particulate matter. Particles cause the most serious health problems among those susceptible groups with pre-existing lung or heart disease and/or the elderly and children. There is evidence that short- and long-term exposure to particulate matter cause respiratory and cardiovascular illness and even death. It is likely that the most severe effects on health are caused by exposure to particles over long periods of time. However, UK estimates indicate that short-term exposure to the levels of PM_{10} that we experienced in 2002 led to 6,500 deaths and 6,400 hospital admissions being brought forward that year, although it is not possible to know by what length of time those deaths were brought forward.

11.1.4 The Regulations require that likely exceedences of Air Quality Objectives are assessed in relation to:

"…the quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…".

11.1.5 The Air Quality Objectives apply only where members of the public are likely to be regularly present for the averaging time of the objectives (i.e. where people will be exposed to pollutants). The annual mean objectives apply to all locations where members of the public might be regularly exposed; these include building façades of residential properties, schools, hospitals, care homes etc. The 24 Hour Mean Objectives apply to all locations where the annual mean objective would apply, together with hotels and gardens of

residential properties1. The 1 Hour Mean Objectives also apply at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1 hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

11.1.6 Air quality monitoring across the UK have shown that the 1 Hour Mean NO_2 Objective is unlikely to be exceeded unless the annual mean NO_2 concentration is greater than 60 µg/m^3 (Laxen and Marner, 2003). Therefore exceedances of 60 µg/m^3 as an annual mean NO_2 concentration are used as an indicator of potential exceedances of the 1 hour mean NO_2 objective.

11.1.7 LAQM.TG(09) have also established a relationship between the Annual Mean PM10 concentration and the number of exceedances of the 24 Hour Mean Objective[2].

The Environmental Protection Act 1990 (EPA)

11.1.8 Dust and air pollution can cause nuisance affecting properties and the public population adjacent to a construction site and can also adversely affect other environmental receptors including watercourses and ecological receptors. In addition, there are statutory objectives in relation to NO_2 and PM_{10} which have known health impacts.

11.1.9 The EPA (Section 79, Chapter 43, Part III - Statutory Nuisances and Inspections) contains a definition of what constitutes a 'statutory nuisance' with regard to dust, and places a duty of care on Local Authorities to detect any such nuisances within their area. EPA (1990) Section 79 of the Act further defines "Best Practicable Means" (BPM) as…

"reasonably practical having regard, among other things, to local conditions and circumstances, to the current state of technical knowledge and to the financial implications".

11.1.10 It also defines a number of factors relating to dust and air pollution which constitute a statutory nuisance. These include:

- smoke emitted from premises so as to be prejudicial to health or a nuisance;
- fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;

[1] Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

[2] LAQM.TG(09) Relationship between the annual mean and 24-hour mean PM_{10} concentration, Paragraph 2.36

- any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance; and
- any accumulation or deposit which is prejudicial to health or a nuisance.

11.1.11 Local Authorities have the power under Section 80, Chapter 43, Part III of the EPA (Summary Proceedings for Statutory Nuisances) to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence. Generally, if something is unreasonable to an average person, a court may decide that it is a nuisance. A typical example of statutory nuisance is dust produced by construction activities.

The National Planning Policy Framework (NPPF) March 2012

11.1.12 The National Planning Policy Framework (NPPF) (March 2012) replaces existing national planning policy adopted since 2004. However, although the NPPF supersedes previously adopted national planning policies, decision makers may continue to give consideration to relevant adopted policies for a 12 month period from its publication (i.e. until March 2013).

11.1.13 paragraph 109 of the NPPF states that:

"The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water"

11.1.14 Annex 2 of the NPPF defines 'Pollution' as

"Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light."

11.1.15 The environmental impact of the proposed development will be a material consideration during the planning process. Paragraph 124 of the NPPF 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."

Defra Local Air Quality Management Technical Guidance (2009)

11.1.16 Defra have produced guidance for local authorities on the Local Air Quality Management process. This includes the document LAQM.TG(09), with methodologies to be used for local air quality assessments and complementing Technical Guidance Notes. Some aspects of these methodologies are also applicable for air quality assessments for development control.

Highways Agency Design Manual for Roads and Bridge (DMRB)

11.1.17 The Highways Agencys Design Manual for Roads and Bridges (DMRB), provides guidance for engineers, planners, and environmental specialists to assess the impact of transport schemes. The Air Quality document, DMRB Volume 11, Section 3, Part 1, HA207/07 (DMRB HA207/0) provides guidance on the assessment of the impacts of road projects on the air quality. This includes local and regional air quality assessments of pollutants including total carbon

Environmental Protection UK guidance on Development Control: Planning for Air Quality

11.1.18 This guidance provides a framework for identifying and addressing air quality issues in the planning process. The most recent version was produced by Environmental Protection UK in 2010. The guidance includes a methodology for assessing the significance of air quality impacts and the need for mitigation measures.

IAQM Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance

11.1.19 This guidance was produced by the Institute of Air Quality Management (IAQM) and provides assistance on how to assess construction impacts of developments or schemes to be considered. It focuses on classifying sites according to the risk effects and on identifying the mitigation appropriate to the risk.

11.2 Assessment Methodology for Construction Phase

11.2.1 The assessment methodology for Construction Impact followed the IAQM guidance (January 2012) and detailed in below:

- Evaluation of the proposed site layout, to evaluate possible site construction activities, their likely location and duration. No information on the precise construction plan was available at the time of the current assessment and hence assumptions were made;

- Collection and appraisal of meteorological data related to wind speed, direction and frequency for the local and wider area;
- Identification of any natural shelters, such as trees, to reduce the risk of wind-blown dust;
- In the case of PM10, mapping of local background concentrations;
- Identification of the location and type of sensitive receptors within 350 m of the boundary of the site and/or within 100 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) (at-risk receptors). The location of sensitive receptors has involved use of Ordnance Survey Address Layer 2 data;
- Indication of the number of receptors and sensitivity types at different distances from the site boundary (or dust generating activities wherever known);
- Assessment of the risk of dust effects arising using three risk categories: low risk, medium risk, and high risk. The site was allocated to a risk category based on two factors:

the scale and nature of the works, which determined the risk of dust arising (i.e. the magnitude of potential dust emissions) classed as: small, medium or large; and

the proximity of receptors, considered separately for ecological and human receptors (i.e. the potential for effects)

- Identification of appropriate mitigation measures; and
- Description of the likely effects taking mitigation into account.

11.2.2 Activities on construction site have been divided into four types to reflect their different potential impacts. These were:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

11.2.3 These are addressed in turn below. As no detailed traffic information was available for the construction phase of the proposed scheme impacts of traffic emissions due to construction activities were only assessed qualitatively in the current assessment.

Demolition

11.2.4 There are no proposals for demolition of buildings or structures associated with the proposed scheme. Consequently, the impact of demolition was screened out.

Earthworks

11.2.5 The dust emission classes used in Table 11-3 to determine the earthworks risk category are as follows:

- Large: Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes
- Medium: Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes – 100,000 tonnes; and
- Small: Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Table 11-3: Risk Category from Earthworks Activities

Distance to Nearest Receptor (m) [(a)]		**Dust Emission Class**		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
< 20	**-**	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	**-**	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	**<20**	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	**20 – 40**	Medium Risk Site	Low Risk Site	Negligible
200 – 350	**40 – 100**	Low Risk Site	Low Risk Site	Negligible

[(a)] These distances are from the dust emission source. Where this is not known then the distance should be from the site boundary. The risk is based on the distance to the nearest receptor.

Construction

11.2.6 The dust emission classes used in Table 11-4 to determine the construction risk category are as follows:

- Large: Total structure volume >100,000m^3, piling, on site concrete batching; sandblasting;
- Medium: Total structure volume 25,000m^3 - 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- Small: Total structure volume <25,000m^3, construction material with low potential for dust release.

Table 11-4: Risk Category from Construction Activities

Distance to Nearest Receptor (m) [(a)]		Dust Emission Class		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
< 20	**-**	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	**-**	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	**<20**	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	**20 – 40**	Medium Risk Site	Low Risk Site	Negligible
200 – 350	**40 – 100**	Low Risk Site	Low Risk Site	Negligible

[(a)] These distances are from the dust emission source. Where this is not known then the distance should be from the site boundary. The risk is based on the distance to the nearest receptor.

Trackout

11.2.7 Trackout is the transport of dust and dirt from the construction site onto the public road network, where it may be deposited and then resuspended by vehicles using the network.

11.2.8 The dust emission classes used in Table 11-5 to determine the trackout risk category are as follow:

- Large: >100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- Medium: 25 – 100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and

- Small / Medium: <25 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

11.2.9 These numbers are for vehicles that leave that site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

Table 11-5: Risk Category from Trackout

Distance to Nearest Receptor (m) [(a)]		Dust Emission Class		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
< 20	**-**	High Risk Site	Medium Risk Site	Low Risk Site
20 – 50	**<20**	Medium Risk Site	Medium Risk Site	Low Risk Site
50 – 100	**20 – 100**	Low Risk Site	Low Risk Site	Negligible
[(a)] For trackout the distance is from the roads used by construction traffic.				

Definition of Sensitivity and Significance of Effects

11.2.10 Sensitivity of a particular cluster was based on criteria set out in the IAQM dust guidance:

- Very High: >100 dwellings within 20m/very sensitive receptor present;
- High: 10-100 dwellings within 20m of site;
- Medium: <10 dwellings within 20m of site; and
- Low: No dwellings within 20m of site/wooded area between site and receptors.

11.2.11 The significance of the estimated effects without mitigation is presented on

Table 11-6. It shows how sensitivity and risk of a site are considered to inform of significance of effects for construction and earthworks activities at each risk cluster before mitigation.

Table 11-6: Significance of Effects Classification without mitigation

Sensitivity of Surrounding Area	Risk of a Site Given Rise to Dust Effects		
	High	Medium	Low
Very high	Substantial Adverse	Moderate Adverse	Moderate Adverse
High	Moderate Adverse	Moderate Adverse	Slight Adverse
Medium	Moderate Adverse	Slight Adverse	Negligible
Low	Slight Adverse	Negligible	Negligible

11.3 Assessment Methodology for Operation Phase

Screening of Traffic Data

11.3.1 A screening exercise was undertaken on the traffic data in order to identify the affected road links which are likely to have impact on air quality. The screening criteria used is provided in DMRB HA207/07 guidance and cited below:

- Road alignment will change by 5 m or more; or
- Daily traffic flows will change by 1,000 AADT or more; or
- Daily HDV flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hour; or
- Peak hour speed will change by 20 km/hour or more

Selection of public exposure worst case receptors

11.3.2 The location of relevant receptors for population exposure predictions has been identified using Ordnance Survey Address Layer 2 data. Overall 60 worst case receptors were identified and then modelled to ascertain annual mean concentrations of NO_2 and PM_{10} within the study area. Locations of receptors are listed and presented in Table 11-7 and Figure 2.

Table 11-7: Worst Case Receptors utilised in the study

Receptor No	Receptor ID	X	Y
1	J_1	497541	375160
2	J_3	500006	373644
3	J_9	497062	371776
4	J_22	497951	371927
5	J_24	498696	371933
6	J_28	498010	371611
7	J_29	496926	371691
8	J_36	493498	370815
9	J_40	500309	368301

Receptor No	Receptor ID	X	Y
10	J_41	498501	369498
11	J_42	497351	369697
12	J_43	497186	369157
13	J_50	497219	370028
14	J_58	497506	370980
15	J_59	497659	370962
16	J_60	497797	371089
17	J_61	497816	370652
18	J_63	498462	370085
19	J_66	497826	370586
20	J_68	499194	366724
21	Adit1	498618	366775
22	Adit2	497612	374086
23	Adit5	492547	369852
24	Adit6	492614	368775
25	Adit11	500769	362283
26	Adit13	499247	373981
27	Adit15	498276	374043
28	Adit27	501208	373701
29	Adit29	499717	371814
30	Adit30	499502	372780
31	Adit32	498562	373038
32	Adit34	497050	372601
33	Adit35	496658	370083
34	Adit36	496710	368139
35	Adit37	497156	369618
36	Adit38	497411	370806
37	Adit41	495563	369248
38	Adit49	499337	374386
39	Adit53	500629	373122
40	Adit54	500466	373280
41	Adit55	498667	372263
42	Adit57	498232	372057
43	Adit61	498848	373472
44	Adit68	497950	370371
45	Adit69	497907	370502
46	Adit75	498055	371693
47	Adit80	498339	372715
48	Adit84	497944	372041
49	Adit85	497041	372697
50	Adit86	496999	372237
51	Adit92	497068	371433
52	Adit95	497379	371115
53	Adit98	497815	370652
54	Adit99	496864	371280
55	Adit110	497024	369059
56	Adit114	497785	371297
57	Adit116	497734	371404
58	Add1	500728	370596
59	Add2	500998	371799
60	Add3	499791	375201

Processing of background data

11.3.3 Background levels of NO_x, NO_2 and PM_{10} have been obtained for 2008 and 2017 from the Defra website3 for the receptors identified.

11.3.4 'Double counting' of background pollution concentrations due to the presence of the A15 and other major roads, was removed by subtracting these emissions from total values. This was undertaken by excluding from total background concentrations the following sectors:

- primary A roads In,
- trunk A roads In,
- primary A roads In, and
- minor roads In.

Local monitoring data

11.3.5 Monitoring data (2006 – 2011) from the Lincoln's continuous and passive monitoring sites within the study area have been reviewed and used in the assessment as appropriate. Details of the continuous monitoring sites and diffusion tube monitoring are presented in Table 11-9 and Table 11-10 and drawing 1030171-LEB-EIA-AIR-002.

11.3.6 CLC manages two automatic monitors located at Canwick Road (A15) and Broadgate (A15) in Lincoln. CLC also manages a network of diffusion tubes measuring NO_2 concentrations across the city. 26 monitoring locations were within 200m of the network modelled and twenty of these sites were considered suitable for model verification purposes. These were evaluated in terms of distance to the road sources modelled; site type, data quality, and data capture, and were within close proximity to the site and the modelled road network.

Advanced Dispersion Modelling Procedures

11.3.7 The prediction of concentrations in the verification year (2008) and opening year (2017) has involved the use of ADMS Roads pollution modelling software. A detailed explanation of the modelling process, input data, verification and adjustment procedures are available in section below. Data inputs to the assessment have included:

- Annual Average Daily Traffic flows (AADT 24h) for the following categories: LGVs and HDVs;
- Speed (km/hr) of vehicles for each year modelled; and

[3] Defra Website for 2010 Based Background Maps for NO_x, NO_2, PM_{10} and $PM_{2.5}$ - http://laqm.defra.gov.uk/maps/maps2010.html

- Hourly sequential meteorological data for 2008.

11.3.8 Predicted concentrations were derived for each receptor with and without the proposed scheme to establish the increase or reduction that would be likely to occur and the predicted concentration at each receptor following opening of the proposed scheme.

Assessment of Impact Significance

11.3.9 Impact ratings relative to annual mean concentrations at each receptor have been based on the magnitude of the difference in concentrations of NO_2 and PM_{10} with and without the proposed scheme and the predicted level with and without the proposed scheme relative to the limit values for the two pollutants (as detailed in current guidance from Environmental Protection UK (EPUK). Details of the impact significance criteria are presented in section below.

11.3.10 The impact assessment relative to 1-hour mean concentrations for NO_2 has been followed LAQM.TG(09). The guidance is based on analysis of the relationship between annual mean concentrations and exceedances of the 1-hour limit value undertaken in 2003[4] and 2008[5]. The guidance indicates that the 1-hour mean limit value for NO_2 is unlikely to be exceeded when the annual mean concentration is lower than 60µg/m^3.

11.3.11 LAQM.TG(09) have also established a relationship between the Annual Mean PM10 concentration and the number of exceedances of the 24 Hour Mean Objective[6].

11.4 Local Background Concentrations

11.4.1 The average background concentrations across the study area are presented in Table 11-8.

[4] Laxen D and Marner B (2003). Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.
[5] Cook A (2008) Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective
[6] LAQM.TG(09) Relationship between the annual mean and 24-hour mean PM10 concentration, Paragraph 2.36

Table 11-8: Average Background Concentrations across the Study Area

1 x 1 km Grid Square Background Concentrations	2008 Annual Mean Background Concentration µg/m^3			2017 Annual Mean Background Concentration µg/m^3		
	NO_x	NO_2	PM_{10}	NO_x	NO_2	PM_{10}
Maximum	45.7	30.2	20.1	32.8	20.8	18.4
Minimum	14.5	12.0	16.9	10.4	7.6	15.5
Mean	26.7	19.7	18.6	18.7	12.9	16.9

11.5 Local Monitoring Data

11.5.1 The details of local monitoring are presented in Table 11-9, Table 11-10, Table 11-11 and Table 11-12.

Table 11-9: Description of the Continuous Monitoring sites in the Study Area

Monitor ID	Monitor Type	In AQMA ?	X	Y
Canwick Road	Chemiluminescence	Y	497962	370375
Broadgate	BAM	Y	497787	371309

Table 11-10: Description of Local Authorithy Diffusion Tube Monitoring Sites

Site Number	Site Name	Site Type	X (m)	Y (m)
Lincoln_1	Chatterton Ave	Intermediate	497391	373742
Lincoln_2	Scorer St	Intermediate	497306	370294
Lincoln_3	Drill Hall, Broadgate	Roadside	497785	371300
Lincoln_4	City Hall	Background	497326	371421
Lincoln_5/6/7	Canwick Rd (triplicate)	Roadside	497962	370375
Lincoln_8	Dixon St / High St Junction	Roadside	497190	370080
Lincoln_9	St. Catherine's	Roadside	497112	369351
Lincoln_10	Cross O Cliff Hill	Roadside	497322	368928
Lincoln_11	Carholme Rd	Roadside	496590	371571
Lincoln_12	Monks Rd / Broadgate	Roadside	497908	371421

Site Number	Site Name	Site Type	X (m)	Y (m)
Lincoln_13	Clasketgate / Broadgate	Roadside	497735	371404
Lincoln_14	Ruskin Ave	Roadside	498746	372766
Lincoln_15	Newark Rd / Rookery Lane	Roadside	496464	368187
Lincoln_16	The Avenue	Roadside	497107	371510
Lincoln_17	Tritton Rd/Skellingthorpe Rd	Roadside	495542	369271
Lincoln_18	High St/St Mary's St	Roadside	497467	370956
Lincoln_19	106 Yarborough Rd	Roadside	496946	372027
Lincoln_20	Pelham St	Roadside	497801	370909
Lincoln_22	Monks Rd	Roadside	498275	371422
Lincoln_23	Wragby Rd	Roadside	498663	372263
Lincoln_24	Newport Arch	Roadside	497670	372113
Lincoln_25	Yarborough Rd	Roadside	496987	372243
Lincoln_26	Burton Rd	Roadside	497036	372693
Lincoln_27	Yarborough Rd	Roadside	497050	372588
Lincoln_28 (2009-2011)	Greetwell Road	Kerbside	498827	370908
Lincoln_21 (2009-2011)	Doddinton Road	Kerbside	494849	367895

Table 11-11: Continuous Monitoring - Annual Mean NO_2 and PM_{10} Concentrations

Monitor Location Description	Type	Pollutants Monitored	2006 (%DC)	2007 (%DC)	2008 (%DC)	2009 (%DC)	2010 (%DC)
Canwick Road	Roadside	NO_2 Annual Mean	37.7 (91)	40.7 (88)	37.5 (86)	36.1 (96)	38.0 (96)
Broadgate (BAM)	Roadside	PM_{10} Annual Mean	36.4 (n/a)	35.0 (n/a)	-	33.7 (n/a)	34 (93)
Broadgate (BAM)	Roadside	No. of PM_{10} 24h mean >50µg/m^3	57 (n/a)	50 (n/a)	-	14 (n/a)	50 (93)

Table 11-12: Diffusion Tube Monitoring - Annual Mean NO_2 Concentrations

Site ID	Within AQMA	2006	2007	2008	2009	2010	2011*
Lincoln_1	N	14.2	15.5	16.2	15.7	14.1	16.4
Lincoln_2	Y	17.9	19.7	19.7	18.6	18.2	20
Lincoln_3	Y	**49**	**52.1**	**48.5**	**53.9**	**51.6**	**86.9**
Lincoln_4	N	15.5	17.1	16	15.5	15.4	23.2
Lincoln_5/6/7	Y	37.7	40.4	37.4	36.6	38	**54.3**
Lincoln_8	Y	29.7	35	33.4	32.3	35.7	39.3

Site ID	Within AQMA	2006	2007	2008	2009	2010	2011*
Lincoln_9	Y	30.3	29.3	26.4	26	28.6	39.1
Lincoln_10	N	19.3	22.8	21.1	20	21.9	22.8
Lincoln_11	N	22.2	22.8	23.9	24.6	23.3	37
Lincoln_12	Y	33.4	31.6	28.2	26.3	24.7	**40.4**
Lincoln_13	Y	25.4	26.8	24.1	26.6	25.5	29.2
Lincoln_14	N	18.4	20.2	19.3	18.8	20.8	22.9
Lincoln_15	Y	28.1	28.5	29.1	27.1	27.3	**48.1**
Lincoln_16	Y	32.6	30.4	30.5	28.8	29.2	**44.3**
Lincoln_17	N	24.5	26.7	25.8	25.8	23.9	26.4
Lincoln_18	Y	29.4	32.1	32.1	30.8	27.7	**43.8**
Lincoln_19	N	29	31	29.8	28.8	28.9	**46.7**
Lincoln_20	Y	29.9	34.3	34	30.5	31.1	36.4
Lincoln_22	N	21.2	22.1	22.8	20.4	22	23.9
Lincoln_23	N	17.2	18.8	19	18.1	16.3	18.3
Lincoln_24	N	16.1	20.1	15.9	16.3	-	-
Lincoln_25	N	28.6	33	32.5	32.4	27.8	30.5
Lincoln_26	N	19.5	20.3	20.1	19.8	19.4	22
Lincoln_27	N	29.4	31.5	32.3	31.2	31.5	37.4
Lincoln_28 (2009-2011)	N	-	-	-	22.9	22.5	26.5
Lincoln_21 (2009-2011)	N	-	-	-	25.3	21.8	25.7

* 2011 data considered unreliable by CLC Environmental Health Officers.

11.6 Model Performance and Verification Procedures

11.6.1 The comparison of modelled concentrations with local monitored concentrations is a process termed ‘verification’. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- estimates of background pollutant concentrations;
- meteorological data uncertainties;
- traffic data uncertainties;
- model input parameters, such as ‘roughness length’; and
- overall limitations of the dispersion model.

Model Precision

11.6.2 Residual uncertainty may remain after systematic error or 'model accuracy' has been accounted for in the final predictions. Residual uncertainty may be considered synonymous with the 'precision' of the model predictions, i.e. how wide the scatter or residual variability of the predicted values compare with the monitored true value, once systematic error has been allowed for. The quantification of model precision provides an estimate of how the final predictions may deviate from true (monitored) values at the same location over the same period.

11.6.3 Suitable local monitoring data for the purpose of verification is available for concentrations of NO_2 at the locations shown in Table 11-12. This monitoring data has been used to validate the dispersion model prediction and obtain adjustment factors which can be applied to predictions of pollutant concentrations in the base and future years. NO_x adjustment factors were used as a proxy to adjust the PM_{10} output as no monitoring of PM_{10} has been undertaken close to the site.

Model Performance

11.6.4 An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG(09) (Defra, 2009) identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. The statistical parameters used in this assessment are:

- root mean square error (RMSE);
- fractional bias (FB); and
- correlation coefficient (CC).

11.6.5 A brief for explanation of each statistic is provided in Table 11-13 and further details can be found in LAQM.TG(09) Box A3.7.

Table 11-13 Model Performance Statistics

Statistical Parameter	Comments	Ideal value
RMSE	RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if the model predictions are for the annual mean NO_2 objective of 40 µg/m^3, if an RMSE of 10 µg/m^3 or above is determined for a model it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4 µg/m^3 for the annual mean NO_2 objective.	0.01
FB	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
CC	It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

11.6.6 These parameters estimate how the model results agree or diverge from the observations. These calculations have been carried out prior to, and after, adjustment and provide information on the improvement of the model predictions as a result of the application of the verification adjustment factors.

Verification Process

11.6.7 The model outputs of road-NO_x (i.e. the component of total NO_x coming from road traffic) were compared with the measured road-NO_x at the diffusion tube locations. Mouchel have then applied a Two Stage Model Verification process in order to suitably correct any under or over estimations in the model, developing the method set out by Defra (2009) and taking into account the most recent guidance.

11.6.8 Firstly, total measured NO_x was calculated from the measured NO_2 concentrations at the monitoring locations using the recently updated NO_x from

NO_2 calculator available on the Defra website. The measured road-NO_x contribution was then calculated as the difference between the total and the background value. The NO_x roads adjustment factor was determined as the multiplier between the calculated (measured) road contribution and the model derived road contribution.

11.6.9 Secondly, the modelled road NO_x concentrations were converted to modelled road NO_2 concentrations using the updated NO_x from NO_2 calculator as described above. The NO_2 roads adjustment factor was then determined as the multiplier between the calculated (measured) road contribution and the model derived road contribution.

11.6.10 Verification process and the adjustment factors applied in the assessment are presented in Table 11-14, Table 11-15 and Table 11-16.

Table 11-14: Verification Process for NO_x/NO_2

Site ID	X	Y	Modelled Road NO_x	Monitored NOx (Roads) - NAQIA NO_x from NO_2 Calculator TG(09)	Modelled Vs. Monitored NO_x (Roads) %	Adjusted modelled NO_x Roads	Background NO_x	Background NO_2	Monitored NO_2	Monitored Road NO_2	Modelled Road NO_2	Modelled Vs. Monitored NO_2 (Roads) %	Adjusted modelled NO_2 Roads	Modelled Vs. Monitored NO_2 (Roads) %	Modelled tot NO_2	% Difference	Adjusted Total NO_2	%Difference
1	497391	373745	2	6	-68%	3	19	13	16	3	1	-0.59	1	-58%	14	-10.55	14.5	-10.5
3	497785	371291	30	81	-63%	39	29	19	49	29	16	-0.45	17	-44%	36	-26.49	35.7	-26.5
8	497191	370080	15	17	-9%	19	45	26	33	7	8	0.16	8	18%	35	3.83	34.7	3.8
9	497113	369352	21	20	5%	27	27	18	26	9	12	0.33	12	35%	29	11.70	29.5	11.7
10	497322	368928	9	16	-45%	11	20	14	21	8	5	-0.28	5	-27%	19	-9.65	19.1	-9.7
11	496591	371571	8	15	-46%	10	26	17	24	7	5	-0.29	5	-28%	22	-8.03	22.0	-8.0
12	497874	371415	23	20	12%	30	29	19	28	9	13	0.40	13	42%	32	13.52	32.0	13.5
14	498721	372781	6	10	-37%	8	21	15	19	5	4	-0.18	4	-17%	19	-4.14	18.5	-4.1
15	496464	368188	17	33	-49%	21	22	15	29	14	10	-0.32	10	-31%	25	-15.10	24.7	-15.1
16	497113	371535	15	26	-42%	20	29	19	31	11	9	-0.23	9	-22%	28	-8.28	28.0	-8.3
17	495541	369272	20	25	-22%	25	21	14	26	11	11	0.00	12	2%	26	0.88	26.0	0.9
19	496946	372028	10	35	-70%	14	22	15	30	15	6	-0.58	6	-57%	21	-28.88	21.2	-28.9
20	497800	370884	37	18	107%	48	45	26	34	8	18	1.41	19	144%	45	32.40	45.0	32.4
22	498277	371423	17	11	48%	22	27	18	23	5	10	0.84	10	87%	27	20.04	27.4	20.0
23	498663	372261	9	9	-6%	11	21	15	19	4	5	0.20	5	22%	20	5.24	20.0	5.2
24	497671	372113	6	2	143%	7	22	15	16	1	4	2.15	4	220%	18	15.39	18.4	15.4
25	496987	372244	21	42	-50%	27	22	15	33	18	12	-0.32	12	-31%	27	-17.08	27.0	-17.1

Site ID	X	Y	Modelled Road NO_x	Monitored NOx (Roads) - NAQIA NO_x from NO_2 Calculator TG(09)	Modelled Vs. Monitored NO_x (Roads) %	Adjusted modelled NO_x Roads	Background NO_x	Background NO_2	Monitored NO_2	Monitored Road NO_2	Modelled Road NO_2	Modelled Vs. Monitored NO_2 (Roads) %	Adjusted modelled NO_2 Roads	Modelled Vs. Monitored NO_2 (Roads) %	Modelled tot NO_2	% Difference	Adjusted Total NO_2	%Difference
26	497039	372687	10	11	-14%	13	22	15	20	5	6	0.11	6	12%	21	3.26	20.8	3.3
27	497053	372599	15	41	-64%	19	22	15	32	18	9	-0.50	9	-49%	24	-26.58	23.7	-26.6
5/6/7	497963	370374	37	27	37%	48	45	26	37	11	18	0.64	18	67%	45	19.74	44.8	19.7
					1.29							**1.016**				**1.000**		

Table 11-15: Verification Summary for PM_{10}

Name	PM Model Results	BG PM10	2007 Monitored PM_{10}	Monitored Road PM	Modelled Vs. Monitored NO_x (Roads) %	Adjustment factor a
PM_CM	1.8623	17.4	35.0	17.61	-89%	9.46

Table 11-16: Verification Summary for NO_x/NO_2 and PM_{10}

NO_x/NO_2	No Adjustment	NO_x Roads Adjustment	NO_2 Roads Adjustment	NO_2 Total Adjustment
Adjustment Factor A	-	1.29	1.29	1.29
Adjustment Factor B	-	-	1.016	1.016
Adjustment Factor C	-	-	-	1.000
Correlation Co-efficient	0.7	0.8	0.3	0.8
RMSE	6.0	5.5	5.5	5.5
Fractional Bias	0.1	0.0	0.0	0.0
Within +-10%	8	7	8	8
Within +-10 to 25%	8	9	8	8
Within +- 25%	16	16	16	16
PM10	**No Adjustment**	**PM_{10} Roads Adjustment**		
Adjustment Factor A	-	9.46		

11.7 Operation Phase Impact Significance (EPUK)

11.7.1 Impact significance criteria used in the assessment are presented in Table 11-17, Table 11-18, Table 11-19 and Table 11-20.

Table 11-17: Impact Magnitude for change in annual mean NO_2 and PM_{10} concentrations

Magnitude of Change	Increase / Reduction (µg/m3)
Large	>4
Medium	> 2 – 4
Small	≥ 0.4 – 2
Imperceptible	< 0.4
No Change	0

Table 11-18: Impact Magnitude for change in number of days with PM_{10} concentrations greater than 50µg/m^3

Magnitude of Change	Increase / Reduction (Days)
Large	>4
Medium	> 2 – 4

Magnitude of Change	Increase / Reduction (Days)
Small	≥ 1 – 2
Imperceptible	< 1
No Change	0

Table 11-19: Impact Ratings - NO_2 and PM_{10} concentrations

Concentration in Relation to Objective / Limit Value	Change in Concentration			
	Negligible or No Change	Small	Medium	Large
Increase with scheme				
Above Objective/Limit Value with scheme (>40 µg/m3)	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with scheme (36-40 µg/m3)	Negligible	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with scheme (30-36 µg/m3)	Negligible	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with scheme (<30 µg/m3)	Negligible	Negligible	Negligible	Slight Adverse
Decrease with scheme				
Above Objective/Limit Value without scheme (>40 µg/m3)	Negligible	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value without scheme (36-40 µg/m3)	Negligible	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value without scheme (30-36 µg/m3)	Negligible	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value without scheme (<30 µg/m3)	Negligible	Negligible	Negligible	Slight Beneficial

Table 11-20: Air Quality Impact Descriptors for Changes to Number of Days with PM_{10}

Concentration in Relation to Objective / Limit Value	Change in Number of Days			
	Negligible or No Change	Small	Medium	Large
Increase with scheme				
Above Objective/Limit Value with scheme (>35 days)	Negligible	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with scheme (32 – 35 days)	Negligible	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with scheme (26- 32 days)	Negligible	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with scheme (<26 days)	Negligible	Negligible	Negligible	Slight Adverse
Decrease with scheme				
Above Objective/Limit Value without scheme (>35 days)	Negligible	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value without scheme (32 – 35 days)	Negligible	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value without scheme (26- 32 days)	Negligible	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value without scheme (<26 days)	Negligible	Negligible	Negligible	Slight Beneficial

11.8 2008 Windrose at Waddington Meteorological Station

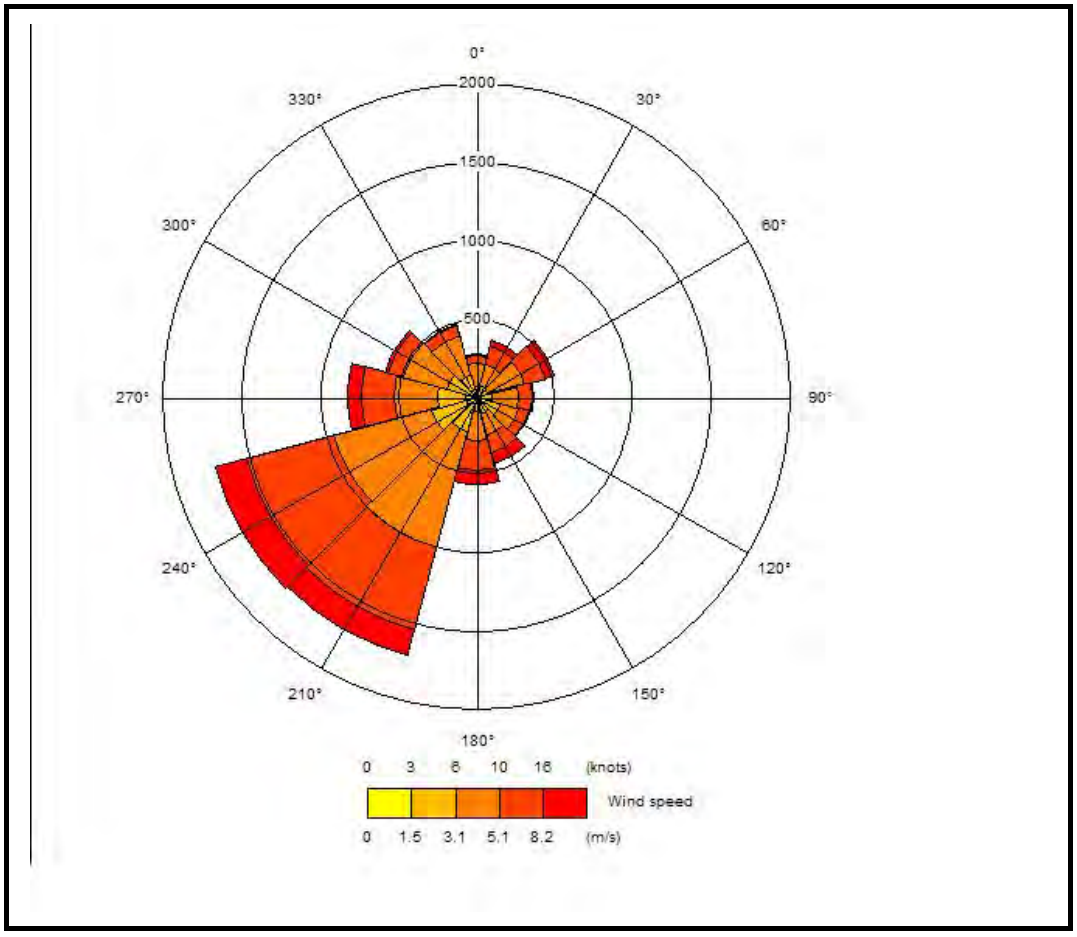


Diagram 1: 2008 Windrose from Waddington Meteorological Station

11.9 Assessment of Construction Impact

11.9.1 The construction impact assessment is summarised in Table 11-21, Table 11-22, Table 11-23 and Table 11-24.

Table 11-21: Distance of Receptors from Construction Site

Distance band from construction site boundary	Number of receptors within the banding
0-20m	16
20-50m	50
50-100m	92
100-200m	280
200-350m	498
Total	936

Table 11-22: Summary Risk Effects for Each Activity

Construction Phase	Details of Each Activity	Potential Dust Emission Class	Distance to the nearest Receptors	Dust Risk Category
Earthworks	Total site area >10,000m^2	Large	<20m	High Risk
Construction Activities	Total structure volume >100,000m^3	Large	<20m	High Risk
Trackout	No data – assumed worst case which >100 HDV trips per day	Large	<20m	High Risk

Table 11-23: Sensitivities of the Study Area

Effects	Conditions of Study Area	Sensitivity of Study Area
Dust Soiling and PM_{10} Effects	Majority of the construction site area located in the rural area. North of site is close to the residential area, which has approximately 10 dwellings within 20m of site (Hawthorn Road).	Medium
Ecological	No designations	Low
PM_{10} Effects	Local PM_{10} background concentrations below the objective	Low

Table 11-24: Summary Significance Table with No Mitigation

	Dust Soiling and PM_{10} Effects	Ecological	PM_{10} Effects
Earthwork	Moderate Adverse	None	Slight Adverse
Construction Activities	Moderate Adverse	None	Slight Adverse
Trackout	Moderate Adverse	None	Slight Adverse
Overall Significance	Moderate Adverse		

11.10 Modelling Assessment Results

11.10.1 The adjusted modelling results for the worst case receptors are presented in Table 11-25, Table 11-26 and Table 11-27.

Table 11-25: Predicted Annual Mean NO_2 Concentrations

Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
1	J_1	497541	375160	12.4	12.5	0.2	Negligible
2	J_3	500006	373644	10.5	10.6	0.1	Negligible
3	J_9	497062	371776	18.9	18.7	-0.3	Negligible
4	J_22	497951	371927	17.9	18.0	0.1	Negligible
5	J_24	498696	371933	18.7	18.6	-0.1	Negligible
6	J_28	498010	371611	25.0	23.5	-1.4	Negligible
7	J_29	496926	371691	14.3	14.2	-0.1	Negligible
8	J_36	493498	370815	10.5	10.5	0.0	Negligible
9	J_40	500309	368301	10.4	10.8	0.4	Negligible
10	J_41	498501	369498	14.5	13.8	-0.6	Negligible
11	J_42	497351	369697	19.3	20.1	0.8	Negligible
12	J_43	497186	369157	15.7	15.5	-0.2	Negligible
13	J_50	497219	370028	23.1	22.8	-0.3	Negligible
14	J_58	497506	370980	27.7	28.2	0.4	Negligible
15	J_59	497659	370962	26.2	26.0	-0.2	Negligible
16	J_60	497797	371089	30.6	28.3	-2.4	Slight Beneficial
17	J_61	497816	370652	24.6	23.9	-0.7	Negligible
18	J_63	498462	370085	17.6	17.9	0.3	Negligible
19	J_66	497826	370586	24.8	24.6	-0.2	Negligible
20	J_68	499194	366724	8.5	8.6	0.1	Negligible
21	Adit1	498618	366775	9.6	9.6	0.0	Negligible
22	Adit2	497612	374086	12.7	12.8	0.1	Negligible
23	Adit5	492547	369852	10.5	10.6	0.0	Negligible
24	Adit6	492614	368775	13.5	13.5	0.0	Negligible
25	Adit11	500769	362283	10.1	11.0	0.9	Negligible
26	Adit13	499247	373981	12.2	11.9	-0.2	Negligible
27	Adit15	498276	374043	10.7	10.7	0.0	Negligible
28	Adit27	501208	373701	11.8	12.3	0.5	Negligible
29	Adit29	499717	371814	13.7	14.0	0.3	Negligible
30	Adit30	499502	372780	14.8	14.2	-0.6	Negligible
31	Adit32	498562	373038	13.1	12.7	-0.4	Negligible
32	Adit34	497050	372601	16.0	15.7	-0.3	Negligible
33	Adit35	496658	370083	23.9	23.7	-0.1	Negligible
34	Adit36	496710	368139	15.9	16.0	0.2	Negligible
35	Adit37	497156	369618	17.0	17.0	0.0	Negligible
36	Adit38	497411	370806	28.8	28.5	-0.3	Negligible

Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
37	Adit41	495563	369248	15.6	15.5	0.0	Negligible
38	Adit49	499337	374386	10.1	10.2	0.1	Negligible
39	Adit53	500629	373122	10.4	11.1	0.7	Negligible
40	Adit54	500466	373280	12.2	11.8	-0.4	Negligible
41	Adit55	498667	372263	14.0	13.5	-0.5	Negligible
42	Adit57	498232	372057	15.4	14.8	-0.6	Negligible
43	Adit61	498848	373472	12.7	12.4	-0.4	Negligible
44	Adit68	497950	370371	28.4	27.6	-0.8	Negligible
45	Adit69	497907	370502	27.9	27.0	-1.0	Negligible
46	Adit75	498055	371693	30.1	27.4	-2.7	Negligible
47	Adit80	498339	372715	15.6	14.8	-0.8	Negligible
48	Adit84	497944	372041	15.4	15.2	-0.3	Negligible
49	Adit85	497041	372697	14.4	14.1	-0.3	Negligible
50	Adit86	496999	372237	15.9	15.6	-0.3	Negligible
51	Adit92	497068	371433	21.8	21.4	-0.4	Negligible
52	Adit95	497379	371115	20.7	20.8	0.0	Negligible
53	Adit98	497815	370652	24.6	23.9	-0.7	Negligible
54	Adit99	496864	371280	17.3	17.0	-0.2	Negligible
55	Adit110	497024	369059	21.8	22.8	0.9	Negligible
56	Adit114	497785	371297	25.9	24.0	-1.9	Negligible
57	Adit116	497734	371404	21.2	20.9	-0.3	Negligible
58	Add1	500728	370596	10.6	10.8	0.2	Negligible
59	Add2	500998	371799	11.6	12.1	0.5	Negligible
60	Add3	499791	375201	10.2	10.3	0.2	Negligible

Table 11-26: Predicted Annual Mean PM_{10} Concentrations

Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
1	J_1	497541	375160	24.7	25.1	0.4	Negligible
2	J_3	500006	373644	19.6	19.8	0.2	Negligible
3	J_9	497062	371776	21.9	21.7	-0.2	Negligible
4	J_22	497951	371927	19.9	20.1	0.2	Negligible
5	J_24	498696	371933	22.3	22.1	-0.2	Negligible
6	J_28	498010	371611	29.2	28.2	-1.0	Negligible
7	J_29	496926	371691	17.6	17.5	-0.1	Negligible
8	J_36	493498	370815	17.7	17.7	0.0	Negligible
9	J_40	500309	368301	20.6	21.3	0.7	Negligible
10	J_41	498501	369498	22.6	22	-0.6	Negligible
11	J_42	497351	369697	25.6	26.5	0.9	Negligible
12	J_43	497186	369157	21.1	20.8	-0.3	Negligible
13	J_50	497219	370028	23.5	23	-0.5	Negligible
14	J_58	497506	370980	28.8	29.7	0.9	Negligible
15	J_59	497659	370962	26.0	26.4	0.4	Negligible
16	J_60	497797	371089	36.2	34.3	-1.9	Slight Beneficial
17	J_61	497816	370652	24.0	23.5	-0.5	Negligible
18	J_63	498462	370085	21.0	21.8	0.8	Negligible
19	J_66	497826	370586	24.7	24.8	0.1	Negligible
20	J_68	499194	366724	17.6	18	0.4	Negligible
21	Adit1	498618	366775	19.1	19.2	0.1	Negligible
22	Adit2	497612	374086	24.0	24.2	0.2	Negligible
23	Adit5	492547	369852	19.3	19.3	0.0	Negligible
24	Adit6	492614	368775	21.3	21.4	0.1	Negligible
25	Adit11	500769	362283	21.6	23.5	1.9	Negligible
26	Adit13	499247	373981	20.5	20.3	-0.2	Negligible
27	Adit15	498276	374043	20.5	20.5	0.0	Negligible
28	Adit27	501208	373701	22.9	23.8	0.9	Negligible
29	Adit29	499717	371814	18.4	19	0.6	Negligible
30	Adit30	499502	372780	22.4	21.4	-1.0	Negligible
31	Adit32	498562	373038	20.3	19.8	-0.5	Negligible
32	Adit34	497050	372601	22.3	21.8	-0.5	Negligible
33	Adit35	496658	370083	20.7	20.6	-0.1	Negligible
34	Adit36	496710	368139	23.1	23.2	0.1	Negligible
35	Adit37	497156	369618	23.3	23.3	0.0	Negligible
36	Adit38	497411	370806	30.0	29.8	-0.2	Negligible
37	Adit41	495563	369248	23.3	23.3	0.0	Negligible
38	Adit49	499337	374386	19.4	19.5	0.1	Negligible
39	Adit53	500629	373122	19.4	20.8	1.4	Negligible
40	Adit54	500466	373280	22.2	21.6	-0.6	Negligible
41	Adit55	498667	372263	20.0	19.3	-0.7	Negligible
42	Adit57	498232	372057	21.4	20.8	-0.6	Negligible
43	Adit61	498848	373472	20.2	19.7	-0.5	Negligible
44	Adit68	497950	370371	29.7	28.7	-1.0	Negligible
45	Adit69	497907	370502	28.5	27.4	-1.1	Negligible
46	Adit75	498055	371693	35.9	33.8	-2.1	Slight Beneficial
47	Adit80	498339	372715	22.4	21.3	-1.1	Negligible
48	Adit84	497944	372041	21.3	20.8	-0.5	Negligible
49	Adit85	497041	372697	20.4	20	-0.4	Negligible
50	Adit86	496999	372237	22.5	22.1	-0.4	Negligible
51	Adit92	497068	371433	26.6	26.2	-0.4	Negligible
52	Adit95	497379	371115	23.6	23.9	0.3	Negligible

Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
53	Adit98	497815	370652	23.9	23.5	-0.4	Negligible
54	Adit99	496864	371280	21.5	21.1	-0.4	Negligible
55	Adit110	497024	369059	29.2	30.0	0.8	Negligible
56	Adit114	497785	371297	29.6	28.5	-1.1	Negligible
57	Adit116	497734	371404	23.1	23.2	0.1	Negligible
58	Add1	500728	370596	19.3	19.7	0.4	Negligible
59	Add2	500998	371799	20.0	21	1.0	Negligible
60	Add3	499791	375201	20.5	20.8	0.3	Negligible

Table 11-27: Predicted 24-hour Mean PM_{10} Concentrations

Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
1	J_1	497541	375160	12	13	1	Negligible
2	J_3	500006	373644	3	3	0	Negligible
3	J_9	497062	371776	6	6	0	Negligible
4	J_22	497951	371927	3	4	0	Negligible
5	J_24	498696	371933	7	6	0	Negligible
6	J_28	498010	371611	25	21	-3	Negligible
7	J_29	496926	371691	1	1	0	Negligible
8	J_36	493498	370815	1	1	0	Negligible
9	J_40	500309	368301	4	5	1	Negligible
10	J_41	498501	369498	7	6	-1	Negligible
11	J_42	497351	369697	14	16	2	Negligible
12	J_43	497186	369157	5	4	0	Negligible
13	J_50	497219	370028	9	8	-1	Negligible
14	J_58	497506	370980	23	26	3	Negligible
15	J_59	497659	370962	15	16	1	Negligible
16	J_60	497797	371089	56	46	-10	Substantial Beneficial
17	J_61	497816	370652	10	9	-1	Negligible
18	J_63	498462	370085	5	6	1	Negligible
19	J_66	497826	370586	12	12	0	Negligible
20	J_68	499194	366724	1	1	0	Negligible
21	Adit1	498618	366775	2	2	0	Negligible
22	Adit2	497612	374086	10	11	0	Negligible
23	Adit5	492547	369852	3	3	0	Negligible
24	Adit6	492614	368775	5	5	0	Negligible
25	Adit11	500769	362283	6	9	3	Negligible
26	Adit13	499247	373981	4	4	0	Negligible
27	Adit15	498276	374043	4	4	0	Negligible
28	Adit27	501208	373701	8	10	2	Negligible
29	Adit29	499717	371814	2	2	1	Negligible
30	Adit30	499502	372780	7	5	-2	Negligible
31	Adit32	498562	373038	4	3	-1	Negligible
32	Adit34	497050	372601	7	6	-1	Negligible
33	Adit35	496658	370083	4	4	0	Negligible
34	Adit36	496710	368139	8	8	0	Negligible
35	Adit37	497156	369618	9	9	0	Negligible
36	Adit38	497411	370806	28	27	-1	Negligible
37	Adit41	495563	369248	9	9	0	Negligible
38	Adit49	499337	374386	3	3	0	Negligible
39	Adit53	500629	373122	3	4	2	Negligible
40	Adit54	500466	373280	7	6	-1	Negligible
41	Adit55	498667	372263	3	3	-1	Negligible
42	Adit57	498232	372057	5	4	-1	Negligible
43	Adit61	498848	373472	4	3	-1	Negligible
44	Adit68	497950	370371	26	23	-3	Negligible
45	Adit69	497907	370502	22	19	-3	Negligible

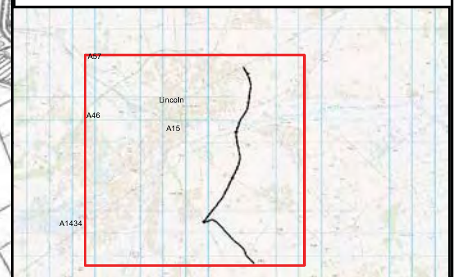
Receptor No	Receptor ID	X	Y	DM	DS	Change	Impact Significant Class
46	Adit75	498055	371693	54	44	-11	Substantial Beneficial
47	Adit80	498339	372715	7	5	-2	Negligible
48	Adit84	497944	372041	5	4	-1	Negligible
49	Adit85	497041	372697	4	3	-1	Negligible
50	Adit86	496999	372237	7	6	-1	Negligible
51	Adit92	497068	371433	17	15	-1	Negligible
52	Adit95	497379	371115	9	10	1	Negligible
53	Adit98	497815	370652	10	9	-1	Negligible
54	Adit99	496864	371280	5	5	-1	Negligible
55	Adit110	497024	369059	25	28	3	Slight Adverse
56	Adit114	497785	371297	26	22	-4	Negligible
57	Adit116	497734	371404	8	8	0	Negligible
58	Add1	500728	370596	3	3	0	Negligible
59	Add2	500998	371799	3	5	1	Negligible
60	Add3	499791	375201	4	4	0	Negligible

11.11 1030171-LEB-EIA-AIR-001

NOTES:

KEY

- Proposed Scheme Links
- Links within 200m of Affected Links
- Affected Links
- Lincoln City Council AQMAs



Rev	Description		Drawn By:	GIS By:	Approved By:	Approved Date:
A	First Issue		LT	CCH	MD	30/11/12

Revision: Description:

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Created by: LT Date: 30/11/2012

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Paper Size A3 Drawing Number: 11030171-LEB-EIA-NOI-001 Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Air Quality
Study area and affected links

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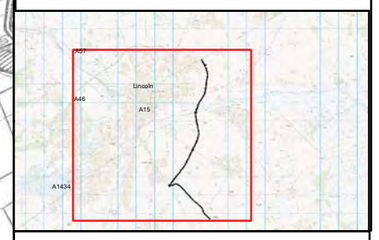
11.12 1030171-LEB-EIA-AIR-002

N

NOTES:

KEY

- PM_{10} Monitor
- NO_2 Monitoring Sites
- Jacobs Worst Case Receptors
- Mouchel Worst Case Receptors
- Proposed Scheme Links
- Links within 200m of Affected Links
- Affected Links
- Lincoln City Council AQMAs



A	First Issue		LT	CCH	MD	30/11/12
Revision:	Description:		Drawn By:	GIS By:	Approved By:	Approved Date:

Amendment Details:

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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-002 Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Locations of monitoring sites and worst case receptors

0 450 900 1,800 2,700 3,600 Meters

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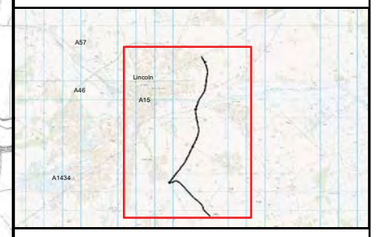
11.13 1030171-LEB-EIA-AIR-003

N

NOTES:

KEY
- 0-20m
- 20-50m
- 50-100m
- 100-200m
- 200-350m
- Proposed Construction Site Boundary
- 0-20m Buffer
- 20-50m Buffer
- 50-100m Buffer
- 100-200m Buffer
- 200-350m buffer



A	First Issue		LT	CCH	??	30/11/12

Revision: Description: Drawn By: GIS By: Approved By: Approved Date:

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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-003 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
Receptors within 350m of the Construction Site Boundary

0 230 460 920 1,380 1,840 Meters

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11.14 1030171-LEB-EIA-AIR-004

N

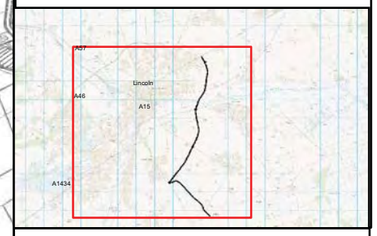
NOTES:

KEY

DM Adjusted Annual Mean

NO_2 Concentration ($\mu g/m^3$)

- <30
- 30 - 36
- 36 - 40
- >40
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	30/11/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

Revision: Description:

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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-004 Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Air Quality

DM Annual Mean NO_2 Concentration ($\mu g/m^3$)

0 450 900 1,800 2,700 3,600 Meters

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11.15 1030171-LEB-EIA-AIR-005

N

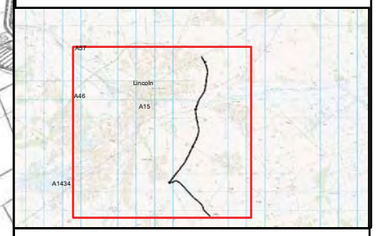
NOTES:

KEY

Magnitude of Change

Annual Mean NO_2 Concentration (µg/m³)

- Large Decrease (>-4)
- Medium Decrease (-4 - -2)
- Small Decrease (-2 - -0.4)
- Impercepible (-0.4 - 0)
- No Change (0)
- Impercepible (0 - 0.4)
- Small Increase (0.4 - 2)
- Medium Increase (2 - 4)
- Large Increase (>4)
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	30/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-005 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality

DS Annual Mean NO_2 Concentration (µg/m^3)

0 450 900 1,800 2,700 3,600 Meters

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11.16 1030171-LEB-EIA-AIR-006

N

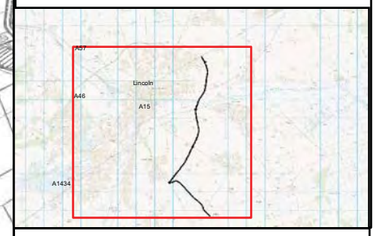
NOTES:

KEY

Magnitude of Change

Annual Mean NO_2 Concentration ($\mu g/m^3$)

- Large Decrease (>-4)
- Medium Decrease (-4 - -2)
- Small Decrease (-2 - -0.4)
- Impercepible (-0.4 - 0)
- No Change (0)
- Impercepible (0 - 0.4)
- Small Increase (0.4 - 2)
- Medium Increase (2 - 4)
- Large Increase (>4)
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	07/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-006 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality

Changes of Annual Mean NO_2 Concentration ($\mu g/m^3$)

0 450 900 1,800 2,700 3,600 Meters

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11.17 1030171-LEB-EIA-AIR-007

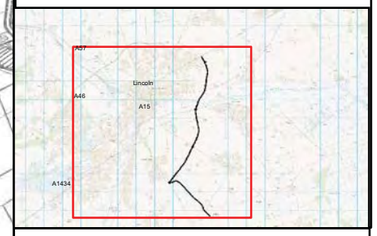
N

NOTES:

KEY

Annual Mean NO_2 Concentration ($\mu g/m^3$)
Impact Signifiance Classes

- Substantial Adverse
- Moderate Adverse
- Slight Adverse
- Negligible
- Slight Beneficial
- Moderate Beneficial
- Substantial Beneficial
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	09/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-007 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
Annual Mean NO_2 Concentration Impact Significance

0 450 900 1,800 2,700 3,600 Meters

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11.18 1030171-LEB-EIA-AIR-008

N

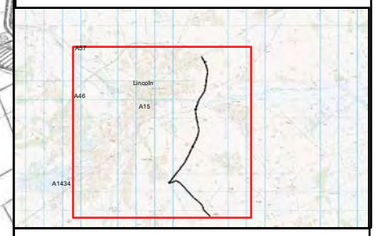
NOTES:

KEY

DM Adjusted Annual Mean

PM_{10} Concentration ($\mu g/m^3$)

- <30
- 30 - 36
- 36 - 40
- >40
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	02/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-008 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality

DM Annual Mean PM_{10} Concentration ($\mu g/m^3$)

0 450 900 1,800 2,700 3,600 Meters

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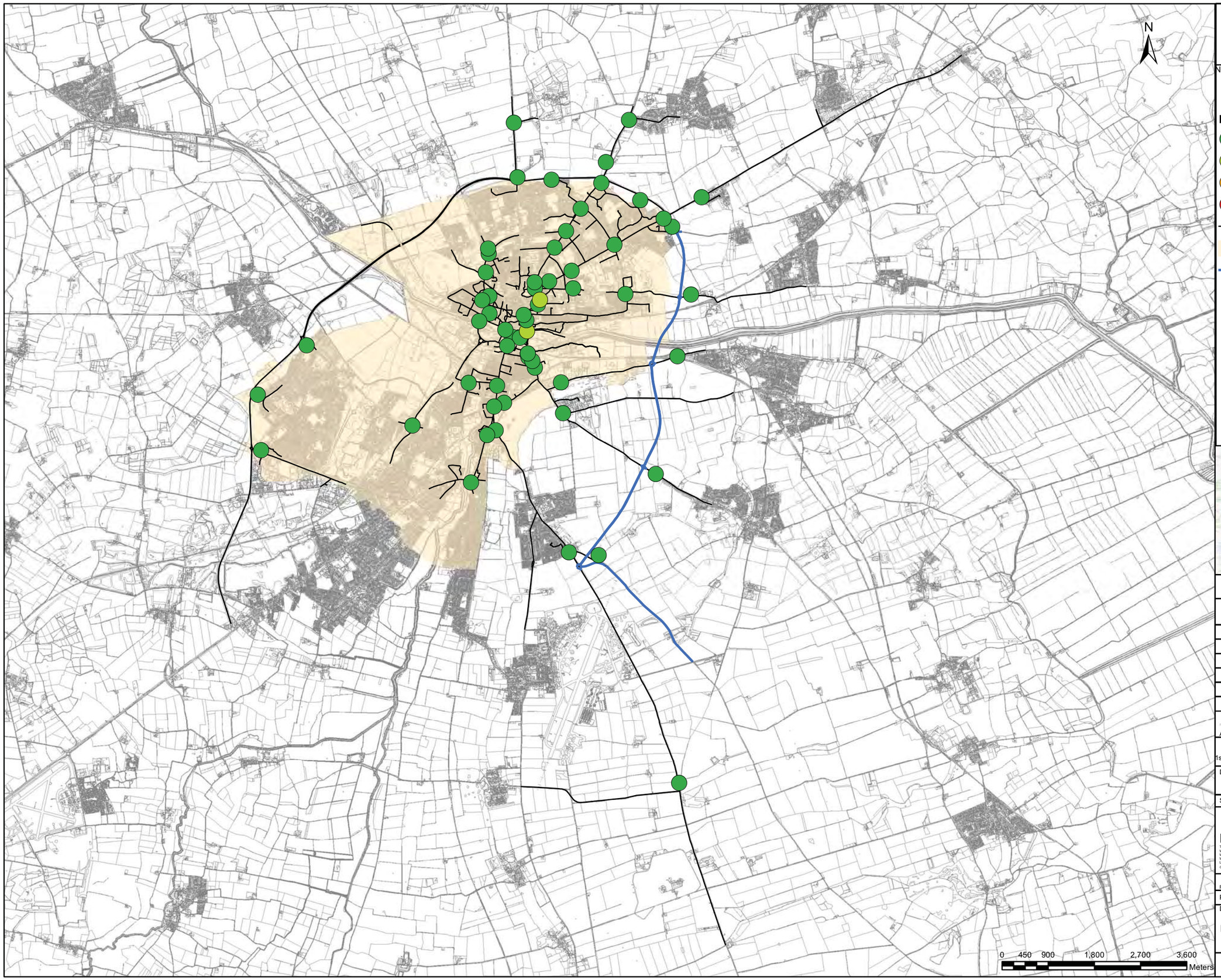
11.19 1030171-LEB-EIA-AIR-009

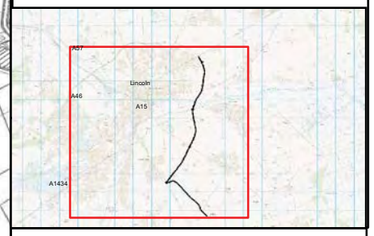


NOTES:

KEY

DS Adjusted Annual Mean PM_{10} ($\mu g/m^3$)

- <30
- 30 - 36
- 36 - 40
- >40
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	02/11/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

Revision: Description:

Amendment Details:

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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-009 Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Air Quality

DS Annual Mean PM_{10} Concentration ($\mu g/m^3$)

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11.20 1030171-LEB-EIA-AIR-010

N

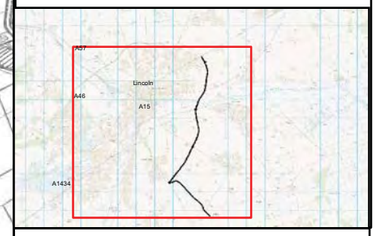
NOTES:

KEY

Magnitude of Change

Annual Mean PM Concentration$_{10}$ (µg/m^3)

- Large Decrease (>-4)
- Medium Decrease (-4 - -2)
- Small Decrease (-2 - -0.4)
- Impercepible (-0.4 - 0)
- No Change (0)
- Impercepible (0 - 0.4)
- Small Increase (0.4 - 2)
- Medium Increase (2 - 4)
- Large Increase (>4)
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	02/11/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

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Paper Size A3 Drawing Number: 110301711-LEB-EIA-AIR-010 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
Changes of Annual Mean PM_{10}
Concentration (µg/m^3)

0 450 900 1,800 2,700 3,600 Meters

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11.21 1030171-LEB-EIA-AIR-011

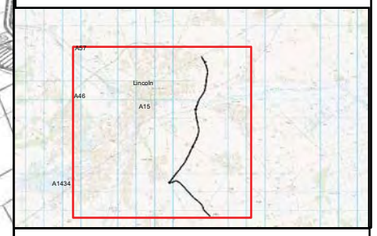
NOTES:

KEY

Annual Mean PM_{10} Concentration ($\mu g/m^3$)

Impact Signifiance Classes

- Substantial Adverse
- Moderate Adverse
- Slight Adverse
- Negligible
- Slight Beneficial
- Moderate Beneficial
- Substantial Beneficial
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	02/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-011 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
Annual Mean PM_{10} Concentration Impact Significance

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11.22 1030171-LEB-EIA-AIR-012

N

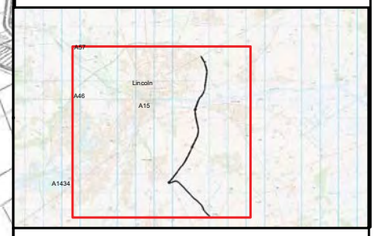
NOTES:

KEY

Annual Mean PM_{10} Concentration ($\mu g/m^3$)

Impact Significance Classes

- Substantial Adverse
- Moderate Adverse
- Slight Adverse
- Negligible
- Slight Beneficial
- Moderate Beneficial
- Substantial Beneficial
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



A	First Issue		LT	CCH	MD	12/11/12
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Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-012 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality

DM Short Term Mean PM_{10} (Days of Exceedence)

0 450 900 1,800 2,700 3,600 Meters

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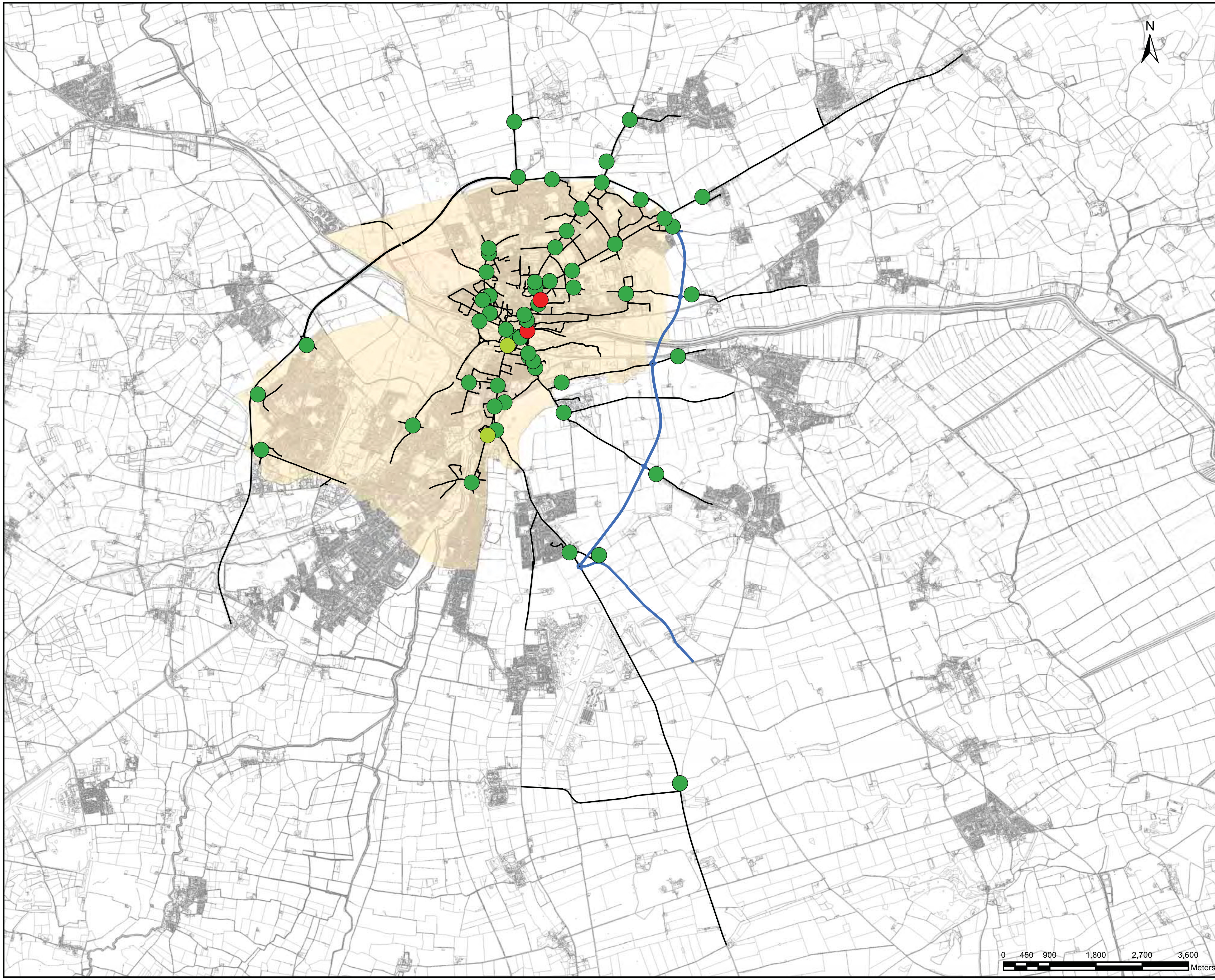
11.23 1030171-LEB-EIA-AIR-013



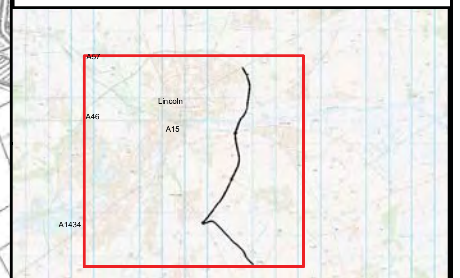
NOTES:

KEY

DS Adjusted Short Term Mean

PM_{10} Days of Exceedence

- <26 Days
- 26 - 32 Days
- 32 - 35 Days
- >35 Days
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



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WATERSIDE SOUTH
LINCOLN LN5 7JN
Customer Service Centre: (01522) 782070

Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-013 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
DM Short Term Mean PM_{10}
(Days of Exceedence)

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11.24 1030171-LEB-EIA-AIR-014

N

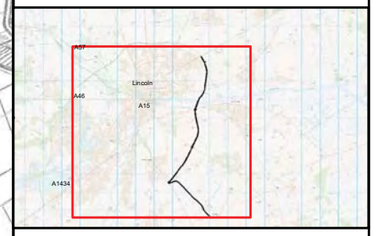
NOTES:

KEY

Magnitude of Changes PM_{10} Short Term Mean

Day of Exceedence

- <-4 Days
- -2 - -4 Days
- -1 - -2 Days
- -1 - 0 Days
- No Change
- 0 - 1 Days
- 1 - 2 Days
- 2 - 4 Days
- >4 Days
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



0 450 900 1,800 2,700 3,600 Meters

A	First Issue		LT	CCH	MD	12/11/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

Revision Description

Amendment Details:

Drawing 1st Approval

1st Approval by: CCH Date: 30/11/2012

Drawn Designed by: CCH

GIS Drawing Creation Created by: LT Date: 30/11/2012

Scale @ A3: 1:70 000

Lincolnshire County Council

Highways Alliance

TECHNICAL SERVICES PARTNERSHIP
WITHAM PARK HOUSE,
WATERSIDE SOUTH
LINCOLN LN5 7JN
Customer Service Centre: (01522) 782070

mouchel building great relationships

Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-014 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality
Changes of Short Term Mean PM_{10}
(Days of Exceedence)

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11.25 1030171-LEB-EIA-AIR-015

N

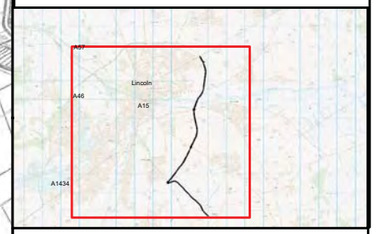
NOTES:

KEY

Short Term Mean PM_{10}

Impact Significance Classes

- Substantial Adverse
- Moderate Adverse
- Slight Adverse
- Negligible
- Slight Beneficial
- Moderate Beneficial
- Substantial Beneficial
- Modelled Network
- Lincoln City Council AQMAs
- Proposed Scheme Links



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mouchel building great relationships

Paper Size A3 Drawing Number: 11030171-LEB-EIA-AIR-015 Rev: A

Project: LINCOLN EASTERN BYPASS

Description: Air Quality

Short Term PM_{10} Impact Significance

0 450 900 1,800 2,700 3,600 Meters

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12 Cultural Heritage

12.1 Statutory and Planning Context

The following table provides further details on the policy context for the proposed scheme.

East Midlands Regional Plan

Table 12-1 East Midlands Regional Plan

Policy	Name	Aim
Policy 26	Protecting and Enhancing the Region's Natural and Cultural Heritage	Sustainable development should ensure the protection, appropriate management and enhancement of the Region's natural and cultural heritage
Policy 27	Regional Priorities for the Historic Environment	The historic environment should be understood, conserved and enhanced in recognition of its own intrinsic value and its contribution to the region's quality of life

Central Lincolnshire Core Strategy

Table 12-2 Central Lincolnshire Core Strategy

Policy	Name	Aim
Policy CL23	A quality environment	Development proposals will be required to contribute positively to environmental quality and local character, and not have an unacceptable effect on the area's natural or historic assets

North Kesteven District Council

Table 12-3 North Kesteven District Council

Policy	Name	Aim
Policy HE1	Sites Containing Nationally Important Archaeological Remains	Planning permission will be granted for proposals that will not adversely affect the archaeological value or interest, or the setting, of a Scheduled Ancient Monument or other site containing nationally important archaeological remains.
Policy HE2	Archaeological Assessment and Evaluation	Planning applications affecting a site where evidence suggests that archaeological remains are likely to be present must be accompanied by an assessment identifying the extent and importance of any remains,

Policy	Name	Aim
		together with any proposals for their protection or to mitigate adverse effects.
Policy HE3	Sites Containing Archaeological Remains	Planning permission will be granted for proposals that will affect locally or regionally important archaeological remains or their setting, provided that: 1. The remains will be preserved in situ, and will not be damaged; or 2. Where preservation in situ is not justified, the recording and/or excavation of the remains prior to and during development is assured.
Policy HE9	Historic Parks and Gardens	Planning permission will be granted for proposals, provided they will not adversely affect the character, appearance, or setting of any park or garden of special or local historic interest.

City Of Lincoln Local Plan

Table 12-4 City Of Lincoln Local Plan

Policy	Name	Aim
Policy 21	Archaeological Assessment	Where it is considered that development proposals may affect known or suspected archaeological remains, the local planning authority will require the results of an archaeological assessment to be submitted with any planning application. This will take the form of an initial desk top assessment followed where appropriate by more detailed evaluation, depending on the interest of the site.
Policy 22	Archaeological Constraints	The local planning authority will seek the preservation of important archaeological remains and their setting when considering development proposals. Where the preferred option of preservation “in situ” is not warranted, taking into account the merit of the remains and other material considerations, planning permission may be granted subject to satisfactory provision being made for excavation, recording and appropriate publication of results.
Policy 23	Scheduled Ancient	Development affecting a Scheduled Ancient Monument or its setting will not be permitted unless it

Policy	Name	Aim
	Monuments	can be demonstrated to the satisfaction of the Local Planning Authority that the Scheduled Ancient Monument and its setting will be preserved and not harmed.
Policy 24	Development affecting Listed Buildings	Planning permission will not be granted for developments which fail to preserve a Listed Building or its setting or any features of architectural or historic interest which it possesses.
Policy 31	Development affecting Buildings and Structures of Local Importance	Planning permission will not be granted for development which would harm the appearance, setting, or townscape contribution of a Building or Structure of Local Importance unless the Local Planning Authority is satisfied that there is an overriding economic, social or environmental case why such proposals should be permitted.
Policy 32	Views Important to Conservation Areas	Development which would obstruct or detract from significant views into, out of and within Conservation Areas will not be permitted.

West Lindsey Local Plan

Table 12-5 West Lindsey Local Plan

Policy	Name	Aim
Policy NBE7	Ancient Monuments, Sites and Remains of Archaeological Importance	Development will not be permitted which will detrimentally affect archaeological remains of national importance which are scheduled or otherwise, or their settings. In respect of remains which are not of national importance development will not be permitted which: i. Would adversely affect the archaeological remains near, on or under the site; or ii. Would adversely affect the character or setting of an archaeological site; or iii. Is located in an area where there is evidence of archaeological interest and the applicant has provided insufficient information needed to determine whether the proposals will adversely affect that interest; and iv. Does not indicate how the archaeological interest will be preserved or recorded if planning permission were to be granted; and v. Does not indicate what means would be employed to ensure the preservation or recording referred to in iv above, that is, condition, agreements, planning obligations or other means. If development will have an adverse effect on archaeological remains the Council will take into account any measures that are put forward to lessen that impact. In order of preference these are: a. Preservation of site in situ with or without access to remains, depending upon their vulnerability; b. Combination of preservation in situ and excavation according to the extent, nature and characteristics of the remains on site; c. Recording and removal of movable artefacts and recording of all other material prior to destruction and publicising the results.
Policy NBE8	Historic Parks and Gardens	Development will not be permitted which would harm the character, appearance, setting or features of: i. The historic parks and gardens within the list compiled by English Heritage; ii. ii. Other parks, garden and formally laid out areas identified by the Local Planning Authority as being worthy of protection.

12.2 Gazetteer of Cultural Heritage Assets

12.2.1 The following table lists the sites and monuments listed in the Lincolnshire County Historic Environment Record and the National Monuments Record as identified through historical references, archaeological investigation, cartographic

evidence and aerial photographs. The gazetteer includes all sites within the proposed development area and assets within a 200m radius of the proposed development area. It also includes designated sites (ie listed buildings, scheduled monuments and conservation areas) within 1km of the proposed scheme. The information gathered for the table has been obtained from the HER and NMR records and from the previous Environmental Statement prepared by Jacobs (2009).

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
1	Monk's Abbey	DLI840	1005028		SK 98900 71300	BUILDING	Scheduled monument	Ruins of nave of the church of Monks abbey, a cell of St Mary's Abbey, York. C13. Repaired and consolidated 1985 and 1990. Coursed squared rubble with ashlar dressings. Chamfered plinth. To south-west, a blocked elliptical headed doorway. Nothing remains but a section of wall approx. 10m long and 4m high,	High
2	Greetwell medieval village, cultivation and post medieval garden remains	DLI801	22748		TF0139171485	SETTLEMENT	Scheduled monument	The monument includes the earthworks remains of the village and the post- medieval gardens which partly overlay it, together with the surviving parts of the medieval fields which formerly surrounded the village. The medieval settlement of Greetwell was established before the late 11th century. The size of the village is thought to have remained fairly constant through most of the medieval period, at about 20-30 households, until the early 15th century when it had declined to ten.	High
3	The Manor House	DLI224	192783		SK 98721 66856	BUILDING	Listed Building, Grade II	Farmhouse. Early C19. Limestone ashlar, with a hipped	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								slate roof and white brick stacks. Quoins. 2 storey, 3 bay front with a blank centre flanked by single wooden canted bay windows with Doric pilasters and entablature.	
4	Dovecote at Hall Farmhouse	DLI280	192795		SK 99018 69878	BUILDING	Listed Building, Grade II	Dovecote. Early C19. Coursed limestone rubble with ashlar dressings and pantile hipped roof. Square plan. Brick plinth, flush ashlar quoins.	Medium
5	Sheepwash Grange	DLI282	192797		TF 00521 70015	BUILDING	Listed Building, Grade II	House. Early C18, with late C18 and C20 alterations. Coursed limestone rubble, with plain tile roofs, that to the main block hipped with a central stone stack, that to side wing half-hipped with lateral stack. Irregular quoins. 2 storey.	Medium
6	Glebe Farmhouse	DLI283	192798		TF 00012 69398	BUILDING	Listed Building, Grade II	Farmhouse. Mid C18 with C19 alterations. Coursed limestone rubble with Welsh slate roofs. 3 brick gable stacks. Quoins. L-plan. 2 storey.	Medium
7	The Lincolnshire Poacher Public House and attached boundary wall	DLI5245			SK 99836 72944	BUILDING	Listed Building, Grade II	Farmhouse, now a house. Late C18, raised mid C19, converted c1994. Yellow brick with hipped slate roof and 4 side wall stacks. Bracketed eaves cornice. 3 storeys, 3 bays.	Medium
8	Lincoln Prison Entrance	DLI5333			SK 99147 71978	BUILDING	Listed Building, Grade II	Prison gate lodge and 3 attached staff houses, now	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
	Buildings and Walls							officers' quarters and welfare department, garden and boundary walls.1869-72, with later alterations. By Frederick Peck of London. Brick with stone dressings and slate roofs. Crenellated Gothic Revival style.	
9	Lincoln Prison Cell Blocks	DLI5334			SK 99033 71950	BUILDING	Listed Building, Grade II	Prison cell blocks. 1869-72, with later alterations. By Frederick Peck of London. Brick with stone dressings and slate roofs with clerestories and coped gables.	Medium
10	Masonry Fragments 25 Metres East Of Chancel at Monks Abbey	DLI5434			SK 98932 71343	BUILDING	Listed Building, Grade II	Masonry fragments of buildings at Monks Abbey, a cell of St Mary's Abbey, York. C13. Rubble wall cores of irregular shape. Included for group value.	Medium
11	Harvest Moon Public House	DLI5507			SK 99947 73123	BUILDING	Listed Building, Grade II	Farmhouse, now a public house. Early C18, with late C20 additions. Coursed rubble, with brick dressings and pantile roof with 2 gable stacks. First floor band, brick coped gables, dentilled eaves. 2 storeys plus garrets, 3 bays.	Medium
12	Farm Buildings at the Manor House	DLI5544	192784		SK 98752 66872	BUILDING	Listed Building, Grade II	Farm buildings. Early C19. Coursed limestone ashlar with brick and ashlar dressings. Pantile hipped roofs, brick	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								quoins. Long barn range to north-west, with attached crew-yard with stable and cart sheds. Included for group value only.	
13	Branston Heath Farmhouse	DLI5584	192290		SK 99869 67123	BUILDING	Listed Building, Grade II	Farmhouse. Early C19. Coursed rubble with ashlar dressings. C20 tiled hipped roof with 2 end wall brick stacks. Two storey, 3 bay.	Medium
14	Gates and Walls at the Manor House	DLI6249	192785		SK 98650 66791	BUILDING	Listed Building, Grade II	Gates and walls. Early C19. White brick and coursed limestone rubble with ashlar dressings. A pair of wooden, segment topped gates, with square white brick gate piers topped with ashlar ball finials, either side curved brick walls to further single square gate piers topped with ball finials.	Medium
15	Church of All Saints	DLI8589	197205		TF 01354 71532	BUILDING	Listed Building, Grade II*	Parish church. C11, early C13, late C14, heavily restored in C19. Coursed limestone rubble. Plain tiled roofs with decorative red ridge tiles. West tower, nave with south porch, apsidal chancel. Early C13 west tower heavily restored in C19.	High
16	Greetwell Lodge and Wall with Gate Piers	DLI8590	197208		TF 01456 71703	BUILDING	Listed Building, Grade II	Lodge and wall with gate piers. 1856. Coursed limestone and ironstone rubble, limestone ashlar. Slate roofs with stone coped gables and finials. Single	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								quadripartite ridge stack and single projecting lateral stack.	
17	Monument to Thomas Winn, 6 Yards South-East of Apse of Church of All Saints	DLI8888	197207		TF 01370 71530	BUILDING	Listed Building, Grade II	Monument to Thomas Winn, died 1855. Limestone ashlar, wrought iron. Cruciform plan with lower cruciform slabs with shallow triangular profiles. Upper cruciform inscribed slab supported on shafts with scalloped, volute and waterleaf capitals. Large 4 petalled flower head at crossing.	Medium
18	Greetwell Hall	DLI8914	197204		TF 01358 71554	BUILDING	Listed Building, Grade II	Small country house. Late C17, early C18, early C19, mid C19. Coursed limestone and ironstone rubble, limestone and ironstone ashlar, stock brick, some red brick. Slate roofs with 3 ridge stacks, single gable stack and 2 projecting lateral stacks. 2 gabled dormers with glazing bar sashes on east side, single gabled dormer with sliding sash on south side. L plan. 2 storey and attic.	Medium
19	Stable Block At Greetwell Hall	DLI9067	197203		TF 01348 71582	BUILDING	Listed Building, Grade II	Stable block, now garages and outbuildings, c.1830. Limestone ashlar and coursed rubble. Pantile roofs. L plan. Single storey, 6 bay east front with 2 storey, 2 bay block set at right angle.	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
20	Monument To Thomas Straw, 4 Yards South East Of Apse Of Church Of All Saints	DLI9068	197206		TF 01366 71527	BUILDING	Listed Building, Grade II	Monument to Thomas Shaw died 1858. Limestone ashlar, wrought iron. Table tomb with moulded base, 4 clustered columns on each side with moulded bases and stiff leaf capitals, 3 cusped trefoil arches on each side with floral terminations to inner cusps and moulded, inscribed slab above. Ornate wrought iron railings around tomb with spiral decoration and finials.	Medium
21	Ashfield House	DLI4182	192297		TF 00509 67610	BUILDING	Listed Building, Grade II	Farmhouse. Early C19. Coursed rubble with ashlar dressings. Slate hipped roof with 2 white brick stacks. Two storey. Central doorway with ashlar porch, with semi-circular opening, moulded impost band topped with cornice.	Medium
22	Medieval pit and artefact scatter	MLI87496			TF 0076 7292	PIT, ARTEFACT SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A pit which contained medieval pottery was uncovered in 2004. Fieldwalking collected four sherds of medieval pottery and a fragment of medieval ridge tile in 2003. During metal detecting and fieldwalking of	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								this area for the Lincoln Eastern Bypass by Archaeological Project Services in November 2009, medieval pottery and ceramic building material was recovered.	
23	Mesolithic to Bronze Age lithic implement, Canwick	MLI92206			TF 00284 70102	ARTEFACT SCATTER		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A lithic implement dated from the Neolithic/Bronze Age was found in Field 38. It is unclear if this artefact is worked. Four worked flints were found in this parcel of land during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Project Services in November 2008. The artefacts dated from the Mesolithic to Bronze Age.	Negligible
24	Post medieval artefact scatter, off Hawthorn Road, Greetwell	MLI98246			TF 00836 72914	ARTEFACT SCATTER		Fieldwalking and metal detecting was undertaken by Archaeological Project Services along the route of the Lincoln Eastern Bypass in November 2008. A small quantity of post medieval pottery and ceramic building material was found at this site along with a metal find	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								an iron smithing slag. Signals of ferrous material were revealed during the metal detecting.	
25	Roman activity, Lincoln Eastern Bypass, Canwick	MLI98247			TF 00284 70116	FINDSPOT, DITCH, PIT		Fieldwalking was undertaken by Archaeological Project Services in November 2008 along the route of the Lincoln Eastern Bypass. Roman pottery was found at this location. Trial trenching was undertaken by Archaeological Project Services in 2008 along the proposed route of the Lincoln Eastern Bypass. A ditch containing a sherd of late Iron Age to Roman pottery and a pit containing Roman pottery and animal bone were found.	Low
26	Post medieval artefact scatter, Canwick	MLI98249			TF 00283 70097	ARTEFACT SCATTER		Fieldwalking and metal detecting was undertaken by Archaeological Project Services along the route of the Lincoln Eastern Bypass in November 2008. A small quantity of post medieval pottery was found at this site along with metal finds and iron smithing slag. Signals for ferrous and non-ferrous material were revealed during the metal detecting.	Negligible
27	Hoard of silver coins	MLI52825			TF 0090 7150	FINDSPOT		Hoard of more than 200 coins and tow silver rings, William I,	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								Henry ii (sic) and Stephen (1154 or 1189). Found in 1848 in making railway cutting at Greetwell Hill. Coins very clipped and Imperfectly die-struck.	
28	Two roman fibulae	MLI52827			TF 0100 7180	FINDSPOT		Two Roman fibulae from Greetwell,	Negligible
29	Ironstone mines	MLI52836	349677		TF 0070 7130	MINE, INDUSTRIAL SITE		Ironstone mines of possible Roman origin.	Low
30	Saxon finds, south of railway line (Field 18)	MLI60925			TF 002 705	ARTEFACT SCATTER		Two Saxon coins, five pins and a strap end were found by the Washingborough Group whilst fieldwalking. 153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Saxon sherds and lava querns attributed to the Saxon period were recovered. It is thought that there was a possible occupation of the decaying Roman farmstead in the Saxon period, but later medieval disturbance has obscured the evidence.	Negligible
31	One possible sherd of Saxon pottery south of the railway line (Field 18)	MLI81077			TF 003 705	FINDSPOT		A sherd of possibly Saxon pottery was found in a field (Field 18) south of the railway line in Canwick by the Washingborough Archaeology	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								Group on 24th October 1993. Finds of other periods, particularly Roman, have also been found in this field.	
32	Sherd of late Bronze Age/early Iron Age pottery (Field 18)	MLI81078			TF 003 705	FINDSPOT		A sherd of late Bronze Age/early Iron Age pottery was recovered from a field south of the railway line (Field 18) by the Washingborough Archaeology Group on 24th October 1993.	Negligible
33	Middle Bronze Age cinerary urn, near the water treatment works	MLI81335			TF 000 703	FINDSPOT		A middle Bronze Age cinerary urn was found near the site of the present water treatment works on the border with Lincoln city. It is in the City and County Museum. The accession number is the same as that assigned to the Bronze Age urn from Canwick Heath Farm. They may be the same find.	Negligible
34	Two bronze palstaves, from south of the Witham	MLI81336			TF 001 707	FINDSPOT		Two bronze palstaves with a shield ornament below the stop ridge were found south of the Witham, and north of the sewage works.	Negligible
35	Upper half of a beehive quern, west of Westfield Farm	MLI81390			SK 9939 6703	FINDSPOT		The upper part of a beehive quern was found west of Westfield Farm in 1960, and was donated to the City and County Museum by G.L.Nelstrop via J.T.Hayes.	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								The tenant farmer stated this to have been found at a depth of approximately 2 feet 6 inches during drainage works.	
36	Undated possible whetstone, Greetwell Quarry	MLI82667	326233		TF 005 725	FINDSPOT		During excavations prior to Phase 1 extension at Greetwell Quarry, an undated possible whetstone was recovered.	Negligible
37	Late Saxon potsherd, Greetwell Quarry	MLI82668			TF 006 727	FINDSPOT		During excavations prior to Phase 1 extension at Greetwell Quarry, a sherd of 10th century shell tempered pottery was recovered. Two sherds of sandstone-tempered pottery were found, which may be Early Saxon or Iron Age	Negligible
38	Beaker sherd, west of Bloxholm Lane, Bracebridge Heath	MLI86226			SK 9881 6639	FINDSPOT		A decorated sherd of Beaker pottery was recovered after topsoil stripping during construction of a water pipeline from Bracebridge Heath to Dunston. It is suggested that it dates from towards the end of the second millennium BC. The unabraded nature of the sherd suggests that it had not been lying long outside a feature.	Negligible
39	Roman tile fragments	MLI87507			TF 0077 7148	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Two fragments of	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								Roman tile were recovered.	
40	Roman pottery sherd	MLI87508			TF 0070 7137	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A single sherd of 3rd to 4th century pottery was recovered.	Negligible
41	Medieval pottery sherd	MLI87504			TF 0078 7147	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A single sherd of 12th to 13th century pottery was uncovered.	Negligible
42	Medieval pottery sherd	MLI87505			TF 0073 7146	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A single sherd of 11th to 12th century pottery was recovered.	Negligible
43	Neolithic to Bronze Age flint flakes	MLI87506			TF 0070 7137	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Two flint flakes dated between the Neolithic and Bronze Age were recovered.	Negligible
44	Neolithic to Bronze Age pottery	MLI87538			SK 9888 6668	FINDSPOT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Two sherds of pottery were recovered. One dated to the Bronze Age and the other between the Neolithic and	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								Bronze Age.	
45	Barded and tanged arrowhead findspot	MLI87575			SK 9887 6664	FINDSPOT		Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass. A single barbed and tanged arrowhead was recovered.	Negligible
46	Mesolithic blade and bladelet core, Canwick	MLI92112			SK 99470 67430	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A blade and bladelet core, dated to the Mesolithic, were found in field 9.	Negligible
47	Neolithic to early Bronze Age knife and ?core, Canwick	MLI92115			SK 98934 66891	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A plano-convex knife and a burnt piece of ?core were found in Field 2. These artefacts were dated to the Neolithic/early Bronze Age.	Negligible
48	Bronze Age thumbnail scraper, Canwick	MLI92118			SK 99593 67689	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A Beaker thumbnail scraper was found in Field 10.	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
49	Neolithic to early Bronze Age core, Canwick	MLI92119			SK 99238 67148	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A Neolithic to early Bronze Age flint core was found in Field 4.	Negligible
50	Mesolithic flint blades, Canwick	MLI92185			SK 99236 67186	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Two Mesolithic flint blades were found in field 4.	Negligible
51	Mesolithic flint blade, Canwick	MLI92186			SK 99493 67452	FINDSPOT		In March/April 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. One Mesolithic flint blade was found in field 9.	Negligible
52	Neolithic/early Bronze Age core, Canwick	MLI92188			SK 99257 67204	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. A Neolithic/early Bronze Age flint core was found in Field 4.	Negligible
53	Neolithic/early Bronze Age flint, Canwick	MLI92190			SK 99356 67381	FINDSPOT		In March/April 2006, fieldwalking of two proposed road routes to the south of	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								Lincoln was undertaken by Birmingham University Archaeological Unit. A Neolithic/early Bronze Age flint arrowhead blank, two serrated blades and a core were found in Field 9.	
54	Romano-British pottery, Canwick	MLI92124			SK 99007 66887	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Three sherds of Romano-British pottery and one sherd of Samian pottery found in Field 2.	Negligible
55	Medieval pottery, Canwick	MLI92195			SK 99421 67388	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Three sherds of 14th to 15th century pottery were found in Field 9.	Negligible
56	Medieval pottery, Canwick	MLI92196			SK 99217 67168	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Three sherds of 14th to 15th century pottery were found in Field 4. Three pieces of slag and five fragments of tile were	Negligible

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								also found in this field.	
57	Lithic implements, Canwick	MLI92202			SK 99360 67324	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Five Neolithic/Bronze Age lithics were found in Field 9. It is unknown if these lithics were worked.	Negligible
58	Post medieval ceramics, Canwick	MLI92203			SK 99588 67749	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Three post medieval pottery sherds were found in Field 10.	Negligible
59	Lithic implements, Canwick	MLI92205			SK 99910 68387	FINDSPOT		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Three lithic implements dated from the Neolithic/Bronze Age were found in Field 13. It is unclear if these artefacts are worked.	Negligible
60	Canwick Heath Farm				SK997236864	FARMSTEAD		Pair of two-storey cottages constructed in 1894, in red brick with a slate roof	Low
61	Halfway House				SK003036829	HOUSE		Much altered two-storey	Low

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					5			cottage of mid-19th century date, of coursed limestone with pantile roof	
62	Stone axe from a former part of Greetwell, now Lincoln	MLI97865			TF 0030 7110	FINDSPOT		A Neolithic stone axehead from a ploughed field in Greetwell.	Negligible
63	Worked flint, off Hawthorn Road, Greetwell	MLI98245	349701		TF 0076 7301	FINDSPOT		Fieldwalking was undertaken by Archaeological Project Services along the route of the Lincoln Eastern Bypass in November 2008. A Mesolithic or Neolithic flint was retrieved.	Negligible
64	Medieval pottery and ceramic building material, Canwick	MLI98252			TF 00307 69091	FINDSPOT		Medieval pottery and ceramic building material was found during fieldwalking along the route of the Eastern Bypass at this location by Archaeological Project Services in November 2008.	Negligible
65	Post medieval metal finds and slag, Canwick	MLI98253			TF 00327 69147	FINDSPOT		Metal finds and iron smithing slag dating from the post medieval to modern periods was found during fieldwalking and metal detecting along the route of the Eastern Bypass at this location by Archaeological Project Services in November 2008.	Negligible
66	Post medieval ceramic building	MLI98256			SK 99981 68425	FINDSPOT		Post medieval ceramic building material and iron smithing slag was found during fieldwalking at	Low

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	material and slag, Canwick							this site along the route of the Lincoln Eastern Bypass by Archaeological Project Services in November 2008.	
67	Roman pottery, Canwick	MLI98310			SK 99367 67309	FINDSPOT		Trial trenching was undertaken by Archaeological Project Services in 2008 along the proposed route of the Lincoln Eastern Bypass. In Parcel S, a pit or ditch terminus containing Roman pottery along with post medieval pottery and a post medieval iron hook was found.	Negligible
68	West Lindsey section of the Roman road from Lincoln to Burgh le Marsh	MLI50580			TF 0299 7475	ROAD, ROAD		This section of this road runs from Lincoln to Newball. From the east gate of Lincoln a main road was laid out apparently with the dual purpose of giving direct access to the Wolds district to the north-east, and then through east to south-east, to approach the northern shore of the Wash at a point almost opposite the terminus of Peddars Way at Holme on the Norfolk coast. Leaving Lincoln by the Wragby Road the alignment is followed rigidly, slightly east of north-east for 6 miles to Langworth, as a fine raised road, And parish boundaries	Low

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								accompany it. Just before the railway crossing is reached, the present road diverges slightly to the south and the alignment is marked by a hedgerow with clear traces of the agger, running behind the houses of the village to the point where a stream crosses it. Just beyond this the main road comes on to the line again as far as Bullington.	
69	Continuation of Mareham Lane, north of Sleaford, along the present A15	MLI86228	1032108		TF 0276 5534	ROAD		It is probable that the Mareham Lane road which has been traced to the east of Sleaford was also directly connected to Lincoln by a road which is generally represented by the present main road, the A15. It joins Ermine Street at Bracebridge Heath on the outskirts of Lincoln. During works along the A15 for the laying of a water pipeline, at (SK 9889 6638) the upper surface of what is believed to be one of the continuations of Mareham Lane from Sleaford was identified The eastern flanking ditch may also have been located.	Low
70	Continuation of	MLI60813	1061215		TF 0279 6142	ROAD		Mareham Lane continues north	Low

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	Mareham Lane, north of Sleaford, along Bloxholm Lane							after Sleaford, substantial traces of which have now been identified. The band of scattered metalling and the side ditches are visible on aerial photographs.	
71	Cropmark undated boundary ditch, Greetwell	MLI90966			TF 01084 71550	BOUNDARY DITCH		Cropmark undated boundary ditch, Greetwell. Seen on Google Maps (web site) aerial photograph layer.	Low
72	Linear cropmark boundary north of the River Witham	MLI50349			TF 0076 7115	BOUNDARY		Single linear cropmark boundary situated north of the River Witham.	Low
73	Linear cropmark boundary between Nettleham Glebe and Danby Hill	MLI50357			TF 0033 7403	MULTIPLE DITCH SYSTEM, BOUNDARY		Linear cropmark boundaries between Nettleham Glebe and Danby Hill. An excavation was carried out in 1979.	Medium
74	Greetwell medieval and post medieval settlement and cultivation	MLI50528	1047192		TF 0138 7164	FIELD SYSTEM, RIDGE AND FURROW, DESERTED SETTLEMENT		Medieval and post-medieval village which has shrunk from a population of 21 in 1086 to 8 in 1539. More than half the parish was enclosed in meadow and pasture before 1650. It is possible that some of the village may have been cleared at this time when the formal gardens south of the hall were laid out. There was a decline	Medium

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								From 8-9 families in the early eighteenth century to 3 in 1752.	
75	Cropmark Enclosures and Hut Circle	MLI52419			TF 0059 7366	HUT CIRCLE, TRACKWAY, BOUNDARY, RING DITCH, ENCLOSURE		Prehistoric enclosures, hut circle, trackway and linear boundaries, which have also been Interpreted as Roman.	Medium
76	Cropmark Long Barrow	MLI52460	1047195		TF 0069 7124	LONG BARROW		Long barrow located on the flood plain of the river Witham. It is aligned SW-NE, and the long axis traverses the contours. It is an enclosure of oval form, and forms part of a dispersed group of levelled round barrows. Length 41m, width 21m, htm 5m	Medium
77	Ironstone Mines, Lincoln	MLI52835	1047188		TF 0049 7169	MINE, QUARRY		Ironstone mines north and south of Greetwell Road. Possible roman or medieval origin. This mine was worked by the Mid Lincolnshire Ironstone Company and was opened in 1904.	Low
78	Possible Ploughed Mound	MLI52838			TF 0103 7254	MOUND		Possible ploughed mound.	Unknown
79	Barrow Cemetery	MLI52841			TF 0056 7115	ROUND BARROW, RING DITCH, BARROW CEMETERY		Barrow cemetery with 11 cropmark barrows some of which are visible on aerial photographs.	Medium

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80	Romano-British Site, Greetwell Quarry	MLI52842	1047187		TF 0070 7240	POST HOLE, PIT, DITCH, RING DITCH, BARROW, HUT CIRCLE, GULLY, FIELD SYSTEM, CORN DRYING OVEN, CEMETERY, GRAVE, COFFIN, INHUMATION, BURIAL, ANIMAL BURIAL, ARTEFACT SCATTER, FARMSTEAD		Romano-British settlement site. Geophysical survey and fieldwalking and subsequent trial trenching in 1997, centred on TF 007 724, recorded features dating to the mid-3rd to 4th centuries. Archaeological excavations at circa TF0063 7257 recorded features dating from the mid-2nd century to the 4th century, although the bulk of the dating evidence indicates mainly 3rd century occupation.	Medium
81	Romano-British Pottery, Greetwell	MLI54247			TF 0070 7215	ARTEFACT SCATTER		A sparse scatter of 11 roman sherds was recovered from this area. It is not clear whether these are outliers of the concentration to the north, or more probably Another concentration immediately to the south and beyond the limits of the survey. The Magnetic susceptibility readings in this area are particularly low so it is	Low

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								suggested that these sherds are probably not from underlying features.	
82	Romano-British artefact scatter south of the railway line (Field 18) (Possible site of high status Roman building)	MLI60463			TF 0023 7051	VILLA, WALL, FARMSTEAD, SETTLEMENT, ARTEFACT SCATTER		A large surface scatter was recovered by Washingborough Archaeology Group in 1994. 153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. The trial trenching revealed the remains of walls which were substantially robbed in the medieval period. Box flue tile indicated the presence of a hypocaust system. Two tiles were cut into a round shape which is probably part of columns or plasters indicating a high status building. Pottery dating to the Iron Age, 1st and 2nd century and 3rd and 4th century was also found as well as fragments of rotary querns and animal bones.	High
83	Prehistoric flints found south of the railway line (Field 18)	MLI60466			TF 0029 7051	FLINT SCATTER		Scattered flints were uncovered by Washingborough Archaeology Group. Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass. A single flake of Late Neolithic to early Bronze Age flint flake was	High

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								recovered.	
84	Medieval artefacts found south of the railway line (Field 18)	MLI60467			TF 0029 7051	STRUCTURE, WALL, ROBBER TRENCH, FLOOR, ARTEFACT SCATTER		53 medieval pottery fragments, often green lead glazed, and including handles and bases were Found scattered about the field during fieldwalking by the Washingborough Archaeology Group on 24/10/1993. 153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Roman walls were uncovered. A wattle and daub wall was also discovered. Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass. An artefact scatter of medieval pottery was collected including 31 sherds of Lincoln glazed wares dating to the 13th to 15th centuries; 18 sherds of Potterhanworth ware (12th to 15th centuries) and small amounts of Toynton ware, Humberware and a single fragment of a Siegburg type drinking jug. During monitoring of trial pits along the proposed route of the Lincoln Eastern Bypass in August to December 2008, Archaeological Project	High

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								Services found a stone surface and seven sherds of medieval ceramic tile.	
85	Post medieval pottery found south of the railway line (Field 18)	MLI60468			TF 0042 7052	ARTEFACT SCATTER		Post medieval and modern pottery found, mostly near the gateway into the field, during fieldwalking by Washingborough Archaeology Group on 24/10/1993. 44 post medieval coins, musket balls and thimbles were recovered during fieldwalking.	Low
86	Part of a post medieval field system	MLI60790			SK 986 664	FIELD SYSTEM, FIELD BOUNDARY		Eight hedgerows were investigated as part of an application for removal. Seven of these hedgerows were found to be an integral part of a field system predating the enclosure acts.	Negligible
87	Original site of Sheepwash Grange	MLI60929			TF 0045 7061	GRANGE		William Martel gave Kirkstead Abbey a house in the fields of Canwick next to a sheepwash c.1184. Land belonging to Sheepwash Grange came from at least six different donors, and covered an area of about 250 acres. The property retained its coherence until modern times, and the site of the grange is indicated in the 1787 Enclosure map. The grange was surrounded by a	High

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								circuit of walls and ditches, the eastern side of which formed the boundary with Washingborough parish. The northern boundary was the middle of the Witham, and the southern part was probably along the Sheepwash or Washingborough Road. However, some of the land which was part of the grange was dispersed. After the Dissolution the grange passed to the Duke of Suffolk. The hearth tax assessment and inventories of 1673 and 1718 suggest that the house at Sheepwash was substantial. The Diocesan Return of 1563 recorded 1 family living at Sheepwash. A geophysical survey was undertaken on land adjacent to the proposed route of the Lincoln Eastern Bypass. This revealed ditches and pits which are thought to correspond to Sheepwash Grange.	
88	Barrow cemetery, south of the Witham, Canwick	MLI60930			TF 0020 7070	RING DITCH, ROUND BARROW, MOUND,		Barrow cemetery noted as cropmarks on aerial photographs and identified during walkover in 1997.	Medium

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						BARROW CEMETERY		Bronze Age pottery discovered on top of southernmost barrow. Two curvilinear ditches excavated as part of Lincoln Eastern Bypass scheme in 2004 containing flints dating to the late Mesolithic/ early Neolithic period..	
89	Possible ring ditch south of Bunkers Hill	MLI70178	1047186	3484	TF 0044 7276	OVAL ENCLOSURE, RING DITCH		Ring ditch identified through geophysical survey in 1997.	Low
90	Possible ring ditch south of Bunkers Hill	MLI70179			TF 0043 7268	RING DITCH		Ring ditch identified through geophysical survey in 1997.	Low
91	Possible medieval wharf on the Witham at Calscroft	MLI81301			TF 006 707	WHARF		Wharf called Calscroft adjoining Sheepwash Grange identified through Hundred Rolls. A dry bed watercourse running to the Witham may suggest the location for the wharf.	Medium
92	The Foreman's House and Workers' Cottages				SK9878366882	HOUSE		Two-storey house and pair of two-storey cottages constructed to provide accommodation for labourers at The Manor House in the early 20th century.	Low
93	Roman pottery from south of the Witham (Field C1)	MLI81344			TF 003 707	ARTEFACT SCATTER		Six sherds of Roman pottery were recovered during fieldwalking by the Washingborough Archaeology Group in 1998 in a field adjacent to the south side of the	Negligible

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								Witham	
94	Medieval-post medieval pottery scatter, south of the Witham (Field C1)	MLI81345			TF 003 707	ARTEFACT SCATTER, DITCH		Large amount of medieval and post medieval pottery sherds were discovered in 1998. Three ditches dating to the post medieval period were uncovered in 2004. These contained post-medieval finds.	Negligible
95	Worked flint from south of the Witham (Field C1)	MLI81343			TF 003 707	FLINT SCATTER, FLINT SCATTER		Worked flints were recovered in 1998. Many worked flints were recovered in 2004 dating to the late Mesolithic and Bronze Age during evaluation trenching and monitoring of trial pits.	Medium
96	Undated cropmark enclosure, south of Canwick Heath Farm, Canwick	MLI81348			SK 9998 6805	ENCLOSURE, FIELD SYSTEM?		Cropmarks were identified on aerial photographs. These were confirmed by linear responses from a geophysical survey undertaken in 2006. These probably form part of a field system	Medium
97	Medieval cropmark boundary, south of Heighington Road	MLI81349	1065906		TF 0083 6950	BOUNDARY		A probable medieval cropmark boundary has been noted on aerial photographs. It runs east-west from north of Highfield House to the parish boundary, and then runs north along the parish boundary to Heighington Road.	Medium
98	Bracebridge Heath airfield	MLI81420	1065908		SK 986 671	AIRFIELD, AIRCRAFT		Bracebridge Heath airfield was established in 1916 for the final	Low

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	and associated buildings					HANGAR		assembly and testing of aircraft from the centres of production at Robeys and Clayton and Shuttleworth. During the Second World War the site was used as a factory by A.V.Roe who specialised in aircraft repair. In the 1950s the site was used for both restoration of historic aircraft and cutting edge research.	
99	Manor Farm		1510959		SK9998369893	FARMHOUSE, FARM		Manor Farm is a two-storey T-plan house, of early 19th century date.	Low
100	Probable Romano-British activity, Bunkers Hill	MLI81691			TF 0047 7272	DITCH, POST HOLE, STRUCTURE, ARTEFACT SCATTER, Track, PIT, PIT		Roman tile fragments recovered in 1998. Trial trenching in 2000 revealed ditches and possible post hole probably of Romano-British date. Excavations in 2001 revealed a track and pottery dating to 2nd and 3rd centuries.	Low
101	Scatter of late Neolithic/early Bronze Age worked flint, Bunkers Hill	MLI81694			TF 0043 7275	ARTEFACT SCATTER		Fieldwalking in 2000 revealed a core, a scraper and a flake of poor quality chert. During trial trenching, a scatter of late Neolithic/early Bronze Age worked flints were recovered.	Negligible
102	Ring ditch, Greetwell Quarry	MLI82640			TF 0059 7254	RING DITCH, ROUND BARROW, PIT		Ring ditch (remains of a round barrow) excavated in 2001 and containing animal bone and possible Beaker pottery dating	Negligible

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								to late third century BC/early Bronze Age. A pit was uncovered underlying the ring ditch and was dated to the Iron Age.	
103	Scatter of worked flint, Greetwell Quarry	MLI82666			TF 0061 7261	ARTEFACT SCATTER		During excavations for Phase 1 of extensions at Greetwell Quarry in 2001, a scatter of blades, flakes and cores were recovered, as well as a flint tool. Presumed these flints are of Neolithic to Bronze Age date, although there is a possibility that some at least may date to the Mesolithic.	Negligible
104	Undated features, Greetwell Quarry	MLI82106			TF 0068 7245	DITCH, ENCLOSURE, PIT, GULLY, PIT, PIT ALIGNMENT, BOUNDARY, OVAL ENCLOSURE, DRAIN		Geophysical survey in 1996 identified pits. Trial trenching in 1997 revealed further undated pits and ditches containing animal bone. Further geophysical survey in 1999 identified linear features and pits. 153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A stone lined pit, drain and a limestone surface were uncovered at TF0082 7273.	Low
105	Triple-ditch system south-west of Greetwell North	MLI50348		953, 3486 to 3489	TF 0051 7256	DITCH, DITCH, DITCH, POST HOLE, PIT, DITCH, Track,		Triple ditch feature dating to late Iron Age/ Roman period.	Medium

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	Farm					CURVILINEAR ENCLOSURE, POST HOLE, BOUNDARY, MULTIPLE DITCH SYSTEM			
106	Roman activity, Lincoln Eastern Bypass (Northeast Access)	MLI86142		5584 to 5594, 5605	TF 00364 71418	DITCH, FIELD BOUNDARY, PIT, WALL, FARMSTEAD		Geophysical survey in 2004 revealed possible drainage ditches and possible enclosures (both undated). Trial excavation following the geophysical survey in 2004 revealed that many of these features including the possible building were of early Roman date (late 1st-mid 2nd century AD) and formed part of a possible agricultural complex. Finds included pits containing animal bone and high status finds such as pottery and jewellery.	Medium
107	Five Neolithic flints from west of Bloxholm Lane, Bracebridge Heath	MLI86223			SK 9867 6639	FLINT SCATTER		Five Neolithic flints were recovered from Field 2 during monitoring of the construction of a water pipeline from Bracebridge Heath to Dunston. These included flakes and a possible blade fragment. The finds were recovered from the plough soil, or from the surface of the subsoil, and not from any	Low

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								features.	
108	Romano-British pottery from west of Bloxholm Lane, Bracebridge Heath	MLI86224			SK 9879 6639	ARTEFACT SCATTER		Seventeen sherds of Romano-British pottery, including second century sherds, were recovered during works along the construction route of a water pipeline from Bracebridge Heath to Dunston	Low
109	Undated features, west of Bloxholm Lane, Bracebridge Heath	MLI86225			SK 9866 6638	DITCH		Undated features, some of which are possibly ditches, were identified during excavations (Area C-F) during construction of a water pipeline from Bracebridge Heath to Dunston.	Low
110	Undated gully and ditch	MLI87494			TF 0066 7312	GULLY, DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. An undated gully and ditch were uncovered.	Low
111	Undated ditch and gully	MLI87497			TF 0076 7292	DITCH, GULLY		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. An undated ditch and gully were uncovered.	Low
112	Post medieval to early modern ditch	MLI87498			TF 0085 7255	DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A post-medieval to early modern ditch was uncovered. It is shown on the 1889-90 OS map.	Low

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113	Late Iron Age Settlement	MLI87499			TF 0085 7209	FARMSTEAD, DITCH, WALL, IRON WORKING SITE, GULLY, PIT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Ditches, gullies and pits were uncovered. They were dated to the Late Iron Age by the pottery that they contained. One ditch also contained limestone blocks in a line which may have been part of a wall. Charred grains, fired clay and large amounts of animal bone suggested a occupation site.	High
114	Late Mesolithic to early Bronze Age lithic scatter	MLI87500			TF 0085 7209	LITHIC SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Flints dating from between the late Mesolithic to the early Bronze Age were recovered. They include 3 late Mesolithic - early Neolithic flakes, 1 late Neolithic to early Bronze Age flake, 2 chips and a chunk.	Medium
115	Post medieval to modern ditches	MLI87501			TF 0074 7146	DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Two ditches containing post medieval to modern pottery were uncovered.	Low
116	Post medieval ditch	MLI87502			TF 0062 7123	DITCH		153 trial trenches were excavated on the proposed	Low

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								route of the Lincoln Eastern Bypass. A ditch was uncovered. It had gone by the surveying of the 1885 OS map.	
117	Undated pits, ditches and postholes	MLI87503			TF 0056 7121	DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. 2 undated pits, 3 undated ditches and an undated posthole was uncovered. A further 2 postholes were uncovered and whilst they are undated, it is possible that they are of a prehistoric date.	Low
118	Undated ditch	MLI87510			TF 0030 7070	DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. An undated ditch was uncovered.	Low
119	Medieval to post medieval limekilns, Canwick	MLI87511			TF 0023 7041	LIME KILN, PIT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A pit containing burnt limestone was uncovered; this was interpreted as a lime kiln. A gully, which appeared to have been a flue, was also uncovered. A circular anomaly was revealed by a geophysical survey in 2006.	Low
120	Undated pit,	MLI87512			TF 0014 7026	BUILDING?,		153 trial trenches were	Low

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	ditches, gullies and postholes, Canwick					PIT, DITCH, GULLY, POST HOLE		excavated on the proposed route of the Lincoln Eastern Bypass. A series of undated pits, ditches and post holes were uncovered. Some containing animal bone. A geophysical survey undertaken in 2006 revealed a possible building.	
121	Iron Age ring ditch	MLI87513			TF 0005 7016	RING DITCH		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A curvilinear gully interpreted as a ring ditch was uncovered.	Medium
122	Romano-British artefact scatter	MLI87514			TF 0000 7006	ARTEFACT SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A scatter of 11 fragments of Romano-British tile was recovered.	Low
123	Post medieval to modern quarry and lime kilns	MLI87515			SK 9996 7001	QUARRY, LIME KILN		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A post medieval to modern quarry and limekiln were uncovered.	Low
124	Undated ditches and pits	MLI87516			SK 9991 6994	DITCH, PIT		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. 5 undated ditches and 9 undated pits were uncovered.	Low

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125	Post medieval to modern quarry	MLI87517			SK 9978 6974	QUARRY		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. A post medieval to early modern quarry was uncovered.	Low
126	Medieval pottery and tile	MLI87518			SK 9978 6974	ARTEFACT SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. An artefact scatter of medieval pottery and tile was recovered. Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass. 11 sherds of medieval pottery and 2 fragments of medieval tile were recovered from this field.	Low
127	Undated gullies and pit	MLI87535			SK 9894 6687	PIT, GULLY		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Three undated gullies and an undated pit were revealed.	Low
128	Medieval pit, ditches and artefacts, Bracebridge Heath	MLI87536			SK 9895 6675	PIT, DITCH, ARTEFACT SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass in 2004. A pit and 2 ditches which may be part of a field system, all which contained medieval pottery dating to the 13th to 15th	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								centuries, were uncovered. Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass in 2003. 16 sherds of medieval pottery were recovered from this field. Medieval pottery and ceramic building material was recovered during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Project Services in November 2008. In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Thirteen 13th to 14th century, one 14th century and two medieval pottery sherds, found in Field 2.	
129	Romano-British pit, gully and artefacts, Bracebridge Heath	MLI87537			SK 9894 6674	PIT, GULLY, ARTEFACT SCATTER		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass in 2004. Pit containing Roman tile and a gully containing sherds of Roman pottery were revealed. Further sherds of Roman pottery and sherds of Samian pottery were	Low

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								unstratified. Fieldwalking was undertaken on the proposed route of the Lincoln Eastern Bypass in 2008. Revealed 3rd century pottery. Trial trenching was undertaken by Archaeological project Services in 2008 along the proposed route of the Lincoln Eastern Bypass. A ditch containing a sherd of Roman pottery was found.	
130	Undated gullies	MLI87539			SK 9887 6665	GULLY		153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass. Two undated gullies were uncovered.	Low
131	Probable modern earthwork gun emplacement, Lincoln	MLI88617			SK 99761 71976	GUN EMPLACEMENT		Probable modern earthwork gun emplacement seen on the National Mapping Programme.	Low
132	Medieval to post medieval field system, Bunkers Hill/Greetwell Quarry	MLI54248	1053386	580	TF 0046 7260	FIELD SYSTEM, DITCH, FIELD BOUNDARY, RIDGE AND FURROW, ARTEFACT SCATTER		In 1994 possible boundary ditch and ridge and furrow were identified. In 1996 medieval and post-medieval pottery were recovered during fieldwalking. Geophysical survey in the same year identified ridge and furrow. Trial trenching in 1997 and 2000 revealed medieval and	Low

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								post medieval pottery and ridge and furrow. Further evidence for ridge and furrow were recorded in 2001.	
133	Ironstone quarries east of Lincoln	MLI89950		6351	TF 00051 72218	QUARRY, IRONSTONE PIT, TRAMWAY		Ironstone quarries to the east of Lincoln, with associated tramways for carriage of goods. The quarries are depicted on the Ordnance Survey County Series map of 1905. This mine was worked by the Mid Lincolnshire Ironstone Company. It was opened in 1875 and closed by 1923.	Low
134	Undated features, Greetwell Quarry	MLI82106			TF 0068 7245	BOUNDARY, DITCH, ENCLOSURE, PIT		Geophysical survey in 1996 detected pit features. During trial trenching in 1997, several undated features were recorded, consisting of ditches, pits, a possible bank, a gully and the curvilinear ditch of a possible enclosure. The gully resembled a drip-gully, but no associated finds or features were recorded. The possible enclosure ditch contained shell, animal bone and limestone fragments. Geophysical survey in 1999, centred on circa TF0060 7258, detected several features including linear feature ran	Low

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								northeast/ south-west; to the north of this feature the land appeared more disturbed, while land to the south was quieter. A curvilinear anomaly was thought to be a ditch belonging to an oval enclosure. Hollows and pit forms were also detected. Small pits or large postholes were detected in Area 2. 153 trial trenches were excavated on the proposed route of the Lincoln Eastern Bypass in 2004. A stone lined pit, drain had a limestone surface were uncovered at TF0082 7273.	
135	Cropmark possible round barrow, Canwick	MLI90979			TF 00165 68450	ROUND BARROW, RING DITCH		Cropmark possible round barrow, Canwick. Seen on Google Maps (web site) aerial photograph layer.	Low
136	Mesolithic flint scatter, Canwick	MLI92110			SK 98984 66855	LITHIC SCATTER		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Eleven blades were found in field 2. These artefacts were dated to the Mesolithic.	Negligible
137	Prehistoric artefact scatter, Canwick	MLI92197			SK 98980 66818	ARTEFACT SCATTER		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								undertaken by Birmingham University Archaeological Unit. Seventeen Neolithic/Bronze Age lithics were found in Field 2. Four worked flints, one dating from the Mesolithic period, the other three dating from the prehistoric period, and a sherd of Bronze Age pottery were found during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Projects Services in November 2008. Trial trenching was undertaken in 2008 by Archaeological Project Services along the proposed route of the Lincoln Eastern Bypass. A ditch containing a possible Neolithic flint flake was found in Parcel W.	
138	Post medieval artefact scatter, Canwick	MLI92199			SK 99000 66852	ARTEFACT SCATTER		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Twelve fragments of post medieval tile and 76 fragments of undated tile were found in Field 2. During geophysical survey in 2006 of Route B of	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								the proposed Lincoln Eastern Bypass a large amount of undated pottery sherds were visible on the ground surface. Post medieval pottery, ceramic building material and glass was recovered during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Project Services in November 2008.	
139	Lithic scatter, Canwick	MLI92200			SK 99226 67202	LITHIC SCATTER		In 2006, fieldwalking of two proposed road routes to the south of Lincoln was undertaken by Birmingham University Archaeological Unit. Twenty two Neolithic/Bronze Age lithics were found in Field 4. It is unknown if these lithics were worked.	Negligible
140	Undated pits and possible enclosure, Canwick	MLI92218			SK 99398 67336	ENCLOSURE?, FIELD BOUNDARY?, PIT		A magnetometry survey was undertaken in 2006 along the proposed route of the Lincoln Eastern Bypass. A series of ditch type responses were identified and may represent a large enclosure or possibly field boundaries. Geophysical survey was undertaken along the proposed Lincoln Eastern Bypass in November 2008 by Stratascan.	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								A possible enclosure was revealed within land parcel S. Trail trenching was undertaken by Archaeological Project Services in 2008 along the proposed route of the Lincoln eastern Bypass in 2009. Four undated pits were found in Parcel s.	
141	Undated features, Canwick	MLI92219			SK 99105 67017	PIT, DITCH?, ENCLOSURE?, FIELD BOUNDARY?		A magnetometry survey was undertaken in 2006 along the proposed route of the Lincoln Eastern Bypass (Route A). A series of linear anomalies identified during the survey are of possible archaeological interest and may represent former field divisions, ditches, a large enclosure or field boundaries. Another complex of ditches was identified during this survey located around a possible kiln structure. Trial trenching was undertaken by Archaeological Project Services in 2008 along the proposed route of the Lincoln Eastern Bypass. An undated oval feature containing burnt animal bone was found.	Low
142	Undated ?curvilinear	MLI92220			SK 98970 66773	DITCH?, ENCLOSURE?		A magnetometry survey was undertaken in 2006 along the	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
	ditch or enclosure, Canwick							proposed route of the Lincoln Eastern Bypass (Route A). A weak curvilinear response was identified at this location. It was approximately 60m in diameter and may be archaeological in origin.	
143	Undated ?ditches and ?enclosure, Canwick	MLI92222			SK 98849 66556	ENCLOSURE?, DITCH?, PIT?		A magnetometry survey was undertaken in 2006 along the proposed route of the Lincoln Eastern Bypass (Route A). A sub circular anomaly was identified and ditch like responses to the southwest of the sub circular feature were revealed, interpreted as evidence of a possible enclosure. Pit responses also appeared to be associated with the ditches.	Low
144	Possible enclosure or field system, Canwick	MLI92225			TF 00278 70084	PIT, DITCH?, ENCLOSURE?, FIELD SYSTEM?, POST HOLE		A geophysical survey was undertaken in 2006 along the proposed route of the Lincoln Eastern Bypass (Route B). Ditch type responses were identified which ran in north to south and east to west alignments. These results may represent several undated enclosures or former field systems. Geophysical survey was undertaken by Stratascan	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								in November 2008 along the proposed Lincoln Eastern Bypass. Parcel J revealed evidence of ditches, probably former field boundaries and enclosures, and pits. Trial trenching was undertaken by Archaeological Project Services Ltd in 2008 along the proposed route of the Lincoln Eastern Bypass. Undated post holes containing animal remains and a pit containing a partial cattle skeleton were found.	
145	Undated ?enclosure or field divisions, Canwick	MLI92226			TF 00341 69575	ENCLOSURE?, DITCH?, FIELD SYSTEM?		A geophysical survey was undertaken in 2006 along the proposed route of the Lincoln Eastern Bypass (Route B). Ditch type responses were identified which were interpreted as possible evidence of an enclosure or former field divisions. The possible features are undated.	Low
146	Possible kiln, Canwick	MLI92227			SK 99145 67022	KILN?		During geophysical survey in 2006 of Route B of the proposed Lincoln Eastern Bypass, a strong magnetic response was identified at this location. This type of anomaly is usually associated with highly burnt material which possibly	Low

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								indicates a kiln or other industrial structure may have existed on this site. A large amount of pottery was also identified on the ground surface	
147	St John's Heath park, Bracebridge Heath	MLI92368			SK 98736 66794	PARK		A park recorded on the first edition c.1880 and c.1905 Ordnance Survey maps at St John's Heath, Bracebridge Heath.	Low
148	Monks Tower park, Abbey, Lincoln	MLI92394			SK 99641 71730	PARK		A park is recorded on the first edition c.1880 Ordnance Survey map and on the and c.1905 map at Monk's Park, Lincoln.	Negligible
149	Monks Abbey Mine, Lincoln	MLI97796			SK 9925 7172	IRONSTONE MINE, MINE		This mine was worked by the Mid Lincolnshire Ironstone Company. It was opened in 1878 and closed by 1896.	Negligible
150	Greetwell Mine, Lincoln	MLI97797		6352	SK 9944 7209	IRONSTONE MINE, MINE		This mine was worked by the Mid Lincolnshire Ironstone Company and was opened in 1879. By 1909 the mine had been worked out. The quarry associated with the mine is shown on the 1920 Ordnance Survey map as 'Quarry (Ironstone)'. This was worked until 1933.	Negligible
151	East Drift Mine, Lincoln	MLI97801			TF 0035 7221	IRONSTONE MINE, MINE		This mine was worked by the Mid Lincolnshire Ironstone Company and was opened in	Negligible

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								1904.	
152	No 2 Mine, Lincoln	MLI97802			TF 0048 7187	IRONSTONE MINE, MINE		This mine was worked by the Mid Lincolnshire Ironstone Company and was opened in 1904.	Negligible
153	Roman artefact scatter, Canwick	MLI98254			SK 99908 68245	ARTEFACT SCATTER		Roman pottery and ceramic building material was recovered at this site during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Project Services in November 2008.	Negligible
154	Medieval activity, Canwick	MLI98248			TF 00274 70151	ARTEFACT SCATTER, DITCH, PIT, POST HOLE		Fieldwalking was undertaken by along the route of the Lincoln Eastern Bypass in 2008. A small quantity of medieval pottery and ceramic building material was found at this site. Trial trenching was undertaken along the route of the Lincoln Eastern Bypass in 2008. In Parcel J, a ditch which contained a sherd of 13th to 15th century pottery, ceramic building material and animal bone was found. A pit or ditch terminus containing 13th to 15th roof tile and animal bone, a ditch containing 14th to 15th tile and pottery, animal bone and 9th to 10th century pottery, a pit containing medieval	Low

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								pottery, animal bone and mid 9th to 10th century pottery and a post hole containing a 13th century iron blade, a rectangular iron bar and animal remains was also found.	
155	Roman pottery and ceramic building material, Canwick	MLI98251			TF 00367 69138	ARTEFACT SCATTER		Roman pottery and ceramic building material was found during fieldwalking along the route of the Eastern Bypass at this location by in 2008.	Negligible
156	Prehistoric flints and pottery, Canwick	MLI98250			TF 00362 69193	ARTEFACT SCATTER		Three worked flints dating from the Mesolithic, Neolithic and the prehistoric period respectively, and prehistoric pottery was found during fieldwalking along the route of the Eastern Bypass at this location by Archaeological Project Services in 2008.	Negligible
157	Possible ditches and pits, Canwick	MLI98262			TF 00360 69168	DITCH?, PIT?		Geophysical survey was undertaken by Startascan in 2008 along the proposed Lincoln Eastern Bypass. Within parcel L, evidence of ditches and pits was revealed.	Unknown
158	Medieval pottery and ceramic building material, Canwick	MLI98255			Not recorded	ARTEFACT SCATTER		Medieval pottery and ceramic building material was recovered at this site during fieldwalking along the route of the Lincoln Eastern Bypass by Archaeological Project Services	Negligible

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								in 2008.	
159	Possible ditches, Canwick	MLI98263			SK 99798 68045	DITCH?		Geophysical survey was undertaken by Stratascan in 2008 along the proposed Lincoln Eastern Bypass. In land parcels Q and R, possible ditches were identified.	Unknown
160	Possible linear feature, Canwick	MLI98264			TF 00047 68517	LINEAR FEATURE?		Geophysical survey was undertaken by Stratascan in 2008 along the proposed Lincoln Eastern Bypass. A possible linear feature was revealed within land parcel O.	Unknown
161	Early medieval activity, Canwick	MLI98306			TF 00282 70102	PIT, DITCH		Trial trenching was undertaken in 2008 along the proposed route of Lincoln Eastern Bypass. A pit containing a sherd of ceramic building material, animal bone, a sherd of late 9th to 10th century pottery and a copper alloy pin head, another pit containing animal bone, early to mid 9th century and mid 9th to 10th century pottery, a post hole, a linear feature and ditches all containing 9th to 10th century pottery and a ditch containing 9th to 10th century pottery, animal bone, fragments of lava quern and a broken iron blade was found. A ditch and a pit	Medium

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								containing mostly medieval artefacts but also 9th to 10th century pottery was also found.	
162	Iron Age activity, Canwick	MLI98307			TF 00294 69162	DITCH, LINEAR FEATURE		Trial trenching was undertaken in 2008 along the proposed route of the Lincoln Eastern Bypass. In Parcel L, a ditch containing animal bone and a sherd of Iron Age pottery and a linear feature containing an Iron Age coin, pottery, early to late Roman pottery and animal bone.	Low
163	Iron Age pit and finds, Canwick	MLI98308			SK 99405 67390	PIT		Trial trenching was undertaken in 2008 along the proposed route of the Lincoln Eastern Bypass. In Parcel S, a pit containing a sherd of Iron Age pottery, animal bone and an iron nail was found.	Low
164	Post medieval ditch and pit, Canwick	MLI98309			SK 99393 67324	DITCH, PIT		Trial trenching was undertaken in 2008 along the proposed route of the Lincoln Eastern Bypass. In Parcel S, a pit or ditch terminus containing sherds of post medieval pottery, a post medieval iron hook and Roman pottery and a ditch with mid 18th to 19th century pottery was found.	Low
165	Witham Navigation		1343043		TF18815 60050	RIVER		The navigable Witham runs from Lincoln to the Wash below	Medium

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								Boston, for a distance of 36 1/8 miles. It owes its waterway status to the Roman military station and colony at Lincoln. Their engineers improved the drainage of the Witham and made it navigable.	
166	Spalding and Lincoln Railway		1365440	6525, 6526, 6529	TF 24 23	RAILWAY		The Spalding and Lincoln Railway was built as part of a joint GNR and GER scheme to transport freight between Cambridgeshire and Yorkshire, as well as supporting local needs. For this reason, at both Lincoln and Sleaford the line avoided the stations, being connected by spurs. It opened in 1882 and closed in 1964.	Low
167	Sheffield and Lincolnshire Extension Railway		**1365523**	6527	TF 04010 79717	RAILWAY		The Sheffield and Lincolnshire Extension Railway was promoted by the Sheffield and Lincoln Junction Railway to provide a link between Sheffield and Grimsby via Lincoln. Agreement was reached between the S&LJRC and the Great Grimsby and Sheffield Railway to join their Market Rasen Branch line at Market Rasen, and opened between Lincoln and Market Rasen in December 1848.	Low

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168	East Lincolnshire Railway		**1365390**		TF 21799 56343	RAILWAY		The East Lincolnshire Railway was built by the Great Northern Railway Company to compete with London – Northern England routes via the Midlands. The Louth and New Holland section opened in March 1848, Louth to Firsby in September, Firsby to Boston in October, Peterborough to Boston and Lincoln in October. The Lincoln – Gainsborough section was completed in 1849 and the Peterborough - London section in 1850. The entire line closed between 1964 and 1970, except for goods North of Louth.	Low
169	Royal Observer Corps Monitoring Post		1412007		TF 21799 56343	FORMER BUILDING		The site of a Royal Observer Corps monitoring post. The site was built as part of an extensive network of posts designed to confirm and report hostile aircraft and nuclear attacks on the United Kingdom. At the time of the Defence of Britain survey the site was found to have been destroyed. It was opened during October 1962 and closed in October 1968. It was located underground on the east side of	Low

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								a field boundary on the south side of Heighington Road.	
170	Prehistoric Enclosure		1047193		TF 0062 7219	ENCLOSURE		Two sides of a possible Prehistoric ditch defined enclosure were visible as cropmarks and mapped from good quality air photographs. The enclosure has a possible breadth of 40m and is centred at TF 0062 7219.	Low
171	Trackway		1047189		TF 0076 7112	TRACKWAY		Potential trackway of unknown date seen as cropmarks.	Low
172	Ridge and furrow	MLI52834			TF0129872158	RIDGE AND FURROW		Ridge and furrow ridge and furrow cropmarks overlying enclosures and linear features overlain by ridge and furrow.	Low
173	Enclosures and linear features	MLI52833			TF0129972154	LINEAR FEATURE?		This site is part of a larger area which was evaluated by geophysical survey and fieldwalking in advance of quarrying. A sparse scatter of 11 Roman sherds was recovered from this area.	Low
174	Possible Roman burials		349680	5602, 5601	TF0020072100	BURIAL		Roman burials are said to have been found in the ironstone mines at Greetwell.	Negligible
175	Late Roman Burials, Lincoln Eastern Bypass (Northeast	MLI89446		5597,	TF0026871408	BURIAL		Two inhumations were identified during trial excavations. The burial practice represented by these	Low

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	Access)							inhumations is distinctly Christian in form, being east-west aligned.	
176	Prehistoric Activity, Lincoln Eastern Bypass (Northeast Access)	MLI89447		5595, 5598, 5599, 5600	TF0023971357	ARTEFACT SCATTER		Trial excavations revealed various indications of Prehistoric activity and the Prehistoric landscape at this site.	Low
177	Anglo-Saxon Finds From North of Lincoln Road	MLI60593			TF0065070620	FINDSPOT		Findspot of a Anglo-Saxon coin and strap end found during metal detecting.	Negligible
178	Bronze Age Collared Urn From Canwick Heath Farm	MLI81323			SK9972168620	FINDSPOT		A Bronze Age collared cinerary urn was found on Canwick Heath Farm. It is a well made specimen of aber. Type 1, and is now in city and county museum (lm 295.15).	Negligible
179	Medieval Coins From North of Lincoln Road	MLI60592			TF0042068430	FINDSPOT		Artefact scatter. Medieval short and long cross pennies from a field north of Lincoln Road.	Low
180	Field Boundary (site of)				TF0065173139	FIELD BOUNDARY		A field boundary and pathway are shown here on the 1st edition Ordnance Survey map.	Negligible
181	Ridge and Furrow				TF0073872982	RIDGE AND FURROW		Ridge and Furrow identified by geophysical survey in 2004.	Low
182	Ironstone pit				SK9996071990	QUARRY		The pit is shown and labelled on the 1st edition Ordnance Survey mapping	Negligible
183	Greetwell Road			6454	TF000167184	BRIDGE		Carried Greetwell Road over	Negligible

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	Bridge over Tramway (Site of)				7			ironstone quarry tramway [west of] Greetwell Hollow.	
184	Greetwell Road 2nd and 3rd Century Structure Remains				SK9965271815	BUILDING		At Monks Tower, prior to house building, remains of 3 Roman structures were found	Negligible
185	Monks Tower Cottages (Site of)				SK9972271803	HOUSE		Two cottages associated with Monks Tower	Negligible
186	Undated Agricultural Features				TF0078171780	DITCH		Linear anomalies possibly of medieval or earlier origin.	Low
187	Ridge and Furrow				TF0079171786	RIDGE AND FURROW		Ridge and Furrow identified by geophysical survey	Low
188	Geophysical Anomaly - Possible Pit				TF0080271777	PIT?		Geophysical Anomaly - Possible Pit	Negligible
189	Ironstone Mine Tramway, Greetwell Road				SK9987771763	TRAMWAY		Ironstone mine tramway, Greetwell Road	Negligible
190	Allotment gardens, Allenby Road			7806	SK9993371757	GARDEN		Allotment gardens, Allenby Road. No visible trace.	Negligible
191	Crofton House (Site of)			3187	SK9979671753	HOUSE		Detached house on the east side of Allenby Road, probably associated with the Ironstone Mines. 1913, A Wallace, Secretary Ironstone Company.	Negligible

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								Since demolished and replaced by industrial unit.	
192	Allenby Road			2055	SK9975771703	ROAD		Road linking Monks Road on the south with Greetwell Road on the north, although this seems just to have been a renaming of the existing lane in 1918.	Negligible
193	Linear Geophysical Anomaly				TF0066771349	LINEAR FEATURE?		Linear Geophysical Anomaly (not tested by Trial Trenching).	Negligible
194	Medieval Pottery				SK9915166962	ARTEFACT SCATTER		Medieval Pottery identified by fieldwalking in 2008.	Negligible
195	Medieval Pottery				SK9916066958	ARTEFACT SCATTER		Medieval Pottery identified by fieldwalking in 2008.	Negligible
196	Multi-period Artefact Scatter				SK9907566829	ARTEFACT SCATTER		An artefact scatter identified by fieldwalking.	Negligible
197	Medieval Pottery Scatters, Canwick	MLI92126			SK9898466855	ARTEFACT SCATTER		Medieval pottery scatters, Canwick in 2006.	Negligible
198	Multi-Period Occupation Site				TK0048070985	OCCUPATION SITE		Geophysical survey and trial trenching on the route of the Lincoln Eastern Bypass identified an area of peat within the corner of this field, flanked by a levee which had formed along the northern bank of a Prehistoric river channel. Trial trenching found worked flint of late Mesolithic / early Neolithic	High

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								date, indicative of the presence of a knapping floor and carbon dating evidence indicates that many of these features relate to some form of late Mesolithic occupation focussed on the levee. Auger survey indicates that this site could extend over an area of 3000m2. Evidence of late Neolithic / early Bronze Age activity was identified overlying these deposits in the form of a ditch and further worked flint. Auger survey identified possible round barrow site which corresponded with a geophysical anomaly. Paleoenvironmental evidence indicates changing environmental conditions and the wetland character of this area during the Prehistoric period. A row of waterlogged timbers is thought to represent a boundary, route through the wetland, or the support for a narrow boardwalk. C14 dating indicates that these were erected in the late Iron Age or early Roman period.	
199	Possible Building				TF0040571220	BUILDING?		Trial trenching as part of the evaluation works for the Lincoln	Low

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								Eastern Bypass identified two ditches filled with limestone fragments and a sherd of Romano-British pottery. A third ditch also filled with rubble and substantial amounts of Post-Medieval tile. Large amounts of stone are exposed by ploughing in this area. It is possible that the remains of a relatively substantial building may be located close to this area.	
200	Early Modern Field Boundary				TF0086172592	FIELD BOUNDARY		Ditch identified during trial trenching and containing a sherd of 18th / 19th century pottery which is likely to be part of an early modern field system.	Negligible
201	Site of Greetwell Hollow				TF0016871829	FARMSTEAD		Site of a post-medieval farm, noted on the Greetwell Tithe map (1848).	Negligible
202	Roman Coin Findspot				TF0030071100	FINDSPOT		3 Roman coins reported to the Portable Antiquities Scheme.	Low
203	Roman Copper Alloy Mount				TF0040071600	FINDSPOT		Copper alloy mount, probably related to the ironstone mines (Reference 77) or Roman site (Reference 106).	Low
204	Important Hedgerow 1 - Parish Boundary				TF9913666767	FIELD BOUNDARY		Identified from historic mapping (1842).	Low
205	Important				TF991566703	FIELD		Identified from historic mapping	Low

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	Hedgerow 2 - Parish Boundary				4	BOUNDARY		(1842).	
206	Ridge and Furrow				TF0047771106	RIDGE AND FURROW		Ridge and Furrow identified by geophysical survey in 2004.	Low
207	Curvilinear Geophysical Anomaly - Possible Prehistoric or Roman Feature				TF0052571095	UNKNOWN		This feature was not tested by trial trenching but nearby remains indicate that it could be Iron Age or Roman	Unknown
208	Ridge and furrow				TF0044270960	RIDGE AND FURROW		Ridge and Furrow identified by geophysical survey in 2004.	Negligible
209	Linear ditch				TF0021570781	UNKNOWN		Geophysical anomaly identified in 2004.	Low
210	Possible ditch				TF0027270742	DITCH?		Geophysical anomaly identified in 2004.	Low
211	Curvilinear Feature				TF0025570676	UNKKNOWN		Broad curvilinear feature identified by magnetic survey.	Low
212	Worked flint				TF0026870226	ARTEFACT SCATTER		Worked Flint identified by fieldwalking in 2008	Negligible
213	Iron Age or Romano-British Field System				SK9989369880	FIELD SYSTEM		Geophysical survey identified a series of inter-related linear and curvilinear anomalies. The features were confirmed by trial trenching and are believed to be part of an Iron Age or Romano-British field system.	Low
214	Multi-Period Artefact Scatter				TF0029769910	ARTEFACT SCATTER		An artefact scatter identified by fieldwalking. Consisting of two	Negligible

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								worked flints, two sherds of post-medieval pottery and post-medieval machinery parts.	
215	Metal detecting anomaly				TF0033769913	FINDSPOT?		Undated Non-Ferrous metal detecting signal.	Unknown
216	Non Ferrous Metal Detecting Signal				TF0034068948	UNKNOWN		Undated Non-Ferrous metal detecting signal.	Unknown
217	Post Medieval Metal Find				TF0033768937	FINDSPOT		Post-Medieval metal find identified by fieldwalking in 2008.	Negligible
218	Greetwell Road Bridge over Greetwell Beck				TF0018271849	BRIDGE		Road bridge shown on 1887 OS 1:2500 map carrying Greetwell Road over Greetwell Beck.	Negligible
219	Ramper Farm				TF0084573489	FARMSTEAD		Post medieval farmstead, comprising a two-storey cottage and a range of outbuildings	Low
220	Railway Underpass				TF0027070584	BRIDGE		This underbridge was constructed as part of the Spalding and Lincoln Railway in the late 19th century.	Low
221	Washingborough Road Railway Bridge			6568	TF0060170576	BRIDGE		This underbridge was constructed as part of the Spalding and Lincoln Railway in the late 19th century.	Low
222	Cathedral Church of St Mary		486141		SK9779671808	CHURCH	Listed building, Grade I	Cathedral church with attached cloisters, chapter house and libraries. Established c1072-1092 by Bishop Remigius. Restored and extended	Very High

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								following a fire, 1123-1148, for Bishop Alexander. Remodelled c1180-1200 by Richard the Mason and Geoffrey de Noiers for St Hugh of Avalon. Transepts extended and completed c1230-1235 by Michael "magister operis". Crossing tower rebuilt c1240 by master mason Alexander, and heightened 1307-1311 by Richard of Stow. Angel Choir added 1256-1280, probably by Simon de Tresk. Cloisters c1290-1300. Chapter house C13. Song school early C13. Galilee porch, west of south transept, mid C13. Cantelupe Chantry 1355, Fleming chantry 1431 by John Porter, Russell chantry 1494, Langland chantry c1547 by William Kitchin. Old Library c1422. Honywood Library, north of cloister, 1674, by Sir Christopher Wren, with contemporary bookcases. Rooms under west towers c1730 by James Gibbs. Dean Wickham Library 1909-1914 by Hodgson Fowler.	
223	Lincoln Castle				SK9747571875	CASTLE		Castle. 1068, C12, C13, C14, C19. Restored C20. Built for	High

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								William I. Coursed and squared stone and herringbone rubble, with ashlar dressings and slate roofs. PLAN: Quadrangular curtain wall, east gateway and lodges, observatory tower, Lucy Tower (keep), west gate, Cobb Hall (north-east angle tower).	
224	The Bishop's Palace				SK9779671688	HOUSE	Scheduled Monument (also includes the Medieval Palace (Grade I Listed Building), Edward King House (Grade II* Listed Building) and the Inner East Gateway to the Bishop's Palace (Grade II Listed Building)	Former Bishop's Palace. East hall c1175, built for Bishop Chesney. West hall, kitchen and service buildings to south, 1186-1224, for Hugh of Avalon and Hugh of Wells. Repaired and crenellated (Licentia Crenellandi 1329) by Bishop Burghersh. Gate tower, west hall bay window and chapel range, 1436-1449, for Bishop Alnwick. Partly demolished 1648. Chapel range demolished 1725. Restored 1838. Alnwick Tower Restored 1838. Former stables, now offices, c1876. Dressed stone and ashlar. Roofless except for Alnwick Tower and former stables. PLAN: east hall and undercroft, west hall with service rooms and kitchen to south, gate	High

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								tower, chapel range with audience chamber, stable range. The two halls are on opposite sides of a wedge shaped courtyard, open to the south and closed by the northern gate tower. Listing Description for Edward King House - Grade II* Listed Diocesan retreat and conference centre, and diocesan offices. 1727, remodelled in Gothic Revival style 1866 by Ewan Christian. Chapel 1898, by Bodley & Garner, in Decorated style, above the service rooms of the adjoining Bishop's Palace. Mid C20 addition to south. Dressed stone with ashlar dressings and gabled and mansard slate roofs. 4 gable, 3 ridge and 3 side wall stacks, one of them external. Gateway arch. Early C19. Ashlar. Coved string course and crenellated parapet. Chamfered four-centred arch with hoodmould. Single flanking buttress to west. Pair of wrought-iron gates.	
225	Cathedral and				SK977227153	AREA		Conservation Area No. 1	High

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
	City Centre Conservation Area No 1				4			Cathedral and City Centre comprises the historic core of Lincoln taking in the Upper and Lower Cities. This area has been as focus for occupation since at least the Roman period, when a fort and later a Colonia was established overlooking the Witham valley. The historic street pattern has developed over 2000 years of inhabitation and provides the setting for a wide variety of historic buildings which evidence the development of Lincoln throughout much of this time. Buildings within the conservation area include the Roman East Gate, the Cathedral and Castle, the Norman Jew's House, a number of Medieval domestic buildings around the Cathedral Close, and a wide variety of Georgian and Victorian structures constructed following the resurgence of Lincoln as a manufacturing and trading centre in the Early Industrial and Victorian periods. The Conservation Area comprises a townscape of	

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								considerable variety and complexity, both in its built form and its historic and archaeological development	
226	Lindum & Arboretum Conservation Area No. 3				SK9836771743	AREA		Conservation Area Number 3, Lindum and Arboretum takes in an area of Victorian development to the east of Lincoln. A significant area within the designated area is comprised of The Arboretum, a public park designed by Edward Milner and opened in 1872. The park comprises large areas of lawns, lined by mature trees and encircled by a network of paths. Structures within the park include a bandstand, pavilions and a fountain. Victorian housing surrounds the park to the south and east. The housing to the north is characterised by the presence of large-scale Victorian villas. Of both detached and semi-detached plan, the villas are designed principally in the Tudor Gothic or Italianate styles and are set within large gardens which often include mature trees. Villas along Lindum Terrace	Medium

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								enjoy long views to the south across the city and beyond. To the southwest of the park is an area of densely arranged worker's housing which is characterised by the presence of terraced, gabled houses of tall, narrow elevation	
227	Road to Greetwell			1142	TF00063 71569	ROAD		Possible road to Greetwell as a continuation of Monks Road at south end of modern Allenby / Crofton Road Industrial Estate	Low
228	Pond, Allenby Road area			5583	TF00091 71358	POND		Cut feature cut through the natural sand, interpreted as a pond. Not dated	Low
229	Lincoln Sewage Farm, Washingborough Road			6502	SK99793 70436	SEWAGE WORKS		Lincoln Corporation established sewage treatment facility served by underground pipes in 1877 after many years of growing concern about public health, which was affected by the discharge of sewage into public streets, open cesspools and watercourses also used for drinking water. A railway siding was provided by the Great Northern Railway, but it was little used. The farm received sewage from the Sewage works at Great Northern Terrace and treated effluent first on open	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								fields, then in addition, before 1930, in c25 circular filter beds on south side of Washingborough Road. The farm has much been enlarged since 1970s, especially on the south side of the road. The works have been totally modernised except for two extant brick and slate 2-storeyed buildings on the south side of Washingborough Road, whose function has yet to be established.	
230	South Delph, Sincil Dyke east of Stamp End			6505	SK99098 71029	WATERCOURSE		The south-eastwards continuation of Sincil Dyke (MON696), past the point where the Dyke previously first turned north into the Witham at Stamp End, and subsequently north-east to the Witham somewhere near the modern Spa Road. Padley maps do not label it as South Delph, but as Sincil Dyke, while the OS 1887 map and subsequent maps label it South Delph. It now runs parallel to the Witham.	Low
231	Greetwell Junction Signal Box, Greetwell Junction,			6577	SK99497 70584	SIGNAL BOX		Controlled junction of Great Northern and Great Eastern Joint Railway main line and Avoiding Line. Situated on	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
	Washingborough Road							embankment.	
232	Hawthorn Road			6862	TF00340 73042	ROAD		Road from Bunkers Hill, Wragby Road to Reepham. It was called Stocking Lane until the 1950s (OS map evidence).	Low
233	Well, Greetwell Hollow/Crofton Drive			8860	TF00125 71799	WELL		Well close to a complex of buildings. Marked as "W" on the 1907 and 1932 OS maps. Now the site of industrial buildings	Low
234	Well/water pump, Greetwell Hollow/Dowding Road			8861	TF00225 71443	WELL		Well/water pump close to a complex of buildings. Marked as "P" on the 1889 and "W" on the 1907-1932 OS maps. Now the southern end of Dowding Road	Low
235	Stub cross, near Greetwellgate			8985	SK99831 71857	BOUNDARY		Boundary cross marking the point at which the medieval road entered the city boundary. Exact location unknown. It stood alongside Greetwell Gate somewhere near the boundary. It first occurs c.1265 (Cameron 1985, 42) and it was one of the meeting points on the boundary of the Monks Abbey estate in 1455	Low
236	Greetwell Road			1533	SK98619 71914	ROAD		The road east of Greetwellgate, ie, east of junction with St Leonards Lane. Greetwell Lane in 1842-1851 at least. Armstrongs 1779 map shows	Low

Mouchel Reference Number	Site Name	HER Reference Number	NMR Reference Number	Lincoln City Heritage Database Reference Number	Grid Reference	Site Type	Designation	Description	Value
								the road leaving the city and making a junction with Monks Road before reaching Greetwell. A foot road on its south side is marked on 19th-century maps. Detached housing began here in the 1870s, including Monks Manor and the large properties on the south side.	
237	Earthworks, Greetwell	MLI98571			TF 0056 7171	EARTHWORKS		A site visit was undertaken in February 2010 after a member of the public identified the earthworks of a possible barrow at this location. Undulations and earthworks were confirmed to be present on the site. The earthworks may represent a possible barrow or mining in the area.	Unknown

12.3 Table of Impacts

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
2	Greetwell medieval village, cultivation and post medieval garden remains	SETTLEMENT	Scheduled monument	High	Temporary visual and noise intrusion during construction. Minor loss of post-medieval agricultural context in views to south and west. Severance of settlement with its wider post-medieval field system/ landscape. Minor severance between settlement and City of Lincoln in long distance views. The rural context of the site will be further disturbed by increased road noise and new infrastructure as well as new lighting across the valley.	Negligible Minor Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Negligible Minor Minor	Slight Slight Slight
3	The Manor House	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New	Minor	None proposed. Landscaping around the road will soften its appearance	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					infrastructure into a rural setting but understanding of site and its setting will be unaffected.		within long distance views.		
5	Sheepwash Grange	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting.	Minor	None proposed. Retention of existing hedgerows. Landscaping (including grading of road) around the road will soften its appearance within long distance views.	Minor	Slight
6	Glebe Farmhouse	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
12	Farm Buildings at the Manor House	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting but understanding of site and its setting will be	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					unaffected.				
13	Branston Heath Farmhouse	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
14	Gates and Walls at the Manor House	BUILDING	Listed Building, Grade II	Medium	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting but understanding of site and its setting will be unaffected. Walls stand next to the A15.	Negligible	None proposed. Landscaping around the road will soften its appearance within long distance views.	Negligible	Neutral
15	Church of All Saints	BUILDING	Listed Building, Grade II*	High	Increased noise intrusion on setting during construction and once operational. Construction works and completed scheme will be visible from south of church. New infrastructure elements into rural setting. Some obstruction in the long distance views between the church	Moderate	Site is already well screened by existing boundary hedgerows and trees. Increased amounts of planting will further disrupt long distance views. Landscaping and planting and directional	Minor	Minor

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					and the city and Cathedral.		lighting around the proposed road will soften its appearance within long distance views.		
16	Greetwell Lodge and Wall with Gate Piers	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. Completed scheme would be visible on approach to Lodge along Greetwell Road in long distance views but setting remains largely unaffected.	Negligible	None proposed. Site already stands on Greetwell Road which is a busy main road. Landscaping around the road will soften its appearance within long distance views.	Negligible	Neutral
17	Monument to Thomas Winn, 6 Yards South-East of Apse of Church of All Saints	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. Construction works and completed scheme will be visible to south. New infrastructure elements into rural setting. Some obstruction in the long distance views between the monument and the city.	Minor	Site is already well screened by existing boundary hedgerows and trees. Increased amounts of planting will further disrupt long distance views. Landscaping and planting and directional lighting around the proposed	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
							road will soften its appearance within long distance views.		
18	Greetwell Hall	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. Completed scheme would be visible on approach to Hall in long distance views but setting remains largely unaffected.	Negligible	None proposed. Site is already well screened by existing boundary hedgerows and trees. Increased amounts of planting will further disrupt long distance views. Landscaping around the road will soften its appearance within long distance views.	Negligible	Neutral
19	Stable Block At Greetwell Hall	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. Completed scheme would be visible on approach to stable block in long distance views but setting remains largely unaffected.	Negligible	None proposed. Site is already well screened by existing boundary hedgerows and trees. Increased amounts of planting will further disrupt long distance views.	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
20	Monument To Thomas Straw, 4 Yards South East Of Apse Of Church Of All Saints	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. Construction works and completed scheme will be visible to south. New infrastructure elements into rural setting. Some obstruction in the long distance views between the monument and the city.	Minor	Site is already well screened by existing boundary hedgerows and trees. Increased amounts of planting will further disrupt long distance views. Landscaping and planting and directional lighting around the proposed road will soften its appearance within long distance views.	Minor	Slight
21	Ashfield House	BUILDING	Listed Building, Grade II	Medium	Increased noise intrusion on setting during construction and once operational. New infrastructure elements into rural setting.	Negligible	Site is already well screened by existing boundary hedgerows and trees. Landscaping and planting and directional lighting around the proposed road will soften its appearance within long	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
							distance views.		
22	Medieval pit and artefact scatter	PIT, ARTEFACT SCATTER		Low	Features will be destroyed through construction of the scheme.	Major	Strip, map, sample and record prior to construction commencing.	Minor	Slight
25	Roman activity, Lincoln Eastern Bypass, Canwick	FINDSPOT, DITCH, PIT		Low	Features will be destroyed through construction of the scheme.	Major	Strip, map, sample and record prior to construction commencing.	Minor	Slight
29	Ironstone mines	MINE, INDUSTRIAL SITE		Low	Features will be damaged or destroyed through construction of the scheme.	Major	Strip, map, sample and record prior to construction commencing.	Minor	Slight
30	Saxon finds, south of railway line (Field 18)	ARTEFACT SCATTER		Low	Destruction and removal of all sub surface features through construction of carriageway, ponds and access roads.	Moderate	Full site excavation.	Minor	Slight
60	Canwick Heath Farm	FARMSTEAD		Low	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting but understanding of site and its setting will be unaffected.	Negligible	None proposed. Landscaping around the road will soften its appearance within long distance views.	Negligible	Neutral
61	Halfway House	HOUSE		Low	Increased noise and	Negligible	None proposed.	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					visual intrusions on setting during construction and once operational. New infrastructure into a rural setting but understanding of site and its setting will be unaffected.		Landscaping around the road will soften its appearance within long distance views.		
68	West Lindsey section of the Roman road from Lincoln to Burgh le Marsh	ROAD, ROAD		Low	Potential to disturb unknown remains under the existing Wragby Road during construction.	Unknown	Strip map and sample on a 10m buffer from existing Wragby Road. Archaeological monitoring on removal of existing road layers.	Unknown	Unknown
69	Continuation of Mareham Lane, north of Sleaford, along the present A15	ROAD		Low	Potential disturbance or destruction of unknown remains through construction.	Unknown	Strip map and sample on a 10m buffer from existing Sleaford Road. Archaeological monitoring on removal of existing road layers.	Unknown	Unknown
70	Continuation of Mareham Lane, north of Sleaford, along Bloxholm	ROAD		Low	Potential disturbance or destruction of unknown remains through construction.	Unknown	Strip map and sample on a 10m buffer from existing	Unknown	Unknown

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	Lane						Bloxholm Lane. Archaeological monitoring on removal of existing road layers.		
74	Greetwell medieval and post medieval settlement and cultivation	FIELD SYSTEM, RIDGE AND FURROW, DESERTED SETTLEMENT		Medium	Temporary visual and noise intrusion during construction. Minor loss of post-medieval agricultural context in views to south and west. Severance of settlement with its wider post-medieval field system/ landscape. The rural context of the site will be further disturbed by increased road noise and new infrastructure as well as new lighting across the valley.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
76	Cropmark Long Barrow	LONG BARROW		Medium	Partial destruction as the footprint of the proposed scheme runs through the asset to the west. Working areas are	Major	Full excavation.	Moderate	Moderate

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					likely to damage the remainder of the monument.				
79	Barrow Cemetery	ROUND BARROW, RING DITCH, BARROW CEMETERY		Medium	Temporary construction works causing noise and visual intrusions to setting. At least one known barrow would be destroyed through construction. Potential damage to other barrows through construction (ie vehicle movement etc). The scheme would truncate the barrow cemetery thus severing the relationship between the barrows. The rural setting of the barrows will be largely lost with the introduction of the carriageway. The rural context of the site will be further disturbed by	Negligible Major Moderate Minor	No mitigation required. English Heritage level 2 topographic earthwork survey of earthworks and land between prior to commencement of construction works. Followed by detailed excavation. Photographic survey of site within its context prior to construction works commencing.	Negligible Minor Minor	Neutral Slight Slight Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					increased road noise and new infrastructure as well as new lighting across the valley.				
80	Romano-British Site, Greetwell Quarry	POST HOLE, PIT, DITCH, RING DITCH, BARROW, HUT CIRCLE, GULLY, FIELD SYSTEM, CORN DRYING OVEN, CEMETERY, GRAVE, COFFIN, INHUMATION, BURIAL, ANIMAL BURIAL, ARTEFACT SCATTER, FARMSTEAD		Medium	Potential for associated remains to be damaged or destroyed during construction.	Unknown	Strip, map, sample and record prior to construction commencing.	Unknown	Unknown
82	Romano-British artefact scatter south of the railway line (Field 18) (Possible site of high status Roman building)	VILLA, WALL, FARMSTEAD, SETTLEMENT , ARTEFACT SCATTER		High	Destruction and removal of all sub surface features through construction of carriageway, ponds and access roads.	Major	Full site excavation.	Moderate	Moderate
84	Medieval artefacts	STRUCTURE,		High	Destruction and	Moderate	Full site	Minor	Minor

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	and Roman features found south of the railway line (Field 18)	WALL, ROBBER TRENCH, FLOOR, ARTEFACT SCATTER			removal of all sub surface features through construction of carriageway, ponds and access roads.		excavation.		
86	Part of a post medieval field system	FIELD SYSTEM, FIELD BOUNDARY		Low	Partial destruction of two hedgerows.	Minor	No further mitigation required. Sufficient record previously made.	Minor	Neutral
87	Original site of Sheepwash Grange	GRANGE		High	Destruction of the majority of the site through construction of carriageway, embankments for bridge, balancing ponds and access roads.	Major	Full site excavation.	Moderate	Moderate
88	Barrow cemetery, south of the Witham, Canwick	RING DITCH, ROUND BARROW, MOUND, BARROW CEMETERY		Medium	Temporary construction works causing noise and visual intrusions to setting. At least two barrows would be destroyed through construction. Potential damage to other barrows through construction (ie vehicle movement	Negligible Major	No mitigation required English Heritage level 2 topographic earthwork survey of earthworks and land between	Negligible Minor	Neutral Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					etc). The scheme would truncate the barrow cemetery thus severing the relationship between the barrows. The rural setting of the barrows will be largely lost with the introduction of the carriageway. The rural context of the site will be further disturbed by increased road noise and new infrastructure as well as new lighting across the valley.	Moderate Minor	prior to commencement of construction works. Followed by detailed excavation. Photographic survey of site within its context prior to construction works commencing.	Minor	Slight Slight
92	Foreman's House and Workers' Cottages	HOUSE		Low	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting but understanding of site and its setting will be unaffected.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
94	Medieval-post medieval pottery scatter, south of	ARTEFACT SCATTER, DITCH		Negligible	Destruction of remains through construction.	Minor	No further mitigation required.	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	the Witham (Field C1)						Suficient record previously made.		
96	Undated cropmark enclosure, south of Canwick Heath Farm, Canwick	ENCLOSURE, FIELD SYSTEM?		Medium	Potential to disturb or destroy associated remains through construction.	Unknown	Strip, map, sample and record area to west of site in area of scheme footprint.	Unknown	Unknown
97	Medieval cropmark boundary, south of Heighington Road	BOUNDARY		Medium	The proposed scheme will truncate the feature and will destroy it within the scheme footprint during construction.	Moderate	Full excavation.	Minor	Slight
98	Bracebridge Heath airfield and associated buildings	AIRFIELD, AIRCRAFT HANGAR		Low	Increased noise and visual intrusions on setting during construction and once operational. New infrastructure into a rural setting.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
99	Manor Farm	FARMHOUSE, FARM		Low	Increased noise and visual intrusions on setting during construction and once operational.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Negligible	Neutral
110	Undated gully and ditch	GULLY, DITCH		Low	Damage or destruction of feature through construction.	Minor	Strip, map, sample and record.	Negligible	Neutral
111	Undated ditch and	DITCH,		Low	Damage or	Minor	Strip, map,	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	gully	GULLY			destruction of feature through construction.		sample and record.		
112	Post medieval to early modern ditch	DITCH		Low	Damage or destruction of site through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Slight
113	Late Iron Age Settlement	FARMSTEAD, DITCH, WALL, IRON WORKING SITE, GULLY, PIT		High	Damage or destruction of site through construction.	Major	Full excavation of site.	Moderate	Moderate
115	Post medieval to modern ditches	DITCH		Low	Damage or destruction of site through construction.	Moderate	Full excavation of site.	Minor	Slight
116	Post medieval ditch	DITCH		Low	Damage or destruction of features through construction.	Major	Archaeological monitoring during ground breaking works.	Minor	Slight
117	Undated pits, ditches and postholes	DITCH		Low	Damage or destruction of features through construction.	Major	Full excavation of all features.	Minor	Slight
118	Undated ditch	DITCH		Low	Damage or destruction of features through construction.	Major	Full excavation of all features.	Minor	Slight
119	Medieval to post medieval limekilns, Canwick	LIME KILN, PIT		Low	Destruction of features through construction.	Major	Strip, map, sample and record.	Minor	Slight
120	Undated pit, ditches, gullies and postholes, Canwick	BUILDING?, PIT, DITCH, GULLY, POST HOLE		Low	Destruction of site through construction.	Major	Full excavation of all features.	Minor	Slight
127	Undated gullies	PIT, GULLY		Low	Damage or	Major	Full excavation	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	and pit				destruction of features through construction.		of all features.		
128	Medieval pit, ditches and artefacts, Bracebridge Heath	PIT, DITCH, ARTEFACT SCATTER		Low	Damage or destruction of features through construction.	Major	Full excavation of all features.	Moderate	Slight
129	Romano-British pit, gully and artefacts, Bracebridge Heath	PIT, GULLY, ARTEFACT SCATTER		Low	Damage or destruction of features through construction. Potential to disturb associated remains within working areas.	Major	Strip, map, sample and record.	Minor	Slight
130	Undated gullies	GULLY		Low	Damage or destruction of features through construction.	Minor	Strip, map, sample and record prior to commencement of construction works.	Negligible	Neutral
132	Medieval to post medieval field system, Bunkers Hill/Greetwell Quarry	FIELD SYSTEM, DITCH, FIELD BOUNDARY, RIDGE AND FURROW, ARTEFACT SCATTER		Low	Field boundaries would be damaged or destroyed through construction of the proposed scheme.	Moderate	No mitigation required. Sufficient record has been made previously.	Minor	Slight
134	Undated features, Greetwell Quarry	BOUNDARY, DITCH, ENCLOSURE, PIT		Low	Damage or destruction of site through construction.	Major	No further mitigation required. Sufficient record previously made.	Minor	Slight
135	Cropmark possible	ROUND		Low	Damage or	Major	Full excavation	Moderate	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
	round barrow, Canwick	BARROW, RING DITCH			destruction of features through construction.		of all features.		
140	Undated pits and possible enclosure, Canwick	ENCLOSURE ?, FIELD BOUNDARY?, PIT		Low	Damage or destruction of features through construction.	Minor	Strip, map, sample and record prior to commencement of construction works.	Negligible	Neutral
141	Undated features, Canwick	PIT, DITCH?, ENCLOSURE ?, FIELD BOUNDARY?		Low	Damage or destruction of features through construction.	Minor	Strip, map, sample and record prior to commencement of construction works.	Negligible	Neutral
142	Undated ?curvilinear ditch or enclosure, Canwick	DITCH?, ENCLOSURE ?		Low	Damage or destruction of features through construction.	Major	Full excavation of all features.	Minor	Slight
143	Undated ?ditches and ?enclosure, Canwick	ENCLOSURE ?, DITCH?, PIT?		Low	Damage or destruction of features through construction.	Major	Strip, map, sample and record prior to commencement of construction works.	Minor	Slight
144	Possible enclosure or field system, Canwick	PIT, DITCH?, ENCLOSURE ?, FIELD SYSTEM?, POST HOLE		Low	Damage or destruction of site through construction.	Major	Strip, map, sample and record prior to commencement of construction works.	Moderate	Slight
145	Undated ?enclosure or field divisions, Canwick	ENCLOSURE ?, DITCH?, FIELD		Low	Damage or destruction of features through construction.	Major	Strip, map, sample and record prior to	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
		SYSTEM?					commencement of construction works.		
154	Medieval activity, Canwick	ARTEFACT SCATTER, DITCH, PIT, POST HOLE		Low	Destruction of the majority of the eastern side of the site through construction.	Major	Strip, map, sample and record prior to commencement of construction works.	Moderate	Slight
157	Possible ditches and pits, Canwick	DITCH?, PIT?		Unknown	Damage or destruction of site through construction.	Major	Archaeological monitoring during ground breaking works.	Minor	Unknown
159	Possible ditches, Canwick	DITCH?		Unknown	Damage or destruction of site through construction.	Major	Archaeological monitoring during ground breaking works.	Minor	Unknown
160	Possible linear feature, Canwick	LINEAR FEATURE?		Unknown	Damage or destruction of site through construction.	Moderate	Full excavation.	Minor	Slight
161	Early medieval activity, Canwick	PIT, DITCH		Medium	Damage or destruction of site through construction. Potential to damage or destroy associated remains through construction.	Major	Full excavation.	Moderate	Moderate
162	Iron Age activity, Canwick	DITCH, LINEAR FEATURE		Low	Destruction of site through construction.	Major	Full excavation.	Moderate	Slight
163	Iron Age pit and finds, Canwick	PIT		Low	Damage or destruction of site through construction.	Major	Full excavation.	Moderate	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
164	Post medieval ditch and pit, Canwick	DITCH, PIT		Low	Damage or destruction of site through construction.	Moderate	Full excavation.	Minor	Slight
166	Spalding and Lincoln Railway	RAILWAY		Low	A bridge over the railway will carry the new road. New infrastructure into setting of railway.	Minor	Photographic record of the area and its setting prior to construction works commencing.	Negligible	Neutral
167	Sheffield and Lincolnshire Extension Railway	RAILWAY		Low	A bridge over the railway will carry the new road. Small parts of the sides of the cutting will be removed. New infrastructure into setting of railway.	Minor	Photographic record of the area and its setting prior to construction works commencing.	Negligible	Neutral
168	East Lincolnshire Railway	RAILWAY		Low	A bridge over the railway will carry the new road. New infrastructure into setting of railway.	Minor	Photographic record of the area and its setting prior to construction works commencing.	Negligible	Neutral
169	Royal Observer Corps Monitoring Post	FORMER BUILDING		Low	Potential disturbance of remains relating to former underground building.	Moderate	Archaeological monitoring on all ground breaking works.	Minor	Slight
180	Field Boundary (site of)	FIELD BOUNDARY		Negligible	Damage or destruction of feature through construction.	Minor	Archaeological monitoring during ground breaking works.	Negligible	Neutral

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
181	Ridge and Furrow	RIDGE AND FURROW		Low	Damage or destruction of feature through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Slight
186	Undated Agricultural Features	DITCH		Low	Damage or destruction of features through construction.	Major	Strip, map, sample and record.	Minor	Slight
187	Ridge and Furrow	RIDGE AND FURROW		Low	Damage or destruction of site through construction.	Major	Archaeological monitoring during ground breaking works.	Minor	Slight
188	Geophysical Anomaly - Possible Pit	PIT?		Negligible	Damage or destruction of features through construction.	Major	Strip, map, sample and record.	Minor	Slight
193	Linear Geophysical Anomaly	LINEAR FEATURE?		Negligible	Partial damage or destruction of site through construction.	Moderate	Full excavation.	Minor	Slight
194	Medieval Pottery	ARTEFACT SCATTER		Negligible	Damage or destruction of features through construction.	Major	Strip, map, sample and record.	Minor	Slight
198	Multi-Period Occupation Site	OCCUPATION SITE		High	Damage or destruction to majority of site through construction. Potential to damage or destroy associated remains within working areas.	Major	Full excavation.	Moderate	Moderate
200	Early Modern Field Boundary	FIELD BOUNDARY		Negligible	Damage or destruction of features through construction.	Major	No further mitigation required. Sufficient record previously made.	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
204	Important Hedgerow 1 - Parish Boundary	FIELD BOUNDARY		Low	Partial removal of hedgerow through construction.	Minor	Photographic survey of feature and its setting prior to removal. Archaeological monitoring during removal.	Negligible	Neutral
205	Important Hedgerow 2 - Parish Boundary	FIELD BOUNDARY		Low	Partial removal of hedgerow through construction.	Minor	Photographic survey of feature and its setting prior to removal. Archaeological monitoring during removal.	Negligible	Neutral
206	Ridge and Furrow	RIDGE AND FURROW		Low	Damage or destruction of site through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Slight
207	Curvilinear Geophysical Anomaly - Possible Prehistoric or Roman Feature	UNKNOWN		Unknown	Destruction of site through construction.	Major	Full excavation.	Minor	Unknown
208	Ridge and furrow	RIDGE AND FURROW		Negligible	Damage or destruction of features through construction.	Major	Archaeological monitoring during ground breaking works.	Minor	Slight
210	Possible ditch	DITCH?		Low	Damage or destruction of site through construction.	Major	Full excavation.	Minor	Slight
211	Curvilinear Feature	UNKKNOWN		Low	Damage or	Major	Full excavation.	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					destruction of site through construction.				
215	Metal detecting anomaly	FINDSPOT?		Unknown	Damage or destruction of feature through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Unknown
216	Non Ferrous Metal Detecting Signal	UNKNOWN		Unknown	Damage or destruction of site through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Slight
217	Post Medieval Metal Find	FINDSPOT		Negligible	Potential to damage or destroy associated remains through construction.	Moderate	Archaeological monitoring during ground breaking works.	Minor	Slight
220	Railway Underpass	BRIDGE		Low	Demolition and removal of underpass.	Major	English Heritage level 2 Historic Building Record to be created prior to demolition works taking place.	Moderate	Slight
221	Washingborough Road Railway Bridge	BRIDGE		Low	Temporary increased noise and visual impact from construction works. New infrastructure within setting of bridge including new road and bridge over railway.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
222	Cathedral Church of St Mary	CHURCH	Listed building, Grade I	Very High	Construction activities and completed	Minor	None proposed. Landscaping	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					scheme will be visible in long distance views from the crossing tower and east elevation both during the day and at night. Views to rural hinterland would be maintained despite new infrastructure being added to views.		around the road will soften its appearance within long distance views.		
223	Lincoln Castle	CASTLE		High	Construction activities and completed scheme will be visible in long distance views from the Observatory Tower and Curtain Walls both during the day and at night. Views to rural hinterland would be maintained despite new infrastructure being added to views.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
224	The Bishop's Palace	HOUSE	Scheduled Monument (also includes the Medieval Palace (Grade I Listed Building), Edward King House (Grade II* Listed Building) and	High	Construction activities and the completed scheme will be visible in long distance views from the Upper Terrace both during the day and at night. Views to rural hinterland would be maintained despite	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight

Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
			the Inner East Gateway to the Bishop's Palace (Grade II Listed Building)		new infrastructure being added to views.				
225	Cathedral and City Centre Conservation Area No 1	AREA		High	Construction activities and the completed scheme will be visible in long distance views from the cathedral both during the day and at night. Views to rural hinterland would be maintained despite new infrastructure being added to views.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
226	Lindum & Arboretum Conservation Area No. 3	AREA		Medium	Construction activities and the completed scheme will be visible in long distance views from the conservation area both during the day and at night. Views to rural hinterland would be maintained despite new infrastructure being added to views.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
229	Lincoln Sewage Farm, Washingborough Road	SEWAGE WORKS		Low	Temporary increased noise and visual impact from construction works. New infrastructure	Minor	None proposed. Landscaping around the road will soften its appearance	Minor	Slight

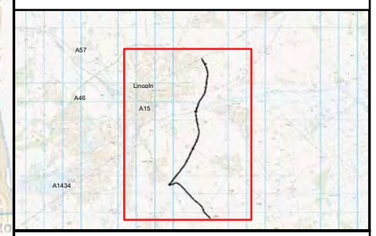
Mouchel Reference Number	Site Name	Site Type	Designation	Value	Impacts from construction and operation	Magnitude of Impact (Unmitigated)	Recommended mitigation	Magnitude of Impact (Mitigated)	Impact Rating
					within setting of bridge including new road and bridge over railway.		within long distance views.		
230	South Delph, Sincil Dyke east of Stamp End	WATERCOURSE		Low	Temporary increased noise and visual impact from construction works. New infrastructure within setting of bridge including new road and bridge over railway.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
231	Greetwell Junction Signal Box, Greetwell Junction, Washingborough Road			Low	Temporary increased noise and visual impact from construction works. New infrastructure within setting of bridge including new road and bridge over railway.	Minor	None proposed. Landscaping around the road will soften its appearance within long distance views.	Minor	Slight
232	Hawthorn Road	ROAD		Low	Potential to uncover earlier road surfaces and stray finds during construction.	Minor	Archaeological monitoring during ground breaking works.	Negligible	Neutral
236	Greetwell Road	ROAD		Low	Potential to uncover earlier road surfaces and stray finds during construction.	Minor	Archaeological monitoring during ground breaking works.	Negligible	Neutral

12.4 1030171-LEB-EIA-HER-001a

NOTES:

KEY

- Heritage Assets
- Heritage Assets
- Heritage Assets
- Scheduled Monument
- Non WFD Watercourses



A	First Issue		LT	JK	OE	08/11/12

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Drawn Designed by: CH

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Highways Alliance

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Paper Size A3 — Drawing Number: 1030171-LEG-EIA-HER-001a — Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Cultural Heritage Assets

CUT LINE

0 185 370 740 1,110 1,480 Meters

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12.5 1030171-LEB-EIA-HER-001b

CUT LINE

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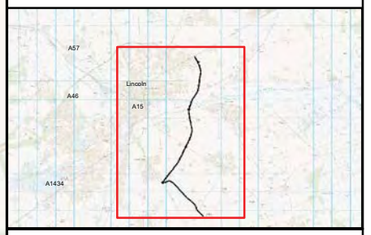
NOTES:

KEY

- Heritage Assets
- Heritage Assets
- Heritage Assets
- Scheduled Monument
- Non WFD Watercourses



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Project: LINCOLN EASTERN BYPASS

Description:

Cultural Heritage Assets

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12.6 1030171-LEB-EIA-HER-002

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Insert Map A
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Insert Map B

0 312.5 625 1,250 1,875 2,500 Meters

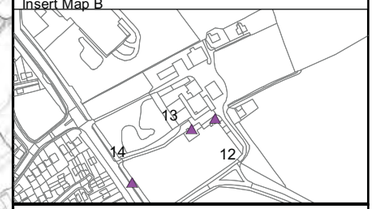
NOTES:

KEY

- Listed Building
- Scheduled Ancient Monument
- Conservation Area
- General Arrangement

Insert Map A

Insert Map B



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Project: LINCOLN EASTERN BYPASS

Description:

Overview of designated heritage assets

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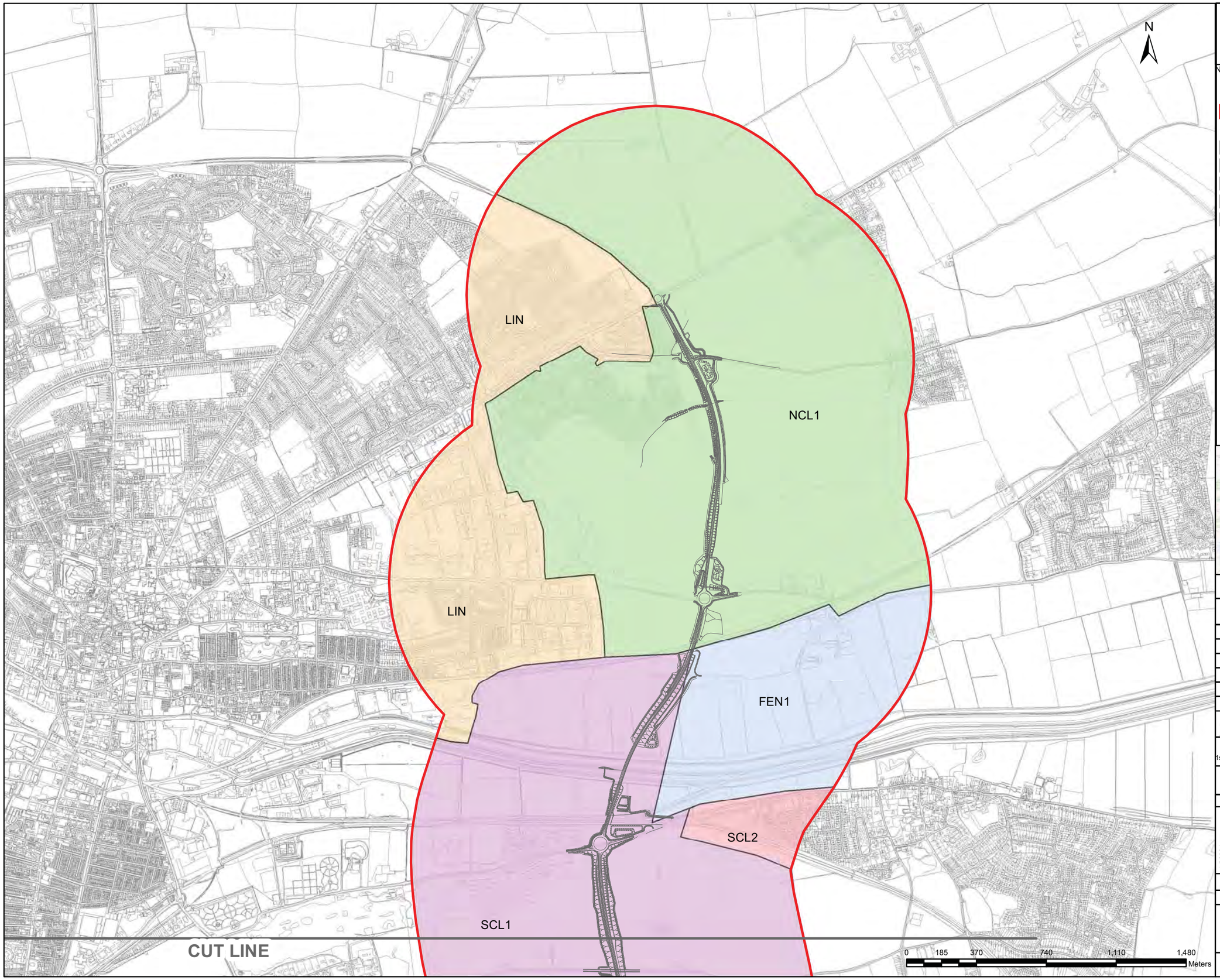
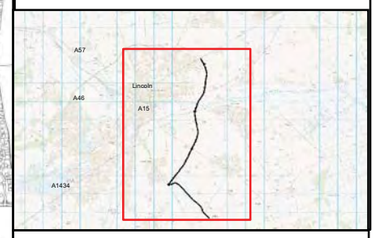
12.7 1030171-LEB-EIA-HER-003a



NOTES:

KEY

- 1000m Buffer
- Proposed Road
- Southern Cliff Heath (SCL1)
- The Fen Edge Settlements (SCL2)
- The Witham Fens (FEN1)
- The Lincoln Satellite Settlements (NCL1)
- City of Lincoln (LIN)



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Project: LINCOLN EASTERN BYPASS

Description:

Historic Landscape Characterisation

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12.8 1030171-LEB-EIA-HER-003b

CUT LINE

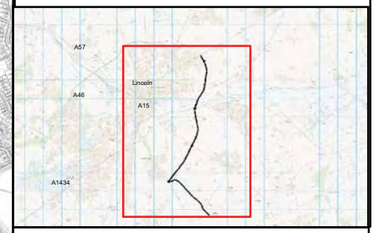
SCL1

N

NOTES:

KEY

- 1000m Buffer
- Proposed Road
- Southern Cliff Heath (SCL1)
- The Fen Edge Settlements (SCL2)
- The Witham Fens (FEN1)
- The Lincoln Satellite Settlements (NCL1)
- City of Lincoln (LIN)



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Paper Size A3 | Drawing Number: 1030171-LEB-EIA-HER-003b | Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Historic Landscape Characterisation

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13 Nature Conservation

13.1 Summary of National and Regional Planning Policy

Table 13-1 Summary of National and Regional Planning Policy

National Planning Policy Framework[7]		
Paragraph 109		The planning system should contribute to and enhance the natural and local environment by: ●● protecting and enhancing valued landscapes, geological conservation interests and soils; ●● recognising the wider benefits of ecosystem services; ●● minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; ●● preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and ●● remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land where appropriate.
Paragraph 113		Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks.
Paragraph 117		To minimise impacts on biodiversity and geodiversity, planning policies should: ●● plan for biodiversity at a landscape-scale across local authority boundaries; ●● identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation; ●● promote the preservation, restoration and re-creation of priority habitats,

[7] National Planning Policy Framework (2012). Department for Communities and Local Government.

		ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan; ●● aim to prevent harm to geological conservation interests; and ●● where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these areas.
Paragraph 118		When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles: ●● if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; ●● proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest; ●● development proposals where the primary objective is to conserve or enhance biodiversity should be permitted; ●● opportunities to incorporate biodiversity in and around developments should be encouraged; ●● planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and ●● the following wildlife sites should be given the same protection as European sites: –– potential Special Protection Areas and possible Special Areas of Conservation; –– listed or proposed Ramsar sites; and –– sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.
East Midlands Regional Plan		
Policy 26	Protecting and Enhancing the Region's Natural and Cultural Heritage	Sustainable development should ensure the protection, appropriate management and enhancement of the Region's natural and cultural heritage
Policy 28	Regional Priorities for Environmental	Local Authorities, statutory environmental bodies and developers should work with the voluntary sector, landowners and local communities to ensure the delivery, protection and enhancement of Environmental Infrastructure

	and Green Infrastructure	across the region.
Policy 29	Priorities for Enhancing the Region's Biodiversity	Local Authorities, statutory environmental bodies and developers should work with the voluntary sector, landowners and local communities to implement the Regional Biodiversity Strategy, and to deliver a major step change increase in the level of biodiversity across the East Midlands.
Policy 32	A Regional Approach to Water Resources and Water Quality	Protect and improve water quality and reduce the risk of pollution especially to vulnerable groundwater.
Policy 33	Regional Priorities for Strategic River Corridors	The natural and cultural environment of the Strategic River Corridors of the Nene, Trent, Soar, Welland. Witham and Derwent, along with their tributaries, and rivers which contribute to river corridors of a strategic nature in adjoining Regions, should be protected and enhanced.
Central Lincolnshire Core Strategy[8]		
Policy CL23	A Quality Environment	Development proposals will be required to contribute positively to environmental quality and local character, and not have an unacceptable effect on the area's natural or historic assets.
Policy CL24	Green Infrastructure & Biodiversity	Green Infrastructure The LDF and all development proposals, local investments, strategies and other planning documents, will:- Contribute to, encourage and take opportunities to maximise the potential value of existing and new green infrastructure, public and other open spaces, through encouraging proposals that benefit: recreation; tourism; public accessibility; biodiversity; geo-diversity, flood and water management; the protection and enhancement of local landscape, landscape character and heritage (including proposals to protect, & increase, tree & woodland cover); and the adaptation to and mitigation of climate change. Improvements to links between green assets within and extending beyond the area will be considered; Support the implementation of the Green Infrastructure Strategy for Central Lincolnshire, including the provision of new green spaces and also a connected Green Infrastructure Network across the area, as illustrated in the strategic Green Infrastructure Network Concept Plan Diagram (Figure 8). This includes encouraging new development and investment proposals to seek to expand and link larger areas of accessible public and other open space and areas of biodiversity value across Central Lincolnshire through creation and management of a strategic, network of green corridors and green links; Support the broadly defined strategic corridors and areas within the Green Infrastructure Strategy, including retaining, enhancing or creating green spaces that link together the Green Infrastructure Network's identified components of: Strategic Green Corridors and routes, Strategic Green Access Links, Urban Green Grids and the Wider Countryside. Development proposals crossing or adjacent to the Network should make provision for its implementation and enhancement.

[8] Central Lincolnshire Core Strategy (2012). Central Lincolnshire Joint Planning Unit, Lincoln.

		Support and consider opportunities for targeted environmental and access improvements in the countryside, to strengthen the multi-functionality of the wider countryside as part of the Green Infrastructure Network, in line with the assets, needs and opportunities identified overall in the Green Infrastructure Study, and for each of the relevant Green Infrastructure Zones. Support the delivery of strategic landscape, biodiversity and recreational designations, initiatives or projects, where they present suitable opportunities for safeguarding and enhancing multi-functional green infrastructure. These include (but are not restricted to) the following existing projects, relevant to the area: Lincolnshire Wolds AONB Lincolnshire Limewoods Project Landscape scale conservation approaches Lincolnshire Waterways Development Framework (Lincolnshire Waterways Partnership); Witham Valley Country Park as detailed in Policy L3. Protect green infrastructure through resisting the loss of public and other open spaces that contribute to the functioning of the overall green infrastructure network and not permitting development that will cause significant harm to them. Where an adverse impact on green infrastructure is unavoidable, only permitting development if suitable mitigation measures for network are provided; Support the delivery and management of suitable green infrastructure and recreational open space provision within development proposals and allocations, subject to the availability of suitable appropriate evidence, and the provisions of saved policies in the area's Local Plans together with any future revisions. Biodiversity - The LDF and other plans and strategies will also seek to conserve and enhance the natural assets of the area by: Requiring development proposals to maximise the opportunities to: conserve and enhance biodiversity and the restoration and reclamation of known declining habitat assets; Promoting the appropriate management of features of the landscape of importance for wild flora and fauna; to prevent harm to geological conservation interests; to take into account the need for the continued protection, maintenance, restoration and re-creation of all the area's ecological, biological and geological assets; and to increase provision of, and access to, green infrastructure within the area; Requiring all new developments to ensure that there will be no significant harm to internationally designated wildlife sites and protected species in or around the plan area. Such development will seek to avoid the loss or deterioration of irreplaceable habitats or features, including ancient woodland and aged or veteran trees. Development will be expected to demonstrate that it will not adversely affect valued landscapes or sites of recognised national or local importance and significance within the area, including Local Sites selected in appropriate local evidence; In areas not protected through international or national designations, development will: Minimise fragmentation of habitats and seek to conserve and enhance existing biodiversity assets of acknowledged local importance;

		Where adverse impacts cannot be adequately mitigated and significant harm is unavoidable, off-set these impacts through provision of appropriate compensation measures, either off-site or as an integral part of the development, to achieve a net gain for biodiversity; Support creation of a multi-functional Green Infrastructure Network through provision of new and enhanced areas of public and other open space, wildlife habitats and links, both off-site and as an integral part of the development; Contribute to the long-term maintenance and management of the Green Infrastructure Network.

13.2 Summary of Local Planning Policy

Table 13-2 Summary of Local Planning Policy

North Kesteven Local Plan[9]		
Policy LW2	Green Wedges	Planning permission will be granted for development within a Green Wedge (as defined on the Proposals Map), only if the development will not adversely affect: The landscape setting of the City of Lincoln or any other settlement; The appearance or landscape character of the Green Wedge; The recreational value of the Green Wedge; and The wildlife value of the Green Wedge. unless there is a need for the development which clearly overrides the importance of any adverse effects, such as the Lincoln Eastern Bypass. Where development is permitted the Council will, where appropriate, seek to enter into an agreement with the developer or will place a condition on the permission to require the implementation of measures to minimise, mitigate or compensate for any adverse effects.
Policy LW5	Sites of Special Scientific Interest	Planning permission will be granted for proposals that will directly or indirectly adversely affect a SSSI only if: There is a need for the development which clearly overrides the importance of the site; The proposed development could not feasibly be located in a less sensitive location; and Where appropriate, the implementation of measures to minimise, mitigate or compensate for the harm, or to ensure the future management and enhancement of the site's interest, is assured by means of an agreement between the developer and the Council or by means of a condition on the permission.
Policy LW6	County Wildlife Sites and Local Nature Reserves	Planning permission will be granted for proposals that will directly or indirectly adversely affect a County Wildlife Site of Local Nature Reserve, only if: There is a need for the development which clearly overrides the importance of the Site or Reserve; The proposed development could not feasibly be located in a less sensitive location; and Where appropriate, the implementation of measures to minimise, mitigate or compensate for the harm, or to ensure the future management and

[9] North Kesteven Local Plan (2007).

		enhancement of the Site's interest, is assured by means of an agreement between the developer and the Council or by means of a condition on the permission.
Policy LW7	Feature of Importance for Wildlife	Planning permission will be granted for proposals that will directly or indirectly adversely affect any habitat listed as a priority in the Lincolnshire Biodiversity Action Plan or an existing landscape feature (such as a pond, reservoir, lake, gravel pit, disused railway, road verge, river, canal or drain or their banks, building traditional field boundary (such as a hedgerow or stone wall), linear tree belt and shelter, plantation or small woodland, larger semi-natural or ancient woodland, heathland, parkland, semi-natural grassland or unimproved pasture) that is important for wild flora or fauna, only if: The need for the development clearly override the importance of the feature; and Where appropriate, the implementation of measures to minimise, mitigate or compensate for the harm, or to ensure the future management and enhancement of the feature's value, is assured by means of an agreement between the developer and the Council, or by means of a condition upon the permission.
Policy LW8	Protected Species	Planning permission will be granted for proposals that will adversely affect protected species or their habitat, only if: The need for the development clearly overrides the importance of the protected species; The proposed development could not feasibly be located in a less sensitive location; and An agreement between the developer and the Council or a condition on the permission will: Facilitate the survival of individual members of the species; Reduce disturbance of the minimum; Provide adequate alternative habitats to sustain at least the current level of population of the species.
City of Lincoln Local Plan[10]		
Policy 43	Green Wedges and other Open Public Spaces	Planning permission will not be granted for any form of development on land shown on the Proposals Map as part of a Green Wedge unless such development can be carried out without reducing or harming: the contribution which the land makes to the landscape character and setting of the City and local environmental quality; areas of nature conservation and special scientific and geological and geomorphological interest; the value of the Green Wedge for formal and informal recreation. Development proposals will be expected to have particular regard to: the maintenance or enhancement of the City's footpath, cycleway and bridleway system and their links beyond the city boundary; any approved management plan including or affecting the land.
Policy 44A	Sites of Special Scientific Interest and Other Critical Natural Assets	The Local Planning Authority will not grant planning permission for any development which will diminish, or in any other way adversely affect, the interest and importance of a Site of Special Scientific Interest (SSSI).

[10] The City of Lincoln Local Plan (1998).

Policy 44C	Protected Species	Planning permission will not be granted for development which would harm plants or animals protected by law, or their habitats, except where the Local Planning Authority is satisfied that adequate protection will be secured by the use of planning conditions or planning obligations.
Policy 45A	Trees and Other Ecological and Landscape Features on Development Sites	The Local Planning Authority will require all new development proposals to have full regard to: the retention or enhancement of existing trees, shrubs, hedgerows, water courses, areas of open water or other features of wildlife or geological or geomorphological interest within the site; opportunities to introduce areas of semi-natural habitat, suitable species of trees and plants and other features to attract wildlife within landscaping schemes to be carried out as part of the development.
Policy 46B	Protecting the Water Environment	Planning permission will only be granted for development in, under, over or adjacent to lakes, ponds and watercourses if the Local Planning Authority is satisfied that adequate measures will be taken to: safeguard the biodiversity and ecology of the area; prevent pollution and other degradation of the water environment; minimise flood risk; mitigate against erosion; protect the public; safeguard access for maintenance.
West Lindsey Local Plan [11]		
Policy CRT20	Watercourse Corridors	Development will not be permitted which would lead to the unacceptable loss of or cause significant harm to the landscape character, nature conservation importance or recreational roles of the watercourse corridors throughout the plan area, including the Trent, Ancholme, Rase, Witham, Fossdyke, Till, Eau and Barlings Eau watercourses and those minor watercourses which flow through urban areas.
Policy NBE11	Development Affecting Site of Special Scientific Interest and National Nature Reserves	Development which adversely affects the nature conservation interest at an SSSI or designated National Nature Reserve, either directly or indirectly, will not be permitted unless there is an overriding national need for the development and there is no other site available for the particular purpose and the reasons for the development clearly outweigh the nature conservation value of the site itself and the national policy to safeguard such sites. Where development is permitted, conditions will be imposed on the planning permission to require that before development commences: Adequate opportunity is provided to enable proper recording of site; Where appropriate, practical measures are taken by the developer to enable the rescue and re-colonisation of species to other suitable existing or new sites.
Policy NBE12	Development Affecting Locally Designated Nature Conservation Sites and Ancient Woodlands	Development will not be permitted which would adversely affect any of the following, unless there is a demonstrable overriding regional or local need for the development which cannot be accommodated elsewhere and the reason for the development clearly outweighs the need to safeguard the substantive nature conservation value of the site: Site of Nature Conservation Importance; A Local Nature Reserve; A Lincolnshire Trust Nature Reserve;

[11] West Lindsey Local Plan (2006).

		A Regionally Important Geological or Geomorphological Site; Ancient Woodlands; Any species of animal or plant, or its habitat, protected under British or European Law. Where development is permitted planning conditions will be imposed which will require: That adequate opportunity is provided to enable proper recording of the site; That before development commences measures are agreed with the Council and taken by the Developer which mitigates the effects of the development on the site, the woodland and the wildlife, and compensate for any potential loss, in order to recognise and preserve the nature conservation interest.
Policy NBE13	Nature Conservation in Wildlife Corridors	Development will not be permitted in or adjacent to, a wildlife corridor if it would: Materially impair the physical continuity of a wildlife corridor; or Materially impair the functioning of a wildlife corridor in the colonisation or movement of flora and fauna; or Cause a material reduction in a habitat of demonstrable value in a wildlife corridor; or Cause demonstrable harm to any protected species known to be dependent on the use of the affected part of a wildlife corridor for migration, breeding, feeding or shelter.
Policy NBE16	Culverting Watercourses	The culverting of watercourses, including as part of development proposals, will not be permitted unless it is essential for public safety or to provide for access across the watercourse. In all cases, where culverting is unavoidable, the developer must demonstrate that alternative proposals have been considered, and appropriate mitigating environmental enhancements should be incorporated into the development. Development which returns disused or neglected culverts back to open watercourses will be favoured.

13.3 Lincolnshire Biodiversity Action Plan

- Three plans covering common themes:
  - Biodiversity Information and Monitoring
  - Policy, Planning and Resource Management
  - Awareness and Involvement
- Twelve Species Action Plans:
  - Bats
  - Commercial Fish (Marine)
  - Farmland Birds
  - Freshwater Fish
  - Greater Water-parsnip Sium latifolium
  - Natterjack Toad Bufo calamita
  - Newts

  - Seals
  - Urban Birds
  - Water Vole Arvicola amphibius
  - White-clawed Crayfish Austropotamobius pallipes
  - Invasive Non-native Species
- Five Farmland and Grassland Habitat Action Plans:
  - Arable Field Margins
  - Grazing Marsh
  - Hedgerows and Hedgerow Trees
  - Lowland Calcareous Grassland
  - Lowland Meadow
- Two Heathland and Peatland Habitat Action Plans:
  - Heathland and Peatland
  - Lowland Dry Acid Grassland
- Five Coastal and Marine Habitat Action Plans:
  - Coastal Sand Dunes
  - Peat and Clay Exposures
  - Sabellaria spinulosa Reefs
  - Saline Lagoons
  - Saltmarsh
- Six Rivers and Wetlands Habitat Action Plans:
  - Chalk Streams and Blow Wells
  - Fens
  - Ponds, Lakes and Reservoirs
  - Reedbeds and Bittern
  - Rivers, Canals and Drains
  - Springs and Flushes
- Four Trees and Woodland Habitat Action Plans:
  - Lowland Mixed Deciduous Woodland
  - Traditional Orchards
  - Wet Woodland
  - Wood-pasture and Parkland
- Four Urban Habitat Action Plans:
  - Brownfield

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- Churchyards and Cemeteries
- Gardens and Allotments
- Parks and Open Spaces

13.4 Summary of legal protection of ecological receptors

Table 13-3 Summary of legal protection of ecological receptors

Feature	Legal protection
Greetwell Hollow Quarry SSSI	Wildlife and Countryside Act 1981 (as amended) Natural Environment and Rural Communities Act Designated (NERC) Act 2006.
Greetwell Wood SNCI Canwick Hall Wood SNCI Washingborough Junction SNCI Witham Corridor Local Wildlife Site (LWS), Greetwell Junction Railway Embankment LWS Bloxholm Lane LWS Canwick Park Golf Course LWS Cliff Farm Footpaths LWS Cow Paddle Railway Embankment East LWS Fox Covert, Cherry Willingham LWS Willingham Fen West LWS	SNCI and LWS are not afforded any legal protection, however policy instruments in Regional and Local Plans relate directly to the protection of locally designated sites.
Bats	All species of bat and their roosts are fully protected under the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended) and the Wildlife and Countryside Act 1981 (as amended).
Badger	The badger is protected under The Protection of Badgers Act 1992.
Water vole	The water vole is fully protected under the Wildlife and Countryside Act 1981 (as amended).
Otter	The otter is fully protected under the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended) and the Wildlife and Countryside Act 1981 (as amended).
Kingfisher	The kingfisher is fully protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).
Barn owl	The barn owl is fully protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).
Breeding birds	All wild birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended).
Reptiles	Common reptiles are partially protected under the Wildlife and Countryside Act 198, (as amended) which prohibits the intentional killing and injuring of these species.

13.5 Impacts on Designated Sites

Table 13-4 Impacts on Designated Sites

Feature	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
Construction Impacts				
Greetwell Hollow Quarry	National	Land-take	South east corner of the SSSI would be severed (0.5 ha of land-take). Loss of pond, dense scrub and rough grassland and exposed quarry face. .	Major Negative impact/ - significant at a **County scale**. Natural England consent required.
Greetwell Wood SNCI	County	Land-take	Loss of 0.42 ha of broadleaf woodland, including 9 mature ash and sycamore trees, associated ground flora and scrub.	Moderate Negative impact - significant at a **County scale**.
		Disturbance	During construction there is the potential to disturb habitats in the remaining part of the woodland.	Moderate Negative impact - significant at a **Local scale.**
River Witham LWS	County	Land-take	Loss of broadleaved trees and scrub.	Moderate Negative impact- significant at a **Local scale.**
		Disturbance	Potential disturbance of habitats adjacent to the Proposed Scheme during construction, adding to the impact on the LWS. Disturbance of kingfisher, otter and water vole.	Moderate Negative impact - significant at a **County scale.**
		Changes to hydrology, pollution or shading	During construction there is potential for the shading of aquatic habitats, disruption of the hydrology of wetland habitats associated with the River Witham leading to drying out or waterlogging. There is also potential for site run-off to pollute the River Witham.	Moderate Negative impact- significant at a **Local scale.**
Canwick Hall Wood SNCI	County	Disturbance	During construction there is the potential to disturb habitats in the woodland.	Minor Negative impact- significant at a **Local scale.**
Washingborough Junction SNCI	County	Pollution	There is the potential for site run-off to pollute the watercourse.	Minor Negative impact- significant at a **Local scale.**
Greetwell Junction Railway Embankment LWS	County	Land-take	Construction of the road would result in the loss of most of this Local Wildlife Site.	Moderate Negative impact- significant at a **County scale.**

Feature	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
Bloxholm Lane Local Wildlife Site	County	Land-take	Construction of the road would result in the loss of the western end of Bloxholm Lane LWS	Minor Negative impact- significant at a **Local scale**
Willingham Fen West LWS	County	Land-take	Construction of the road would result in the loss of the eastern section of Willingham Fen West LWS. This would result in the loss of wet grassland and wetland habitats including areas suitable for breeding birds, otter and water vole.	Moderate Negative impact- significant at a **Local scale**
		Disturbance	Potential disturbance of habitats adjacent to the Proposed Scheme during construction, adding to the impact on the LWS. Disturbance of breeding birds, otter and water vole.	Moderate Negative impact- significant at a **Local scale**
		Changes to hydrology, pollution risk and shading by temporary bridge structures	During construction there is potential for the shading of aquatic habitats by a temporary bridge structure across the fen, disruption of the hydrology of wetland habitats associated with the LWS leading to drying out or waterlogging. There is also potential for site run-off to pollute the LWS.	Moderate Negative impact- significant at a **Local scale**
Cliff Farm Footpaths LWS	County	Land-take	Potential for a small land-take at the western end of the LWS with the loss of ecological resources indicative of calcareous grassland	Minor Negative impact- significant at a **Local scale**
Cow Paddle Railway Embankment East LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible
Fox Covert, Cherry Willingham LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible
Canwick Park Golf Course LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible
Bloxholm Lane Local Wildlife Site	County	Land-take	Construction of the road would result in the loss of the western end of Bloxholm Lane LWS	Minor Negative impact- significant at a **Local scale**
Operational Impacts				

Feature	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
Greetwell Hollow Quarry	County	Disturbance	The road would directly abut the quarry boundary increasing the risk of disturbance from noise, vibration and lighting.	Moderate Negative impact- significant at a **Local scale.** Natural England consent required.
Greetwell Wood SNCI	County	Disturbance	During operation of the Proposed Scheme there is the potential for disturbance of ecological resources in the remaining part of the wood from traffic noise and lighting.	Moderate Negative impact- significant at a **Local scale.**
River Witham LWS	County	Disturbance Polllution risk	Potential for disturbance because of traffic. Potential for pollution because of run-off and dust.	Moderate Negative impact- significant at a **Local scale.** Minor Negative impact- significant at a **Local scale.**
Canwick Hall Wood SNCI	County	Disturbance	During operation of the Proposed Scheme there is the potential for disturbance of ecological resources in the wood from traffic noise and lighting.	Minor Negative impact- significant at a **Local scale.** .
Washingborough Junction SNCI	County	Pollution	Potential for pollution from run-off and dust.	Minor Negative impact- significant at a **Local scale.**
Greetwell Junction Railway Embankment LWS	County	Pollution	Potential for pollution from dust	Minor Negative impact- significant at a **Local scale.**
Bloxholm Lane Local Wildlife Site	County	Pollution	The road would directly abut the LWS increasing the risk of disturbance from noise, vibration and lighting.	Minor Negative impact- significant at a **Local scale**
Willingham Fen West LWS	County	Pollution Disturbance	Potential for pollution from run-off and dust Potential for disturbance from traffic	Minor Negative impact- significant at a **Local scale** Minor Negative impact- significant at a **Local scale**
Cliff Farm Footpaths LWS	County	Pollution	The road would directly abut the LWS increasing the risk of disturbance from noise, vibration and lighting.	Minor Negative impact- significant at a **Local scale**
Cow Paddle Railway Embankment East LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible

Feature	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
Fox Covert, Cherry Willingham LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible
Canwick Park Golf Course LWS	County	All	No impact predicted because of distance from the Proposed Scheme	Negligible

13.6 Impacts on Species

Table 13-5 Impacts on Species

Feature/species	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
Construction Impacts				
Bats	County	Loss of habitat	Loss of part of Greetwell Hollow Quarry including sections of quarry face with roosting potential.	Major Negative impact - significant at a **County scale**. Natural England consent and licence required.
			Loss of trees in Greetwell Wood SNCI and adjacent to the River Witham.	Moderate Negative impact - significant at a **Local scale**
		Direct mortality	Destruction of roosts and hibernacula could result in direct mortality of bats.	Major Negative impact - significant at a **County scale**. Natural England consent and licence required
		Disturbance	Potential for abandonment of the two known roosts, in Greetwell Church and Manor Farm or of reduced access to roosts and foraging sites as a result of disturbance associated with road construction (noise, vibration and lighting).	Moderate Negative impact - significant at a **Local scale.**
		Loss of foraging habitat	Direct loss of foraging habitat through loss of 0.42ha of Greetwell Wood SNCI, woodland edge, loss of hedgerows, scrub and grasslands.	Moderate Negative impact - significant at a **Local scale.**
Badger	Local	Loss of habitat	Potential loss of badger setts	Moderate Negative impact - significant at a **Local** scale. Natural England consent required.
		Severance of habitat	Severance of existing badger territories and pathways, isolation from key resources	Moderate Negative impact - significant at a **Local** scale.
		Direct mortality	Potential for accidental death as a result of becoming trapped on the construction site or during night working.	Moderate Negative impact - significant at a **Local** scale.
		Disturbance	Disturbance of badgers using main outlier setts within 100m of the Proposed Scheme as a result of construction	Moderate Negative impact - significant at a **Local** scale.

Feature/species	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
			works. Such disturbance could potentially lead to abandonment of the setts. Disturbance of badgers in the vicinity of these setts affecting foraging activity	
Water Vole - including riparian habitat along the River Witham and adjacent watercourses.	County	Disturbance Direct Mortality / Loss of habitat	Disturbance caused by vegetation clearance and probably construction of access routes. Death or loss of habitat due to spillages and run-off during construction.	Moderate Negative impact- significant at a **Local scale.** Minor Negative impact- significant at a **less Local scale**
Otter – including riparian habitat along the River Witham and adjacent watercourses.	County	Disturbance	Disturbance caused by vegetation clearance and probably from construction of access routes.	Moderate Negative impact- significant at a **Local scale.**
Kingfisher	Local	Loss of habitat Disturbance	Loss of breeding habitat along watercourses. Disturbance and restriction of access to nest holes during construction.	Moderate Negative impact- significant at a **Local scale**. Moderate Negative impact- significant at a **Local scale**.
Barn owl	County	Loss of habitat Disturbance	Loss of roosting sites Vibration and noise during construction.	Moderate Negative impact- significant at a **Local scale**. Moderate Negative impact- significant at a **Local scale**.
Other breeding and over-wintering birds	Local	Loss of habitat	Loss of 0.42ha of woodland habitat and 7km of hedgerows that provide a key resource for breeding and over wintering birds. Arable habitat would be lost through construction of the Proposed Scheme that provides a resource for breeding skylark and grey partridge and over wintering habitat for lapwing.	Moderate Negative impact - significant at a **Local** scale.
Reptiles	Local	Loss of habitat	There is also potential for permanent and temporary loss of reptile habitat. These are likely to represent relatively minor effects as extensive suitable habitat is available on adjacent land, and the majority of works will be on arable land which is generally has poor	Minor Negative impact- significant at a **less than local scale.**

Feature/species	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
			suitability for reptiles.	
		Direct mortality	During construction there is potential for individual animals to be killed or injured.	Minor Negative impact- significant at a **less than local scale.**
		Loss of habitat	There is potential for damage to waterbodies and marshy grassland following pollution incidents.	Minor Negative impact- significant at a **less than local scale.**
Other species: hedgehog and brown hare	Local	Loss of habitat	There is also potential for permanent and temporary loss of habitat. These are likely to represent relatively minor effects as extensive suitable habitat is available on adjacent land.	Minor Negative impact- significant at a **less than local scale.**
		Direct mortality	Potential for accidental death as a result of becoming trapped on the construction site or during night working	Minor Negative impact- significant at a **less than local scale.**
Operational Impacts				
Bats	County	Severance of habitat	Severance of commuting routes could restrict bat access to areas of foraging habitat or roosts.	Major Negative impact- significant at a **Local scale.**
		Direct mortality	The severance of commuting routes could lead to an increase in the frequency of bats crossing the operational scheme. This could lead to an increased incidence of bat mortality from traffic	Moderate Negative impact- significant at a **Local scale.**
		Disturbance	Potential for abandonment of roosts at Greetwell Church and Manor Farm or of reduced access to roosts and foraging sites as a result of disturbance associated with the road (noise, vibration and lighting).	Moderate Negative impact- significant at the **County scale.**
Badger	Local	Severance of territories and Direct mortality	Severance of existing badger territories and pathways, isolation from resources and increased traffic flows on Greetwell Road could lead to increased badger deaths caused by road traffic as they cross the road.	Moderate Negative impact- significant at a **Local scale.**
		Disturbance	Increased noise and light in vicinity of setts and in other	Moderate Negative impact- significant at a

Feature/species	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
			parts of badger territories.	**Local scale.**
Water Vole - including riparian habitat along the River Witham and adjacent watercourses.	County	Disturbance	Disturbance from traffic vibration and noise.	Minor Negative impact- significant at a **Local scale.**
		Shading	Shading would cause a reduction in plant growth and associated reduction in food availability.	Minor Negative impact- significant at a **Local scale.**
Otter - including riparian habitat along the River Witham and adjacent watercourses.	County	Direct mortality	Direct mortality from traffic	Moderate Negative impact- significant at a **Local scale.**
		Disturbance	Disturbance from traffic vibration and noise.	Minor Negative impact- significant at a **Local scale.**
Kingfisher	Local	Loss of habitat	Any pollution of the watercourses or marshy grassland as a result of routine run-off or accidental spillages has the potential to impact on habitat used by kingfisher for foraging.	Minor Negative impact- significant at a **Local scale.**
Barn owl	County	Loss of foraging habitat	Loss of arable land and hedgerows.	Moderate Negative impact- significant at a **Local scale.**
			Severance of flightlines, such as along hedgerows and woodland edges, would inhibit dispersal of young barn owls	Moderate Negative impact – significant at a **Local scale**.
		Direct mortality	Direct mortality from traffic	Moderate Negative impact – significant at a **Local scale**.
		Disturbance	Disturbance as a result of operational noise and light in habitats that have been bisected. The noise associated with road schemes could have a negative impact on breeding success.	Moderate Negative impact – significant at a **Local scale**.
Other breeding and over-wintering birds	Local	Disturbance	Disturbance as a result of operational noise and light in habitats that have been bisected. It is likely that the birds would habituate to this disturbance (the species recorded are generally more common species that adapt well to noise and disturbance). Evidence suggests that the noise associated with road schemes can have a negative impact on	Moderate Negative impact- significant at a **Local scale.**

Feature/species	Level of importance	Impact Category	Unmitigated impact	Impact magnitude and significance before mitigation
			breeding success.	
Reptiles	Local	Severance of habitats Direct mortality	Severance of suitable habitat could reduce breeding success. Direct mortality from traffic.	Minor Negative impact- significant at a **less than local scale.** Minor Negative impact- significant at a **less than local scale.**
Other species: hedgehog and brown hare	Local	Loss of habitat Direct mortality	There is also potential for permanent and temporary loss of hedgehog and brown hare habitat. These are likely to represent relatively minor effects as extensive suitable habitat is available on adjacent land. Direct mortality from traffic.	Minor Negative impact- significant at a **less than local scale.** Minor Negative impact- significant at a **less than local scale.**

13.7 Impacts on Habitats

Table 13-6 Impacts on Habitats

Habitat	UK BAP	LOCAL BAP	Receptor value	Impact magnitude and significance before mitigation
Broadleaved woodland	✓	✓	County	Intermediate Negative/ Moderate Adverse
Broadleaved plantation	_	✓	Local	Minor Negative/Neutral
Mixed plantation	_	_	Local	Minor Negative/Neutral
Semi-improved species-rich grassland	✓	✓	Local	Moderate Negative/Moderate Adverse
Improved grassland	_	_	Local	Minor Negative/Neutral
Marshy acid grassland	_	✓	Local	Moderate Negative/Slight Adverse
Amenity grassland	_	_	Very local	Minor Negative/Neutral
Dense scrub	_	_	Local	Minor Negative/Neutral
Species-rich hedgerows	✓	✓	Local	Minor Negative/Slight Adverse
Species poor hedgerows	✓	✓	Local	Minor Negative/Neutral
Standing water	✓	✓	Local	Minor Negative/Neutral
Running water	✓	✓	County	Intermediate Negative/Moderate Adverse
Arable	✓ (field margins only)	✓ (field margins only)	Local	Minor Negative/Neutral
Bare ground	_	_	Very local	Minor Negative/Neutral

13.8 Residual Effects Sites and Species

Table 13-7 Residual Effects Sites and Species

Feature	Impact Category	Unmitigated impact-Construction	Unmitigated impact-Operation	Residual Effect
Greetwell Wood SNCI	Land-take	Moderate Negative impact - significant at a **County scale.**		In the short term-Moderate Negative impact - significant at a **Local scale**. Once replacement habitat is established-Negligible
	Disturbance	Moderate Negative impact - significant at a **Local scale.**	Moderate Negative impact- significant at a **Local scale.**	Negligible
River Witham LWS	Land-take	Moderate Negative impact- significant at a **Local scale.**	Moderate Negative impact- significant at a **Local scale.**	Negligible
	Disturbance	Moderate Negative impact - significant at a **County scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
	Changes to hydrology, pollution risk or shading	Moderate Negative impact- significant at a **Local scale.**		Negligible
Canwick Hall Wood SNCI	Disturbance	Minor Negative impact- significant at a **Local scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
Washingborough Junction SNCI	Pollution	Minor Negative impact- significant at a **Local scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
Greetwell Junction Railway Embankment LWS	Loss of habitat	Moderate Negative impact- significant at a **County scale.**		In the short term-Moderate negative impact-significant at a **County Scale.** In the long term once compensatory replacement habitat has established-Negligible
	Pollution		Minor Negative impact- significant at a **Local scale.**	Negligible
Bloxholm Lane Local	Land-take	Minor Negative impact- significant at		Negligible

Feature	Impact Category	Unmitigated impact- Construction	Unmitigated impact- Operation	Residual Effect
Wildlife Site	Pollution	a **Local scale**	Minor Negative impact- significant at a **Local scale**	Negligible
Willingham Fen West LWS	Land-take	Moderate Negative impact- significant at a **Local scale**		Negligible
	Disturbance	Moderate Negative impact- significant at a **Local scale**	Minor Negative impact- significant at a **Local scale**	Negligible
	Pollution		Minor Negative impact- significant at a **Local scale**	Negligible
Cliff Farm Footpaths LWS	Land-take	Minor Negative impact- significant at a **Local scale**		Negligible
	Disturbance		Minor Negative impact- significant at a **Local scale**	Negligible
Cow Paddle Railway Embankment East LWS	All	Negligilbe	Negligible	Negligible
Fox Covert, Cherry Willingham LWS	All	Negligible	Negligible	Negligible
Canwick Park Golf Course LWS	All	Negligible	Negligible	Negligible
Bats	Land-take - Destruction of roosts and hibernacula	Major Negative impact - significant at a **County scale**. Natural England consent and licence required.		In the short term- Major Negative impact significant at a **District scale.** Once new hibernacula are established- Minor Negative to Negligible.
	Direct mortality	Major Negative impact - significant at a **County scale**. Natural England consent and licence required.	Moderate Negative impact- significant at a **Local scale.**	Negative impact significant at a **Local scale**
	Disturbance	Moderate Negative	Moderate Negative	Negligible

Feature	Impact Category	Unmitigated impact-Construction	Unmitigated impact-Operation	Residual Effect
		impact - significant at a **Local scale.**	impact- significant at the **County scale.**	
	Loss of foraging habitat	Moderate Negative impact - significant at a **Local scale.**	Moderate Negative impact- significant at a **Local scale.**	Negligible
	Severance of habitat	Moderate Negative impact - significant at a **Local scale.**	Major Negative impact - significant at a **Local scale**	In the short term- Moderate Negative impact at a **Local scale.** Negligible in the long term once new commuting and foraging routes are established.
Badger	Land-take-loss of setts	Moderate Negative impact - significant at a **Local** scale. Natural England consent required.		Negligible
	Severance of badger territories and pathways; isolation from key resources	Moderate Negative impact - significant at a **Local** scale.	Moderate Negative impact- significant at a **Local scale.**	Negligible
	Direct mortality	Moderate Negative impact - significant at a **Local** scale.	Moderate Negative impact - significant at a **Local** scale	Negligible
	Disturbance	Moderate Negative impact - significant at a **Local** scale.	Moderate Negative impact - significant at a **Local** scale	Negligible
Water Vole - including riparian habitat along the River Witham and adjacent watercourses	Disturbance	Moderate Negative impact- significant at a **Local scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
	Pollution	Minor Negative impact- significant at a **Local scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
	Shading of vegetation		Minor Negative impact- significant at a **Local scale.**	Negligible
Otter - including riparian habitat along the River Witham and	Disturbance	Moderate Negative impact- significant at a **Local scale.**	Minor Negative impact- significant at a **Local scale.**	Negligible
	Direct		Minor Negative impact- significant at a	Negligible

Feature	Impact Category	Unmitigated impact- Construction	Unmitigated impact- Operation	Residual Effect
adjacent watercourses	mortality		**Local scale.**	
Kingfisher	Land-take	Moderate Negative impact- significant at a **Local scale.**		Negligible
	Disturbance		Minor Negative impact- significant at a **Local scale.**	Negligible
	Pollution	Moderate Negative impact- significant at a **Local scale**.		Negligible
Barn owl	Land-take and loss of habitat	Moderate Negative impact- significant at a **Local scale**.	Moderate Negative impact – significant at a **Local scale**.	Negligible
	Disturbance	Moderate Negative impact- significant at a **Local scale**.	Moderate Negative impact – significant at a **Local scale**.	Negligible
	Direct Mortality		Moderate Negative impact- significant at a **Local scale.**	Negligible
Other breeding and over-wintering birds	Land-take	Moderate Negative impact - significant at a **Local** scale	Moderate Negative impact - significant at a **Local** scale	Negligible
	Disturbance		Moderate Negative impact- significant at a **Local scale.**	Negligible
Reptiles	Direct mortality	Minor Negative impact- significant at a **less than local scale.**	Minor Negative impact- significant at a **less than local scale.**	Negligible
	Severance of habitats	Minor Negative impact- significant at a **less than local scale**	Minor Negative impact- significant at a **less than local scale.**	Negligible
	Pollution	Minor Negative impact- significant at a **less than local scale.**		Negligible
Other species	Land-take and loss of habitat	Minor Negative impact- significant at a **less than local scale.**	Minor Negative impact- significant at a **less than local scale.**	Negligible

Feature	Impact Category	Unmitigated impact- Construction	Unmitigated impact- Operation	Residual Effect
	Direct mortality	Minor Negative impact- significant at a **less than local scale.**	Minor Negative impact- significant at a **less than local scale.**	Negligible

13.9 Residual Effects on Habitats

Table 13-8 Residual Effects on Habitats

Habitat	UK BAP	LOCAL BAP	Receptor value	Impact magnitude and significance before mitigation	Residual effect after mitigation
Broadleaved woodland	✓	✓	County	Intermediate Negative/ Moderate Adverse	Negligible
Broadleaved plantation	_	✓	Local	Minor Negative/ Neutral	Negligible
Mixed plantation	_	_	Local	Minor Negative/ Neutral	Negligible
Semi-improved species-rich grassland	✓	✓	Local	Minor Negative/ Slight Adverse	Negligible
Improved grassland	_	_	Local	Minor Negative/ Neutral	Negligible
Marshy acid grassland	_	✓	Local	Moderate Negative/ Slight Adverse	Negligible
Amenity grassland	_	_	Very local	Minor Negative/ Neutral	Negligible
Dense scrub	_	_	Local	Minor Negative/ Neutral	Negligible
Species-rich hedgerows	✓	✓	Local	Minor Negative/ Slight Adverse	Negligible
Species poor hedgerows	✓	✓	Local	Minor Negative/ Neutral	Negligible
Standing water	✓	✓	Local	Minor Negative/ Neutral	Negligible
Running water	✓	✓	County	Intermediate Negative/ Moderate Adverse	Negligible
Arable	✓ (field margins only)	✓ (field margins only)	Local	Minor Negative/ Neutral	Negligible
Bare ground	_	_	Very local	Minor Negative/ Neutral	Negligible

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14 Community and Private Assets

14.1 Consultation Report with Local Interest Groups for the Lincoln Eastern Bypass

Table 14-1 14.1 Consultation Report with Local Interest Groups for the Lincoln Eastern Bypass

Organisation	Previous Comments – February 2009	Previous Response/Action - February 2009	November 2012 Comments	Date/Name of contact
1. British Horse Society	BHS welcomes the provision of grade-separated crossings of roads across LEB, with only at-grade crossings on feeder routes.	Noted	Majority of statements still apply "showing little evidence of use by horses at the sites and on the dates surveyed, However, given better, safer access facilities, I am sure that would change, bearing in mind the number of horses now kept on Lincoln's commons and in small fields and livery yards in the surrounding villages" 12/11/12	Liz Harding 01522 523322 12/11/12
	Concerned over lack of provision for equestrian crossing through subway at Lincoln Road roundabout. Suggested revising the design of subway at this location with mounting block installed at each end.	Design to be amended to include mounting blocks.		
	BHS wants the bridges (on roads and footbridges) that might be used by equestrians to be built to bridleway standards (1.8m parapet height and at least 600mm infill at the base).	Equestrian parapets included on the Hawthorn Road and Heighington Road bridges and the Greetwell Road and Bloxholm Lane Footbridges.		
	Provisions for equestrians on at-grade crossings i.e. traffic light pole to be sited 1.5 - 2.0m back from the kerb and an additional button installed at 1.5m height.	The current design does not include controlled at-grade crossings. Should this be changed through design development, provision for equestrians will be considered.		
	At un-controlled crossings, additional warning signs and traffic calming should be installed.	Design to include additional warning signs at appropriate locations.		
	Want good separation and fencing of the west side NMU route from the carriageway where it runs at a level with LEB.	The separation of the footway/cycleway varies along the length of the scheme. Maximising the separation within reasonable land-take was an objective. As a minimum it will be 2m back from the kerb (3m back from the nearside trafficked lane). The footway/cycleway has a minimum width of 3m. It is anticipated that any equestrian users will use the grass verge located adjacent to the west side (furthest from traffic) of the footway/cycleway.		
	Want the possibility of the tracks running along the eastern side of the LEB between Lincoln Road and Bloxholm Lane to be joined together to form a bridleway (b/w Ch7000 and Ch 7925).	The existing bridleway, PB/5, provides alternative route.		
	They would also like to see if there is a possibility of upgrading the section of the PF186/140/1 on the western side of the LEB to a bridleway.	PF186/140/1 is being diverted to the new cycleway/footway and will not preclude equestrians.		

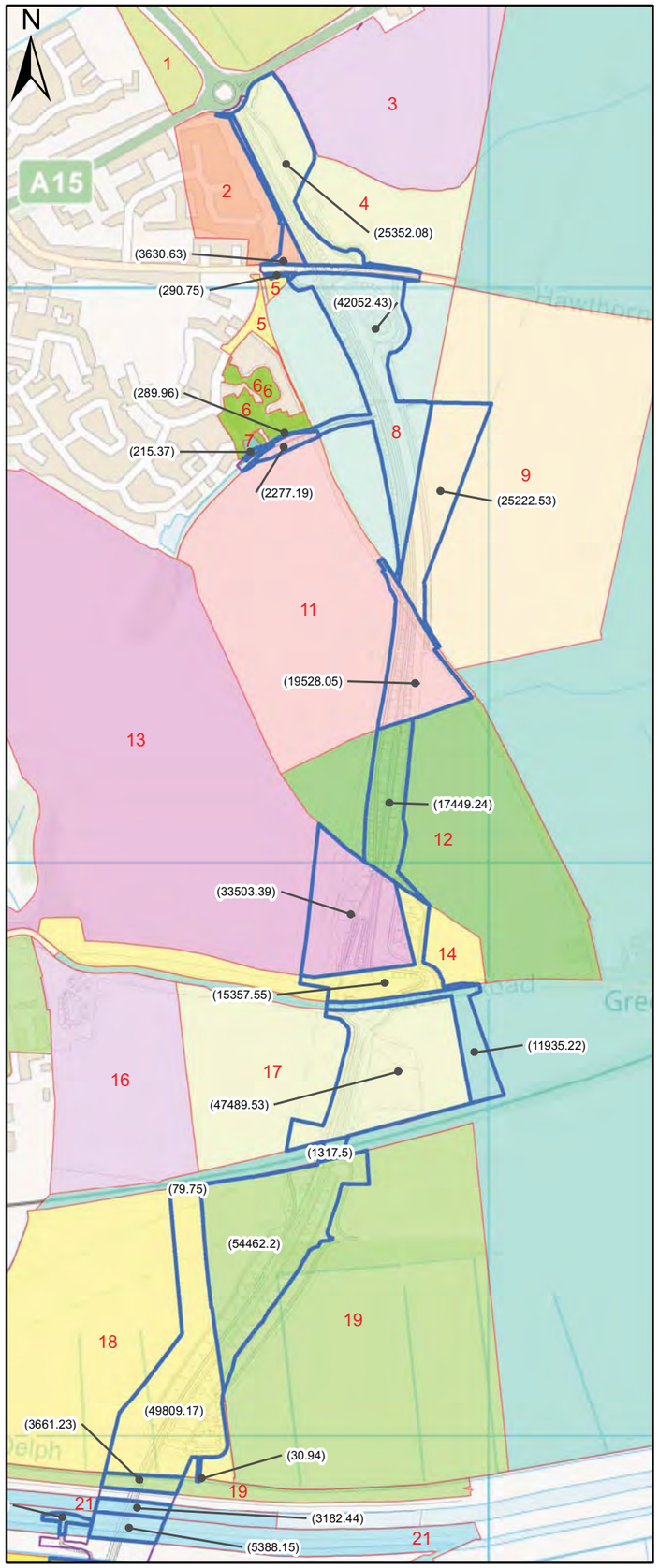
Organisation	Previous Comments – February 2009	Previous Response/Action - February 2009	November 2012 Comments	Date/Name of contact
2. Lincolnshire Fieldpaths Association/ Local Access Forum	**Wragby Road Roadabout:** Concerned about the lack of facilities on the roundabout. Link through Hawthorn Road overbridge involves travelling greater distance.	Signal controlled crossings are considered inappropriate for crossing high speed roads. Grade separation is not economically viable in such close proximity to the Hawthorn Road crossing.	Confirmed that the comments are still valid 12/11/12	Chris Padley 01522 539828 12/11/12
	Greetwell Fields: The LEB severs the route of the Greetwell Fields and no alternative is provided other than the route provided along the eastern side of the LEB	The proposed route along the eastern side of the LEB in conjunction with the crossing points at the grade separated facilities at Hawthorn Road and Greetwell Road is considered an appropriate alternative.		
	Greetwell Road Footbridge: The provision of footbridge is welcome. However, approach to the footbridge could be made less circuitous/direct from approach paths following the direction of travel.	The footbridge is approached by NMUs on Greetwell Road and the ramp is appropriately positioned.		
	River Witham: Concerned about provision of indirect approaches to the public path network within the River Witham corridor.	Assume comment refers to southbound NMUs access to Sustrans route. Cannot provide footbridge over Witham as it is navigable. New link to the LEB would provide a route over the River Witham and link to routes to Greetwell and Washingborough Roads.		
	Washingborough Road Roundabout: The only provision is traditional footways going around the roundabout.	Provision of grade separated crossing of bypass at the River Witham (via the Sustrans route). Further provision at Washingborough Road is not economically viable. Controlled crossings not appropriate on high speed road.		
	Heighington Road: Concerned about the gradient of the NMU route between Washingborough Road and Heighington Road and on approach to the Heighington Road from south. Favours separate routes for connection to Heighington Road and a through route on a gentle grade.	The additional width required for the footpath in this very deep cut would require excessive earthworks and would increase the span of Heighington Road bridge. The line of the LEB follows the natural topography of the land and hence longitudinal gradient cannot be amended.		
	Lincoln Road: Concerned about safety of users on rightangled approaches to subway. Supports straight approaches enabling unobstructed sight lines from a distance and through subway. Also concerned about the lack of provision for the equestrian traffic.	The detailed design of the subway and associated access routes will maximise visibility on the approaches to the subway. The design is to include mounting blocks for equestrian traffic.		

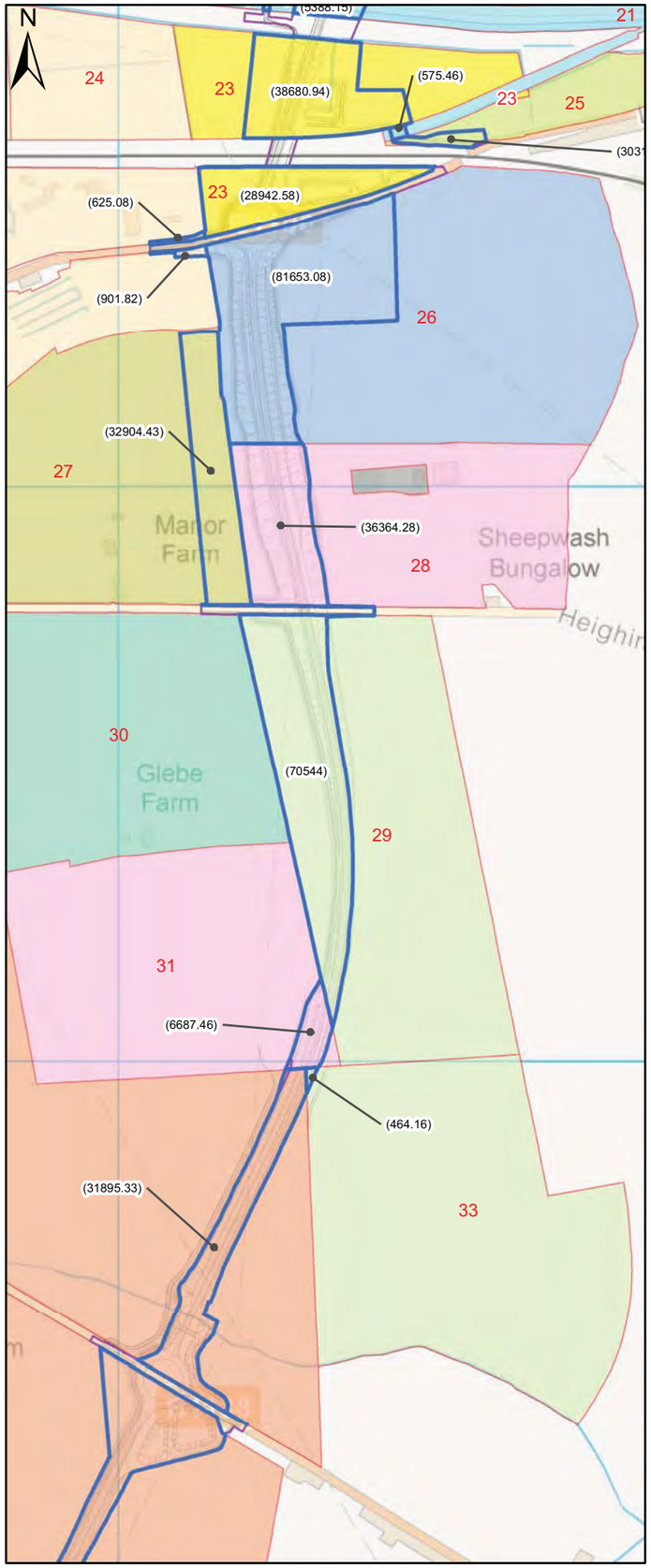
Organisation	Previous Comments – February 2009	Previous Response/Action - February 2009	November 2012 Comments	Date/Name of contact
	Bloxholm Lane: Favours an underpass rather than an overbridge.	An underpass cannot be achieved due to engineering constraints.		
3. Cyclists Touring Club (CTC)	Want to ensure that all walking/cycling facilities meet or exceed the recommendations set out in Local Transport Note, LTN 2/08 – Cycle Infrastructure Design.	The recommendations of LTN 2/08 have been considered in the design wherever it is reasonable to do so.	(no response)	Andy Townhill 01522 682479 07/11/12 (no response)
	Want to ensure that at every junction, points where LEB crosses a field path, bridleway, and farm tracks, safe crossing points are provided by means of an underpass or an overbridge fit for use by all self propelled people including wheelchair users. "Dismount and Dash" is not acceptable on the junctions.	Crossing facilities or alternative routes are proposed for NMU routes crossing the LEB. These alternative routes are accessible to wheelchair users.		
4. Sustrans	General comments on design standards not detailed on new plans – refer to original letter for details.	Design Team Leader will address detailed design issues at the appropriate stage in design development but not prior to ES preparation or Planning Application submission. Current design can incorporate all issues raised.	All Previous comments still valid regardless of the change of width of the road 12/11/12	Nicola Jones 01522 523662 12/11/12
4. Sustrans	Road Crossings in the 2005 scheme were at grade Toucan facilities – preferred by cyclists as they avoid height rise, detours and social nuisance of subways.	Toucan crossings are not considered safe on high speed roads.	All Previous comments still valid regardless of the change of width of the road	
	Wragby Road Roundabout: Wish a signal controlled crossing (across new bypass) south of roundabout to link the shared use path truncated by bypass	Alternative Route provided via Hawthorn Road overbridge		
	Hawthorn Road Footpath Link: Suggest upgrade of short length of footpath linking the NW side of Hawthorn Road bridge to the linear bypass NMU route to allow all NMU use.	Up-grade to be considered.		
	Greetwell Road: a) 2005 scheme had a Toucan crossing on west arm – wish to see it in 2009 scheme. b) cyclists travelling west into city on Greetwell Road (east arm) have to cross GW Rd to reach the bridge – suggest island and "jug-handle" on east arm to cross GW Rd safely.	Crossing facility to be reviewed. Details of uncontrolled crossings to be determined during detailed design stage. 'Jug handle' crossings will be considered.		

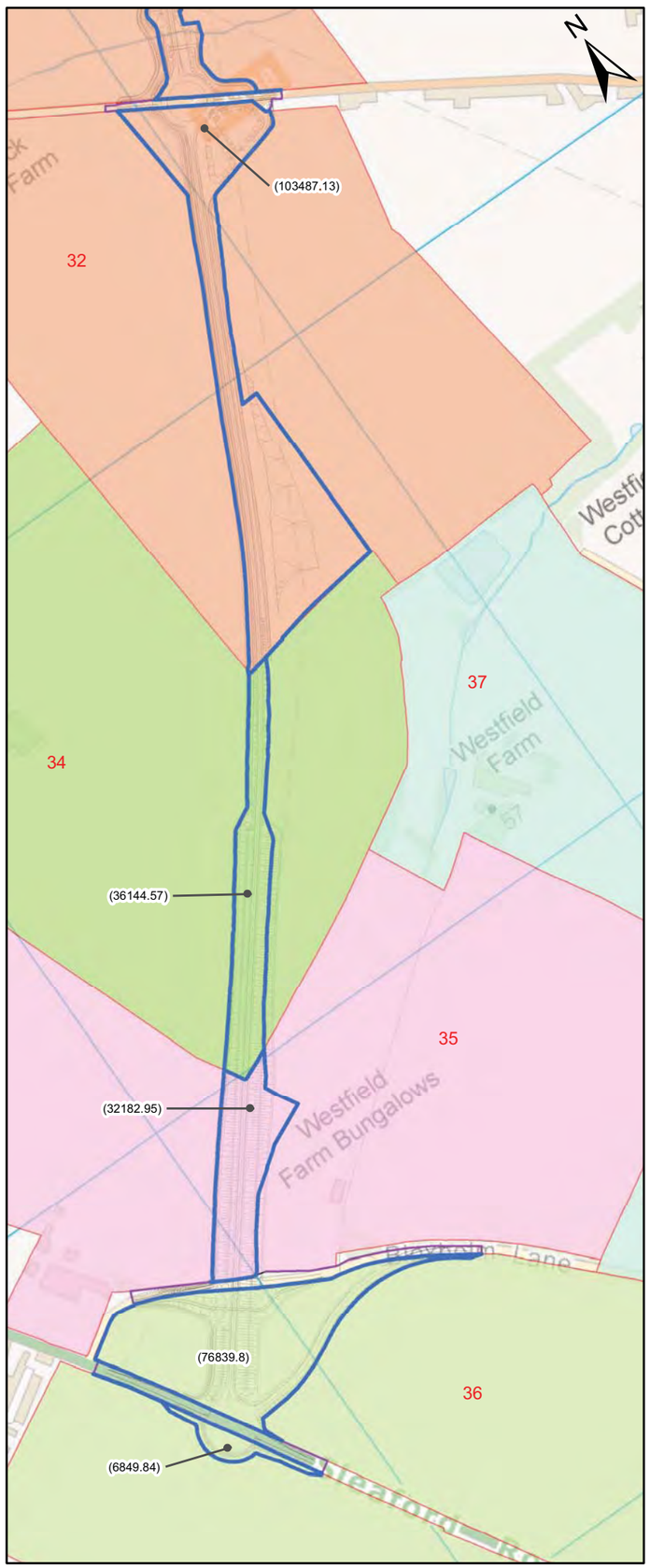
Organisation	Previous Comments – February 2009	Previous Response/Action - February 2009	November 2012 Comments	Date/Name of contact
	South Delph bridge: Revise alignment of link from bypass facility to bridge to remove 90° bend – would not meet LTN 2/08 design standards. Bridge should be 3m width.	Link from bypass to bridge includes a 90° bend with a radius of 25m in accordance with the recommendations in LTN 2/08. It is considered appropriate to reduce the speed of cyclists on the approach to a bridge where there will be shared use with other NMUs. The width of the bridge is 3m.	12/11/12	
	Washingborough Road: 2005 scheme had a Toucan facility across west arm of W'boro Road – suggest add to 2009 scheme.	Crossing facility to be reviewed.		
	Heighington Road: Suggest adding back continuous link under H'ton Road bridge as per 2005 scheme as well as new proposal.	The additional width required for the footpath in this very deep cut would require excessive earthworks and would increase the span of Heighington Road bridge.		Nicola Jones 01522 523662 12/11/12
	Lincoln Road Subway: Agree with subway in favour of Toucan crossing to cross northern arm of bypass but think the design does not comply with current best practice. Subway is at right-angles to line of travel resulting in poor sight lines. Suggest improve the design of the subway.	The subway needs to be square to the bypass. As the NMU facility is parallel to the bypass the scope for reducing the angle of approach. The detailed design of the subway and associated access routes will maximise visibility on the approaches to the subway.		
	Lincoln Road – west arm Toucan: 2005 scheme had a Toucan facility on west arm – suggest add to 2009 scheme.	Crossing facility to be reviewed.		
	Cycle/ped link to B1131 (Canwick Avenue): 2005 scheme had a cycle/ped link to B1131 as this gave good access to an area that may be developed in future. Add to 2009 scheme?	In the 2005 scheme the bypass was much closer to the B1131. LEBH is now 1km away from B1131 – not considered appropriate.		
	Bloxholm Lane bridge: Should be designed as a bridle-bridge so that all NMU groups can use it – must be DDA compliant.	The bridge includes an equestrian parapet. The approach ramps are designed to be accessible by all NMUs.		

Organisation	Previous Comments – February 2009	Previous Response/Action - February 2009	November 2012 Comments	Date/Name of contact
	Future NMU Route – Bloxholm Lane: Allow width for a future NMU route from the east side of BH Lane along east side of bypass and around east side of the A15 roundabout.	There is sufficient width between the bypass and the fence line to allow a future NMU route if required. Not considered necessary in the current scheme.		
5. Lincoln Police	No comments to make	n/a	Comments taken by Mouchel in Stakeholder report 2011	n/a
6. Ramblers Association	No comments received as of 12 Feb 2009	n/a	No Response 12/11/12	Bill Allen 01522 531895 12/11/12 (no response)
7. LCC Countryside Officers	No comments received as of 12 Feb 2009	n/a	n/a	A part of Lincolnshire County Council – have already been consulted
8. Lincolnshire County Council (Public Rights of Way Officers)	No comments received as of 12 Feb 2009	n/a	n/a	A part of Lincolnshire County Council – have already been consulted
9. CycleLincs	Support all of Sustrans' recommendations	n/a	Company only formed in May 2012 and are unaware of any previous consultation	07842 679 117
10. Joanne Schofield – Poppyfields Equestrians	No comments received as of 12 Feb 2009	n/a	No Response 12/11/12	01522 871788 12/11/12 (no response)

14.2 1030171-LEB-EIA-SOC-001





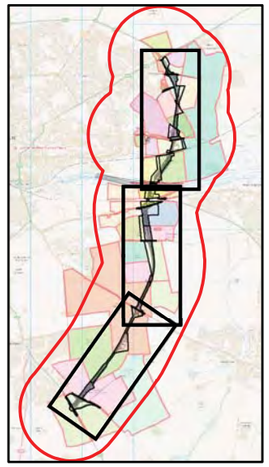


NOTES:

KEY

- Buffer 1km
- LEB Footprint
- Land Ownership
- Area of Land Ownership within LEB Footprint

KEY PLAN



A	First Issue		LT	JK	OE	02/11/12

Revision Description | Drawn By: | GIS By: | Approved By: | Approved Date:

Amendment Details:

Drawing 1st Approval

1st Approval by: | Date:

Drawn Designed by: JK

GIS Drawing Creation Created by: LT | Date: 02/11/12

Scale @ A3: 1:18000

Lincolnshire COUNTY COUNCIL
Highways Alliance
TECHNICAL SERVICES PARTNERSHIP
WITHAM PARK HOUSE,
WITHAM PARK,
WATERSIDE SOUTH
LINCOLN LN5 7JN
Customer Service Centre: (01522) 782070

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Paper Size | Drawing Number: 1103017-LEB-EIA-SOC-001 | Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Agricultural and Private Assets Land-Take

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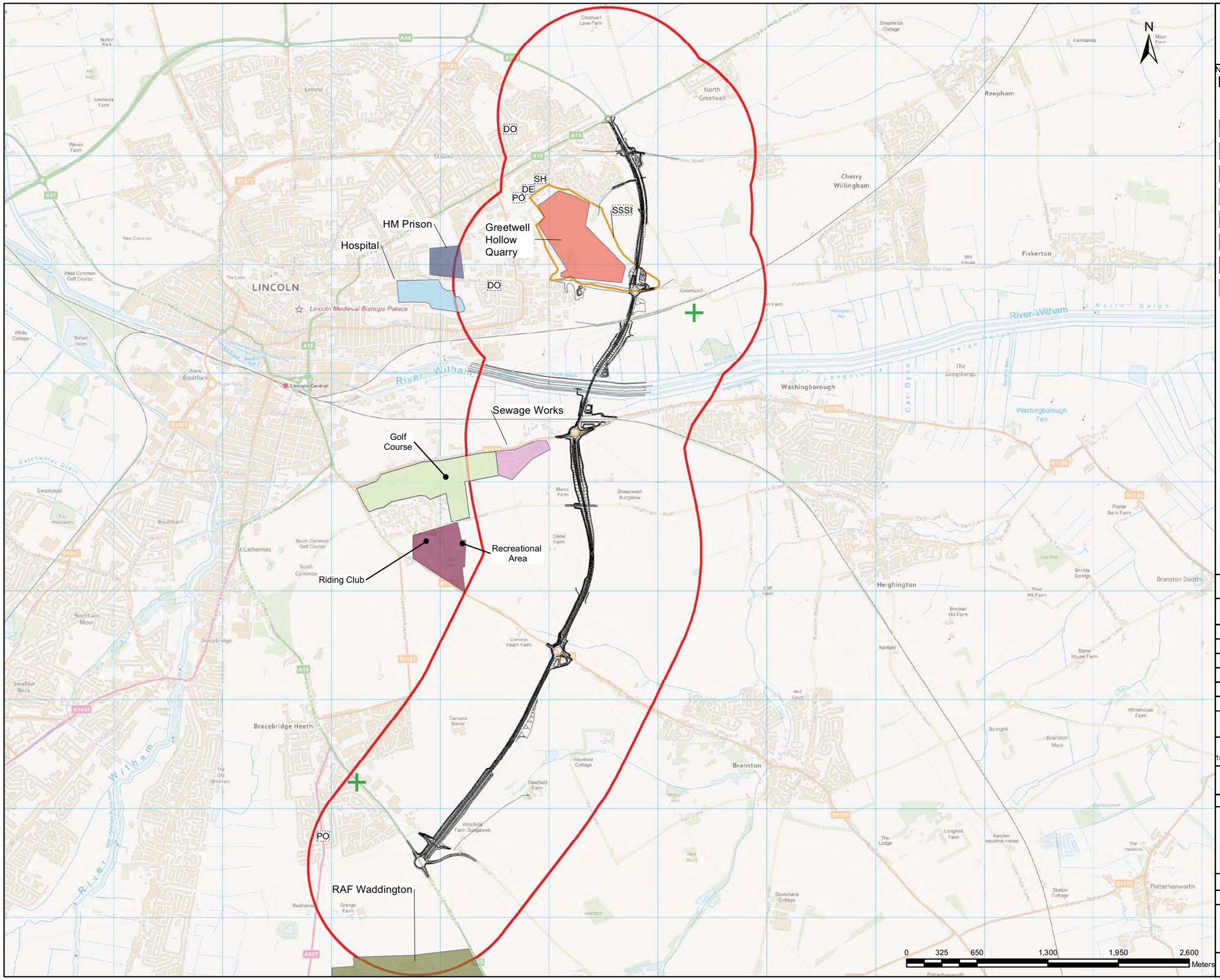
14.3 1030171-LEB-EIA-SOC-002



NOTES:

KEY

Facility

- Golf Course
- Greetwell Hollow Quarry
- HM Prison
- Hospital
- RAF Waddington
- Recreational Area
- Riding Club
- Sewage Works
- Place of Worship
- DO Doctors
- DE Dentist
- SH Shops
- PO Post Office
- Site of Special Scientific Interest
- Buffer 1km
- Proposed Road

A	First Issue		LT	JK	OE	04/12/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

Reason: Description:

Amendment Details:

Drawing 1st Approval

1st Approval by: Date:

Drawn Designed by: JK

GIS Drawing Creation Created by: LT Date: 20/11/12

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Project: LINCOLN EASTERN BYPASS

Description:

Community and Other Private Facilities

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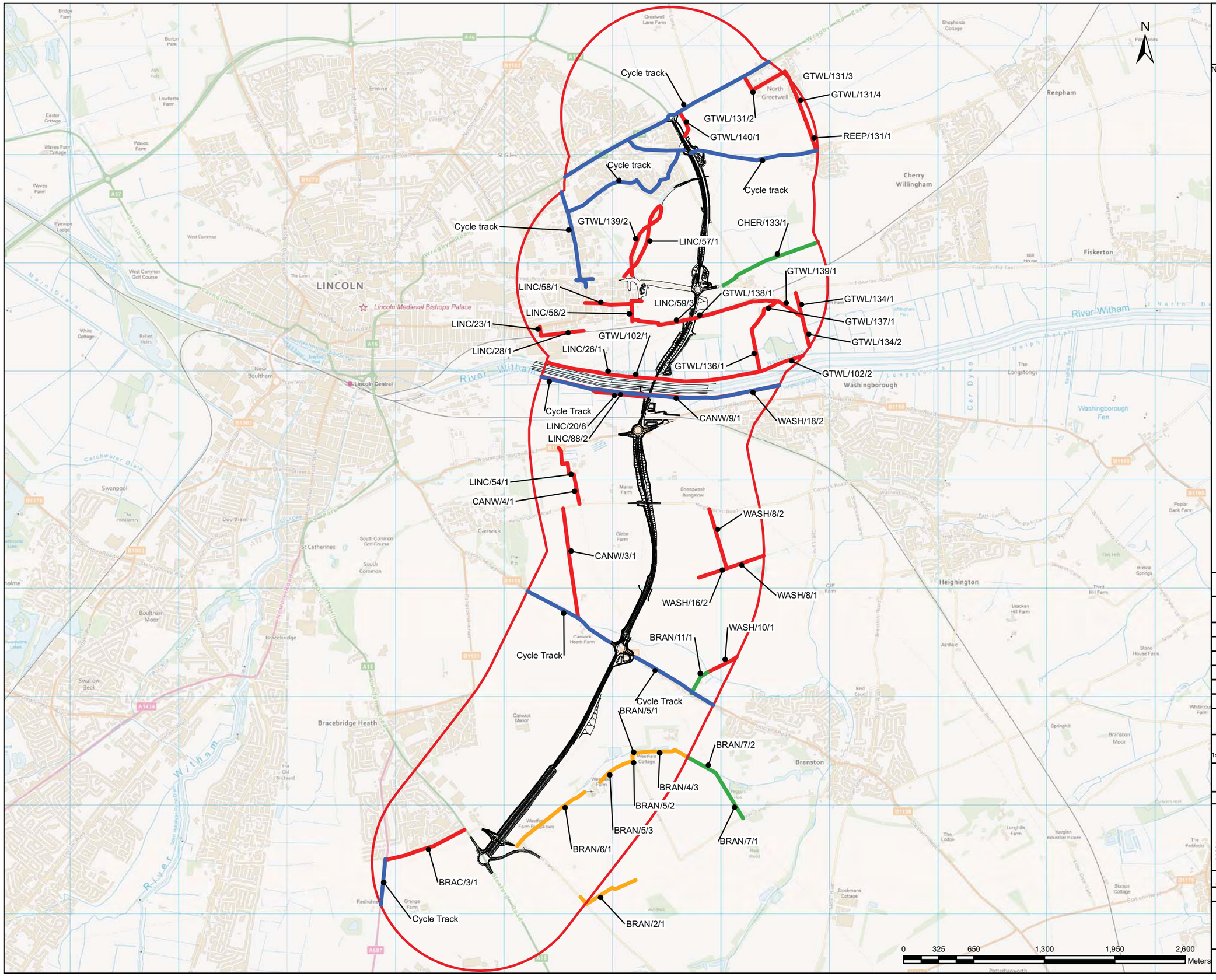
14.4 1030171-LEB-EIA-SOC-003



NOTES:

KEY

- Cycle Track
- Restricted Byway
- Bridleway
- Footpath
- Buffer 1km
- Proposed Road

A	First Issue		LT	JK	OE	30/11/12
			Drawn By:	GIS By:	Approved By:	Approved Date:

Revision: Description

Amendment Details:

Drawing 1st Approval

1st Approval by: Date:

Drawn Designed by: JK

GIS Drawing Creation Created by: LT Date: 02/11/12

Scale @ A3: 1:18000

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Paper Size Drawing Number: 1030171-LEB-EIA-SOC-003 Rev: A

Project: LINCOLN EASTERN BYPASS

Description:

Public Rights of Way

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