Defence Infrastructure Organisation

Future Defence Storage and Redistribution Programme,

Redevelopment of MOD Bicester

Environmental Statement Volume 3: Appendices

BIC/OPA/DOC/10

September 2011

amec

Report for

Ms Ellen O Grady
Senior Planning Officer
Professional and Technical Services
DIO Operations North
Kingston Road
Sutton Coldfield
B75 7RL

Main Contributors

Simon Atkinson
Richard Breakspear
Rachel Dimmick
Stephen Dooley
Liz Duffy
Louise French
Annie Hindley
Chris Hooper
Tessa Jenkins
Marc Rennie

Issued by

Rachel Dimmick

Approved by

Karen Wilson

AMEC Environment & Infrastructure UK Limited

Gables House
Kenilworth Road
Leamington Spa
Warwickshire CV32 6JX
England
Tel: +44 (0) 1926 439000
Fax: +44 (0) 1926 439010

L27808r

h:\projects-mod\ea-210\#27000\27808 bicester planning support\1 client\reports\environmental statement\for formatting\draft es vol 3 appendices.doc

Defence Infrastructure Organisation

Future Defence Storage and Distribution Programme - Redevelopment of MOD Bicester

Environmental Statement
Volume 3: Appendices
(BIC/OPA/DOC/10)

September 2011

AMEC Environment & Infrastructure UK Limited

Certificate No. FS 13881

Certificate No. EMS 69090

Third Party Disclaimer

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by AMEC at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. AMEC excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.

Contents

Appendix A
Glossary and abbreviations

Abbreviations

Term/abbreviation	Description
AADT	Annual average daily traffic
ALC	Agricultural Land Quality
AOD	Above Ordnance Datum
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
ATC	Automatic Traffic Count
BAP	Biodiversity Action Plan
BIFT	Bicester International Freight Terminal
BGS	British Geological Survey
BMV	Best and Most Versatile
BOD	Base Ordnance Depot
BS	British Standard
CDC	Cherwell District Council
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CO	Carbon Monoxide
COD	Central Ordnance Depot
CRTN	Calculation of Road Traffic Noise
CS	Core Strategy
DAS	Design and Access Statement
DCLG	Department for Communities and Local Government
Db	Decibel - unit for measuring noise
DE	Defence Estates (now the Defence Infrastructure Organisation)
Defra	Department for Environment, Food and Rural Affairs
DETR	(former) Department for the Environment, Transport and the Regions
DIO	The Defence Infrastructure Organisations (formerly Defence Estates)
DMRB	Design Manual for Roads and Bridges
DoE	(former) Department of the Environment
DSDC	Defence Storage and Distribution Centre
EA	Environment Agency

Term/abbreviation	Description
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPUK	Environmental Protection UK
ES	Environmental Statement
ESA	Environmentally Sensitive Area
FRA	Flood Risk Assessment
GAC	Generic Assessment Criteria
GIS	Geographical Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GP	General Practitioner (Doctor)
GQA	General Quality Assessment
ha	Hectares
HER	Heritage Environment Record
HGV	Heavy Goods Vehicle
IEMA	Institute of Environmental Management and Assessment
JSCS	Joint Support Chain Services
kmph	Kilometres per hour
L_{A10}	Noise level exceeded for 10% of the measurement period
L_{A90}	Noise level exceeded for 90 percent of the measurement period
L_{Aeq}	Equivalent continuous sound level
L_{Amax}	Maximum recorded noise level during the measurement period
LAQM	Local Authority Air Quality Monitoring
LAQM TG (09)	Local Air Quality Management Technical Guidance 2009
LCA	Landscape Character Area
LCT	Landscape Character Type
LDF	Local Development Framework
LEAP	Local Equipped Areas for Play
LGV	Light Goods Vehicle
LiMA	Environmental Noise Calculation and Mapping Software
LNR	Local Nature Reserve
LP	Local Plan
LPA	Local Planning Authority
LQA	Land Quality Assessment

Term/abbreviation	Description
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metres
MAFF	Ministry of Agriculture, Food and Fisheries (now Defra)
MOD	Ministry of Defence
NEAP	Neighbourhood Equipped Areas for Play
NETCEN	National Environmental Technology Centre
NGR	National Grid Reference
NMP	National Mapping Programme
NMR	National Monuments Record
NMVOC	Non-methane volatile organic compounds
NO_2	Nitrogen Dioxide
NOMIS	Office for National Statistics
NO_X	Nitrogen Oxides
NRTF	National Road Traffic Forecasts
NSCA	National Society for Clean Air
NSMR	National Sites and Monuments Record
NTM	National Transport Model
OCC	Oxfordshire County Council
ODPM	Office of the Deputy Prime Minister
PAHs	Polyaromatic Hydrocarbons
PCT	Primary Care Trust
PIA	Personal Injury Accident
PM_{10}	Particulate matter
$PM_{2.5}$	Particulate Matter with a diameter of less than 2.5 microns
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance Notes
PPS	Planning Policy Statement
PRoW	Public Right of Way
PUA	Principal Urban Area
RFC	Ratio of Flow to Capacity
RRTA	Rail Road Transfer Area
RSS	Regional Spatial Strategy - regional planning document
SATURN	Simulation and Assignment of Traffic to Urban Road Networks

Term/abbreviation	Description
SE	South East
SFRA	Strategic Flood Risk Assessment
SM	Scheduled Monument
SO_2	Sulphur Dioxide
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SUDS	Sustainable Drainage System
TA	Transport Assessment
TEMPRO	Trip End Model Presentation Program
TP	Travel Plan
TPO	Tree Preservation Order
TRADs database	Traffic Flow Data System
TRICS	Trip Rate Information Computer System
UK BAP	UK Biodiversity Action Plan
ZTVI	Zone of Theoretical Visual Influence

Glossary

Term/abbreviation	Description
General Terms	
Core Strategy	A core strategy document is the key compulsory local development document specified under UK planning law. The Core Strategy must set out the long term spatial vision for the local planning authority area and contain policies to help deliver that vision. Every other local development document is built on the principles it sets out, regarding the development and use of land in a local planning authority's area.
Environmental Impact Assessment (EIA)	Process of assessing environmental effects from the planning application which is required for certain developments under town and country planning legislation.
Environmental Management Plan (EMP)	Plan used to set out control and management measures usually during construction.
Environmental Statement (ES)	Document submitted in support of a planning application which summarises the assessment of environmental effects and measures incorporate into the Scheme to mitigate environmental effects.
Traffic Terms	
Automatic Traffic Count (ATC)	ATCs involve the installation of pneumatic tube based counters across a road. The ATCs can record volumes of traffic by vehicle direction and classify vehicles and vehicle speeds.
Heavy Goods Vehicle (HGV)/Large vehicles	Vehicles exceeding 3.5 tonnes gross weight (>3.5t).
National Road Traffic Forecasts (NRTF)	Sets out forecasts of the growth in the volume of motor traffic (excluding motorcycles) on roads in Great Britain until the year 2031. The document considers the effects of congestion and nominal capacity constraints to forecast low, central and high estimates of traffic growth in future years. The central estimate is considered to be the most likely outcome.
National Transport Model (NTM)	Provides a systematic means of comparing the national consequences of alternative national transport policies or widely-applied local transport policies, against a range of background scenarios which take into account the major factors affecting future patterns of travel.
Personal Injury Accident (PIA)	Road traffic accidents where slight, serious or fatal injuries to people have been recorded. The data will generally include such information as the location of the accident, number of casualties, the modes of travel involved, age and gender of those involved and the contributing factors to the accident.
Ratio of Flow to Capacity (RFC)	As a general rule, an RFC value of below 85% means that a junction operates satisfactorily. Above 85% it is approaching capacity and beyond 100% it is over capacity and queues and delays may result. Therefore, such a magnitude of change has the potential to cause potentially significant environmental effects.
Simulation and Assignment of Traffic to Urban Road Networks (SATURN)	A traffic simulation and assignment model for the analysis of road networks.
TEMPRO (Trip End Model Presentation Program)	A program that is designed to allow detailed analysis of pre-processed trip-end, journey mileage, car ownership and population/workforce planning data from the National Trip End Model (NTEM). TEMPRO can also be used to provide summaries of traffic growth using data from the National Transport Model (NTM). Results are presented either in terms of growth over the selected period or in terms of the raw trip-end data.

Term/abbreviation	Description
Air Quality terms	
Dust	Dust is defined as all particulate matter up to 75µm (millionths of a metre or thousandths of a millimetre) in diameter (according to BS6069) and is both suspended in air and deposited from air. Particles less than 1µm behave more like gases than solids and are generally termed 'fume'. The bulk of particulate matter generated by demolition and construction activity has a diameter greater than 30µm.
Nitrogen dioxide	Pollutant associated with vehicle traffic.
Particulate matter	Pollutant associated with vehicle traffic.
Noise terms	
Noise	The ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. Due to this wide range, a scale based on logarithms is used in noise level measurement. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound pressure level. The ear has the ability to recognise a particular sound depending on the pitch or frequencies found at the source. Microphones cannot differentiate noise in the same way as the ear; and to counter this weakness the noise measuring instrument applies a correction to correspond more closely to the frequency response of the ear. The correction factor is called "A Weighting" and the resulting measurements are written as dB(A). "A Weighting" refers to the noise level that represents the human ear's response to sound. The dB(A) unit is internationally accepted and has been found to correspond well with people's subjective reaction to noise. Typical dB(A) noise levels for familiar noises are given below as sound pressure levels (Lp).
Approximate noise level dB(A)	Example
O	Limit of hearing.
30	Rural area at night, no wind or adverse weather conditions.
40	Library.
50	Quiet office without noisy machinery, such as typewriters.
60	Normal conversation.
70	In car noise without radio.
80	Household vacuum cleaner
100	Pneumatic drill.
140	Threshold of pain.
Sound power levels (Lw)	Sound power levels (Lw) are used to describe the noise output of a noise source.
L_{Aeq}	L_{Aeq} is the equivalent continuous sound level and is the sound level of a steady sound having the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. L_{Aeq} is considered the best general purpose index for environmental noise. Used in PPG24 to define daytime (16hr) and night-time (8hr) noise exposure categories for proposed development sites.
L_{A90}	L_{A90} index represents the noise level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is usually referred to as the background noise level.
L_{A10}	L_{A10} refers to the level exceeded for 10% of the measurement period. L_{A10} is widely used as a descriptor of traffic noise.
L_{AE}	L_{AE} is the single event level (SEL). It is a descriptor of the total sound energy of a

Term/abbreviation	Description
	discrete event (e.g. a road vehicle pass by), corrected to 1 second.
L_{Amax}	L_{Amax} is maximum recorded noise level during the measurement period.
Ambient Noise	Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.
Background Noise	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T, measured using the fast time weighting.
Fast Time Weighting	A sound pressure level measurement using a 125ms moving average time weighting period is said to have been determined using 'fast weighting'.
Free Field	Signifies that a noise measurement has been undertaken in 'free field' conditions i.e. away from any reflecting facades e.g. building facades, close boarded fence work etc.
Façade level	Addition of 3dB (A) façade correction to free field levels to reach noise level at the façade of a building (1m or less).
Basic Noise Level (BNL)	Used in CRTN methodology - for road traffic noise - the basic noise level at a reference distance of 10m away from the nearside carriageway edge* is obtained from the traffic flow, the speed of the traffic, the composition of the traffic, the gradient of the road and the road surface.
Specific noise level, $L_{Aeq,Tr}$	The equivalent continuous A-weighted sound pressure level at the assessment position produced by an industrial noise source over a given reference time interval.
Rating level, Lar,Tr	The specific noise level plus any adjustment for the characteristic features of the noise.
Historic Environment terms	
Aerial photographs	Photographs taken from the air (normally from an aeroplane). These have a particular archaeological application as archaeological sites may sometimes be identified from these where they are not visible, or not so clearly visible, on the ground. Earthwork features may be shown in relief by low light and buried or sub surface archaeological remains may be visible either directly as soil marks or through differential vegetation as cropmarks (see also below). Photographs can be 'vertical', which have not normally been taken for specific archaeological purpose, and 'oblique', which are taken at an angle. The latter are often taken specifically to record archaeological remains.
Archaeology	The study of past human societies or people through physical evidence of their material culture. In practical terms, and in terms of this assessment, archaeology encompasses sub-surface remains and artefact finds, although can also include visible surface features, such as earthworks. Archaeological evidence can be described as 'in situ', which means that it has not been significantly disturbed or moved from its original place.
Archaeological evaluation	Comprises both intrusive and non-intrusive fieldwork, normally with the purpose of investigating the potential of a given area. Non intrusive evaluation includes the methodical surface collection of artefacts, normally from a ploughed field, known as 'field walking' and remote sensing techniques, such as metal detecting and geophysical survey. Intrusive evaluation normally involves the digging of a trial trench, or limited area excavation, in order to investigate the potential of a given area or site.
Archaeological monitoring	Commonly referred to as a 'watching brief', this involves the attendance of an archaeologist during groundworks or construction in order that any archaeological remains encountered can be investigated or recorded.
Artefact	An object (or part thereof) which has been created or worked by humans.
Ashlar	Prepared (or "dressed") stone work of any type of stone

Term/abbreviation	Description
Auxiliary Territorial Service	The women's branch of the British Army during the Second World War, formed on 9 September 1938 and operating until 1 February 1949
Banjo Enclosure	A monument consisting of a small (generally less than 100m diameter) subcircular enclosure with a narrow approach way consisting of parallel ditches (thus banjo shaped). Believed to be associated with stock management in the Later Prehistoric period.
Cottar	A low ranking serf, holding a small area of land and owing labour to the lord.
Cropmark	Evidence of the presence of sub-surface archaeological remains through the differential growth in a crop.
Curtilage	The area, usually enclosed, encompassing the grounds and buildings immediately surrounding a home that is used in the daily activities of domestic life.
Designated Heritage Asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated as such under the relevant legislation.
Geophysical Survey	Ground-based physical sensing techniques used for archaeological imaging or mapping, often using detection of local magnetic variation to detect sub-surface archaeology.
Heritage Asset	A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions.
Historic Environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
Historic Environment Record (HER)	A county-based record of all known archaeological or cultural heritage sites, maintained by the County Council
Hut Circle	A round house indicated by the presence of a low, roughly circular bank of turf, earth or stone, which formed the base of the walls. Characteristic of the later prehistoric period
Insula	In Roman architecture either 1. A block of buildings enclosed by four streets or 2. A large tenement house or apartment block.
Lynchet	A bank formed at the end of a field by soil which, loosened by the plough, and gradually moves down slope through a combination of gravity and erosion.
nanoTesla	A measure of magnetic field strength.
National Mapping Programme (NMP)	A long-term project, undertaken in partnership between English Heritage and Northamptonshire County Council, to enhance our understanding about past human activity through the analysis and interpretation of aerial photographs and the plotting of features including cropmarks. The project started in 1994 and was the first NMP project to be implemented in an entirely digital environment, with full GIS functionality.
National Monuments Record (NMR)	The public archive of English Heritage, which includes over 10 million historic photographs, including aerial photographs, architectural and archaeological reports, plans and other items related to the historic environment of England. Also includes databases of buildings and archaeological sites in England and its territorial waters.
Nissen hut	Prefabricated steel structure made from a half-cylindrical skin of corrugated steel, used extensively during World War II.
Posthole	A hole dug to provide a firm base for an upright post, often with stone packing. Use broader monument type where known.
Ridge and Furrow	A series of long, raised ridges separated by ditches used to prepare the ground for

Term/abbreviation	Description
	arable cultivation. This was a technique, characteristic of the medieval period.
Romney hut	A similar structure to a Nissen hut, also widely used during World War II.
Sunken Feature Building (SFB)	A timber building based around a sunken hollow, the floor of which may have been suspended above the hollow to counteract dampness. Grubenhauser are believed to date from the 5th to 8th centuries AD but may be earlier.
Villein	The most common type of serf in the medieval period; not the lowest in the feudal order but generally rented land and owed a duty of labour to the lord.
Landscape and visual terms	
Degree of change	A combination of the scale extent and duration of an effect also defined as 'magnitude'.
Indirect effects	Not a direct result of the development, but often produced away from it or as a result of a complex pathway. Also used to describe visual effects in respect of townscape/landscape assessment and the effects on setting.
Glare	Defined in the 'Guidance Notes for the Reduction of Obtrusive Light' (The Institution of Lighting Engineers) as the uncomfortable brightness of a light source when viewed against a dark background.
GLVIA	Guidelines for Landscape and Visual Impact Assessment, Second Edition, published jointly by the Landscape Institute and Institute of Environmental Management and Assessment, 2002.
LCA	Landscape Character Area - usually defined by a landscape character assessment, and usually occurs within LCTs.
LCT	Landscape Character Type - usually defined by a landscape character assessment and usually contains or relates to a number of LCAs or particular geographical locations.
LVIA	Landscape and Visual Impact Assessment.
Landscape	The Landscape Institute defines landscape as 'the whole of our external environment'. The European Landscape Convention defines landscape as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.*"
Landscape capacity	The degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character. Capacity is likely to vary according the type and nature of change being proposed.
Landscape character	A distinct and recognisable pattern of elements that occurs consistently in a particular type of townscape/landscape and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.
Landscape designations	Areas of land that are acknowledged as making a special contribution to the overall landscape character or visual quality of a locality. Provision for identifying and protecting such areas deemed to be of national importance is made in law and these are known as statutory landscape designations. Areas of regional or local importance are identified at the local level (usually by the Planning Authority) and are known as non-statutory landscape designations.
Landscape effects	Change in the elements, characteristics, character, and qualities of the landscape as a result of development.
Landscape elements	A component part of the landscape, such as trees, woodland and ponds.
Landscape features	Prominent eye-catching elements, e.g. Wooded hill tops, and church spires.
Landscape patterns	Spatial distributions of landscape elements combining to form patterns, which may

Term/abbreviation	Description
	be distinctive e.g. hedgerows and stream patterns.
Landscape quality	The state of repair or condition of the elements of a particular landscape, its integrity and intactness and the extent to which its distinctive character is apparent.
Landscape resource	The combination of elements that contribute to landscape context, character and value.
Landscape sensitivity	The sensitivity of a landscape through combination of value, quality and capacity of a landscape to a particular type of proposed development.
Landscape value	The relative value or importance attached to a landscape or view; (often as a basis for designation) which expresses national or local consensus, because of its quality, including perceptual aspects such as scenic beauty, cultural associations or other conservation issues.
Light Trespass	Defined in the 'Guidance Notes for the Reduction of Obtrusive Light' (The Institution of Lighting Engineers) as the spilling of light beyond the boundary of the property or area being lit.
Magnitude	A combination of the scale, extent and duration of an effect also defined as 'degree of change'.
Mitigation	Measures including any process, activity, or design to avoid, reduce, remedy or compensate for adverse environmental impact or effects of a development.
Obtrusive light	Obtrusive light or light pollution can be sub-divided into three broad forms sky glow, glare and light trespass.
Positive or Negative Types of Landscape Effect	A positive effect will require development to add to the landscape quality and character of an area. Neutral landscape effects will include low or negligible changes that may be considered as part of the 'normal' landscape processes such as maintenance or harvesting activities. A negative effect may include the loss of landscape elements such as mature trees and hedgerows as part of construction leading to a reduction in the landscape quality and character of an area.
Receptor	Physical landscape resource, special interest or viewer group that will experience an effect.
Significant Effects	The significance of an effect is determined by the combination of sensitivity and magnitude of change, a process, which may be used to guide the assessment.
Sky Glow	Defined in the 'Guidance Notes for the Reduction of Obtrusive Light' (The Institution of Lighting Engineers) as the brightening of the night sky above our towns, cities and countryside.
Types of Visual Effect	In visual terms - positive or negative effects are less easy to define or quantify and require a subjective consideration of a number of factors affecting the view, which may be positive, neutral or negative. Opinions may vary widely, however it is not the assumption of this assessment that all change, including high levels of change is a negative experience. Rather this assessment has considered factors such as the visual composition of the landscape in the view together with the design of the development, which may or may not be reasonably accommodated within the scale and character of the landscape as perceived from the receptor location.
Viewpoint	A place from where a view is gained and represents specific conditions or viewers (visual receptors). During the visual assessment process, a number of viewpoints are chosen in order to assess the existing visual resource; the sensitivity of this resource to the development; the proposed design incorporating mitigation measures to minimise any adverse impacts; and the predicted appearance of the finalised development.
Visual Amenity	Value of a particular location in terms of what is seen by visual receptors living at, visiting, working or travelling through that location, taking account of all views that would be available to those visual receptors.
Visual Effect	A subset of landscape effects and concerned wholly with changes in views available

Term/abbreviation	Description
	to people i.e. visual receptors and the changes in the visual amenity of visual receptors resulting from development.
Visual Receptors	The general public when they are anywhere where they could view the development. The main receptors include residents, tourists, road users and users of recreational landscapes. Workers may also be affected to a lesser degree, as their main purpose for being in the landscape is not to be looking at views. The extent to which they are affected will depend on the number of people affected, the duration of the view, the magnitude of change of the view, the sensitivity of the area in which they are and potential seasonal screening effects.
Visual Sensitivity	The sensitivity of visual receptors such as residents, to visual change proposed by development. Using the guidance provided by the GLVIA residents are categorised in accordance with their different levels of visual sensitivity which is influenced by factors such as their permanence, their purpose in being at that location, whether or not appreciation of their surroundings has influence of that purpose, whether or not they are static or moving and cultural factors.
Visual Setting/'Sense of Place'	The essential character and spirit of an area or 'genuis loci'.
Zone of Theoretical Visual Influence	The area of potential or theoretical visibility of the completed development based upon the height of the ridgelines applied to DTM (digital terrain model) data for a defined study area using a suitable software programme. The DTM does not take into account the influence of built development and vegetation such as tree cover and any local variations 'smoothed out' by using data aggregated by taking spot heights on a 50m grid. Also sometimes called a ZVI (Zone of Visual Influence).
Biodiversity terms	
Local Wildlife Sites	Non-statutory nature conservation sites which constitute the most important wildlife and geological sites in the county.
Site of Special Scientific Interest	Statutorily designated nature conservation site considered to be of national importance.
Water terms	
General Quality Assessment	Process of assessing water quality used by the Environment Agency.
Strategic Flood Risk Assessment	The strategic flood risk assessment is a study undertaken jointly between CDC, West Oxfordshire District and Oxfordshire County Councils, to provide background evidence to the districts' Local Development Frameworks and the County Council's Minerals and Waste Development Framework. The assessment contains information on all sources of flooding and is used to inform the selection of sites for development. It also provides information and advice to assist in the submission and consideration of planning applications.
Land quality terms	
Best and Most Versatile	High grade agricultural land.

Appendix B
Scoping opinion

PLANNING, HOUSING & ECONOMY

John Hoad Strategic Director Planning, Housing and Economy

DISTRICT COUNCIL
North Oxfordshire

Bodicote House
Bodicote • Banbury
Oxfordshire • OX15 4AA
Telephone ***01295 252535***
Textphone 01295 221572
DX 24224 (Banbury)
http //www cherwell gov uk

Entec UK
FAO Rachel Dimmick

rachel dimmick@entecuk co uk

Please ask ***Laura Bailey*** *for* *Our ref* ***LB/11/00001/SCOP*** *Your ref*
Direct Dial ***01295 221824*** *Fax* ***01295 221856*** *Email* ***Laura.bailey@cherwell-dc.gov.uk***

11 April 2011

Dear Ms Dimmick

TOWN AND COUNTRY PLANNING (ENVIRONMENT IMPACT ASSESSMENT) (ENGLAND & WALES) REGULATIONS 1999 (AS AMENDED)

REQUEST FOR SCOPING OPINION

Application no. **11/00001/SCOP**

Applicant's name: **Entec UK**

Proposal: **Scoping Opinion - MOD Bicester Redevelopment**

Location: **MOD Bicester Redevelopment, Graven Hill & Arncott, Oxfordshire**

Parish **Arncott**

Further to your email dated 18th February 2010 and submitted attachments, received in this department on the 21st February 2010, I have consulted with relevant colleagues within Cherwell District Council Entec UK has consulted with the relevant statutory consultees and a summary of their responses is also included within this letter Responses are set out below, largely in full, and in some cases this may include matters that go beyond the site boundaries These responses constitute the Council's scoping opinion

The request for a scoping opinion relates to the redevelopment of two sites for disposal. Graven Hill (Bicester) for a mixed use development, including residential use and B1, B2 and B8 uses. and Site A (Piddington) for B8 use It also relates to Site C (Upper Arncott). which is proposed to be redeveloped for B8 use (but retained in MoD ownership)

The Environment Agency (response provided by Entec)
Based on the information presented by Entec, we have not identified any likely significant issues that would need to be addressed through the E I A

However. the following points should be addressed as part of the planning application

Flood Risk

The scoping report sets out that SuDS principles will be used and the small areas of the development sites which are delineated as flood zone two and three will be used as public space We have no objections to this approach, but would like to provide guidance on what we will expect as the proposals develop

As a first step, we expect it to be demonstrated that there is a fundamental understanding of the current natural / semi natural drainage system A baseline drainage report should be submitted to us for agreement This initial report should identify and map existing watercourses, drains, over land flow routes and any other water features It should define exiting drainage catchments within the site and establish existing surface water runoff rates

During this process the applicant should also consider any known (anecdotal) or potential flooding from all sources associated with the site This will include flooding from Rivers, Land, Groundwater, Sewers, Reservoirs, canals and other Artificial Sources

The Environment Agency Flood Map represents areas prone to flooding from river catchments of 3km^2 or larger Although this gives a good representation of flood risk on a national scale, it does not mean that there is not flood risk associated with smaller watercourses

It is important to fully assess flood risk to the development from all watercourses The scoping report states that there are many watercourses which run across the development sites

Percolation tests should be undertaken to establish the viability for infiltration across the site These test should be carried out in accordance with BRE 365

The sequential approach should be applied to the layout of the development, with the most vulnerable elements of the development located in the areas with the lowest probability of flooding

It is vital that the above work is carried out early in the design of the proposed development, as a key consideration in the production of the site masterplan, as recommended in PPS25

Fluvial flood risk

Please Note Site A will need to be sequentially tested in line with Annex D of PPS25 This will need to demonstrate that there were no other suitable alternative developable areas that are at less risk of flooding

If Site passes the sequential test then we would expect that there will be no built development within the 1 in 100 year fluvial flood extent with an allowance for climate change (the design flood event) Any loss of flood water storage within this area must be compensated for on a level-for-level basis

Finished floor levels of all buildings should be set at least 300mm above the design event flood level A safe route of access and egress should be available from every residential unit during the design flood event

Pluvial (surface water) flood risk

Percolation tests will provide an indication as to whether infiltration should be the primary method of surface water discharge The drainage system should be designed to mimic natural drainage patterns In accordance with Document Part H of the Building Regulations,

infiltration should always be maximised Where infiltration is not achievable, then discharge to a watercourse may be considered, and only where this is unfeasible should discharge to surface water sewer be considered

Greenfield surface water runoff rates should be calculated using Institute of Hydrology 124 (IOH124) in line with the requirement of the interim code of practice for sustainable drainage systems When calculating the Greenfield runoff rate for catchments less than 50ha, the method should be applied with 50ha in the formula The results can then be linearly interpolated using the ratio of the development size to 50ha

In the early stages of development of the site masterplan, we expect to see indicative locations of the main regional surface water attenuation devices and conveyance routes The sizing of these main devices should be supported by calculations This is important to show that the proposed drainage system is achievable within the constraints of the site layout A clear narrative should be included with the technical drawings and calculations to explain which SUDs methods have been selected and the reason for their selection This is important for us to understand that the applicant has considered the most appropriate SUDs methods for this site

A design code should be produced which sets out the design standards and range of techniques that will be implemented throughout the development site

The drainage system should fully implement the SuDS Management Train, ranging from source to regional controls The use of the entire SUDS hierarchy will maximise the benefits that SUDS can offer in terms of flood risk management, water quality improvements and amenity/biodiversity enhancements The drainage strategy should also maximise the use of above ground surface water drainage features to achieve these benefits

The SuDS Management Train is outlined in the Interim Code of Practice for Sustainable Drainage

- Prevention to prevent or reduce pollution and runoff quantities This may include good housekeeping, to prevent spills and leaks, storage in water butts, rainwater-harvesting systems, and alternative roofs (i e green and brown roofs)
- Source Control control of runoff at or very near its source (such as the use of rainwater harvesting, pervious pavements or green roofs)
- Site Control management of water from several sub-catchments (including routeing water from roofs and car parks to one large basin or pond for the whole site)
- Regional Control management of runoff from several sites, typically in a detention pond or wetland

Positive drainage of surface water across the development should be limited and we would expect that the outfall to watercourses is provided through open channel or wetland features rather than piped systems

The surface water drainage system should be designed to accommodate all storms up to and including the 100 year plus climate change rainfall event Planning Policy Statement 25 (PPS25) now requires an increase in rainfall intensity to account for climate change implications over the lifetime of the development Please refer to PPS25 table B2

The rate at which surface water is discharged from the site may vary with the severity of the storm event However post development discharges should not exceed the Greenfield runoff rate for a range of storm events up to and including the 100 year plus climate change rainfall event Volumes of surface water discharge should also not exceed those of the site in its greenfield state The likely flood flow routes and the impact of a storm that exceeds the capacity of the system should also be considered

Development offers an opportunity to contribute towards, and not comprise River Basin Management Plans and therefore the goals of the Water Frame Work Directive A well designed SUDS scheme can improve water quality that is discharged into designated river basin They can ensure development does not create adverse pressures on the water environment that could compromise our ability to meet Water Frame Work Directive objectives

The need for sustainable drainage is not disputed, but problems may arise if SUDS are not properly designed and maintained Maintenance requirements for SUDS differ from those for conventional systems, but this should not be a barrier to their selection You will need to provide details of how and who the SUDS features will be maintained by

Groundwater and Contaminated Land

We have reviewed the scoping report and the phase 1/phase 2 Land Quality Assessments (LQA) for sites A,C, D & E of the MoD Bicester site produced by Entec

The results of the studies confirm that the majority of the site lies on clays namely unproductive strata and therefore they are of low sensitivity with respect to groundwater quality

Although elevated levels of contaminants such as petroleum hydrocarbons, chlorinated solvents, ammonium and sulphate have been identified at elevated levels, both within soil and groundwater, the low sensitivity should mean there is little potential risk from the proposed development to groundwater quality

Therefore the information provided it satisfactory for the EIA Obviously as the development proceeds a higher intensity of investigation will be expected for specific phases which will help to fully characterise the site and this can be managed through appropriate planning conditions

Our Nuclear Reg team have reviewed the radiological data and although there have been some detects generally the levels of radioactivity are low except for a solitary luminous dial This material can be detected and removed so would not pose a significant problem unless present in large quantities for which there is no evidence at present

Fisheries and Biodiversity

We welcome the species assessment as part of EIA

We are likely to advise the LPA that there should be 10 metre buffer zones maintained along side all water course and ditches

Great Crested Newts are likely to be inhabiting a pond adjacent to the site and further more there are known populations of Great Crested Newts within the MOD site Appropriate surveys and mitigation will be required

Environment management

You should contact the local utilities provider at the earliest opportunity to discuss whether there is enough capacity in the sewerage network and local water treatment works to accommodate this scale of development and if not to discuss the options for developing the existing infrastructure to enable it to handle the increased load from the development

We would also like to draw your attention to whether proximity of two intensive poultry farms

has been considered when new housing is proposed

Further Advice

Under the terms of the Water Resources Act 1991, and the Land Drainage Byelaws 1981, the prior written consent of the Environment Agency is required for any proposed works or structures, in, under, over or within 8 metres of the top of the bank of the Ray, Piddington Brook or Langford Brooks main rivers

Erection of flow control structures or any culverting of a watercourse requires the prior written approval of the Environment Agency under s 23 of the Land Drainage Act 1991 or s 109 of the Water Resources Act 1991 The Environment Agency resists culverting on nature conservation and other grounds and consent for such works will not normally be granted except for access crossings

With regards to the Water Framework Directive the site lies across four WFD waterbodies, a breakdown of their current status is shown below -

Ludgershall Brook & Muswellhill Brook
Ecological Status = Poor
Reason = Macrophytes
At risk from - Agricultural sources of phosphorous, Phosphorous (from other sources), Combined source sanitary nutrients, & Diffuse Pollution

Oxfordshire Ray (upstream of A41 to Cherwell)
Ecological Status - Poor
Reason - Fish
At risk from - Ammonia, Agricultural sources of phosphorous, Phosphorous (from other sources), Combined source sanitary nutrients, & Diffuse Pollution

Langford Brook (Bicester to Ray including Gagle Brook)
Ecological Status - Moderate
Reason - General physico-chemical status
At risk from - Ammonia, Phosphorous (from other sources), Combined source sanitary nutrients

Langford Brook (Source to downstream of A41)
Ecological Status - Moderate
Reason - General physico-chemical status
At risk from - Ammonia, Combined source sanitary nutrients

According to the WFD there should be "no deterioration" of these waterbodies and the developer should look to integrate practices and features into the development that will enhance and improve the local environment For more information with regards to the WFD please refer to the Environment Agency website (www.environment-agency.gov.uk) and the website for the United Kingdom Technical Advisory Group (www.wfduk.org)

Please note that the Combined Heat and Power (CHP) boiler may require a permit depending on capacity & fuel There is a new combustion plant being constructed near Ardley which may have district heating capacity, there might be an opportunity for using this capacity

Highways Agency (Response provided via Entec)
Section 6 1 on traffic and transport is noted I am not an expert in EIA/ES but if highway alterations are needed then it might be advisable to include them in the ES, to avoid delays to your project

This is an appropriate point to note that a Transport Assessment is also a PPG13 requirement, and PPG13 is more onerous than 6 1 8 and 6 1 9 The DfT's Guidance on TA,s also refers We consider that M40 J9 should be assessed, preferably by Linsyg/Transyt Given the size of the development it might be a good idea to model the development in a OCC area model to arrive at distributions etc We are content to go along with any OCC advice to you on area modelling

Junction 9 has just had a modest improvement but it is anticipated that background growth plus committed development alone is expected to lead to significant congestion again at the junction by the time your development might be complete This congestion is also a concern to Cherwell and OCC

Natural England (Response provided via Entec)

1 Sites of Special Scientific Interest (SSSIs) and sites of European or international importance (Special Areas of Conservation, Special Protection Areas and Ramsar sites).
Development site A is within close proximity (within 2km) to the following designated nature conservation site

- *Arncott Bridge Meadows* SSSI

Further information on the SSSI can be found at www natureonthemap org uk or by request from this office The development proposal should asses the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects

2. Landscape Character and Visual Impacts
We consider that a thorough understanding of landscape character is the starting point for all development affecting land use change, as it is only through understanding the nature of a landscape, that can we measure the effects of change upon it
In helping to bring about development which is sensitive to its landscape context, Natural England strongly advocates the use of Landscape Character Assessment (LCA) LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change, and make positive proposals for conserving character, enhancing or regenerating it as detailed proposals are developed A fundamental part of sustainable development is the need to incorporate landscape considerations into decision-making and LCA is a powerful tool which can make significant contributions to achievement of sustainable development objectives This fact is recognised in the Government's Rural White Paper as well as PPSs 1 and 7 and PPG15, all of which endorse the use of LCA as a way of informing planning decisions
Countryside Character Areas for England have been mapped to produce the "*Countryside Character*" series of volumes Information regarding the Character Area(s) within which the proposal site lies is contained in Volume 7 of the Countryside Character series (South East & London) (publication reference CA13) Character area descriptions are also available from our website at www naturalengland org uk under our landscape pages

Guidance on the landscape character assessment is also available - "*Landscape Character Assessment Guidance for England and Scotland*" April 2002 (publication reference CAX 84)
Landscape Character Assessments, Countryside Design Summaries (CDS), Concept Statements, Village Design Statements (VDS), and Town Design Statements (TDS) are becoming increasingly common and can provide useful insights into how development can affect the character of these areas They also provide information on what types of development are most likely to be acceptable, and how design and materials are used

Further information regarding these tools and techniques can be found on the positive planning pages of the Natural England website http //www naturalengland org uk /

3. Access and Recreation
Natural England would encourage any proposal to incorporate measures to help encourage people to access the countryside for quiet enjoyment Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways are to be encouraged Links to other green networks or urban fringe areas should also be explored to help promote the creation of a wider green infrastructure To this end, relevant green infrastructure strategies put in place by local authorities should be incorporated where appropriate

4. Local Wildlife Sites
Our records indicate that the development sites are in close proximity to the following Local Wildlife Sites

- Bicester Wetland Reserve
- Graven Hill

Local Wildlife Sites are identified by the County ecologist and/or local wildlife trust and are of county importance for wildlife I would therefore recommend that the county ecologist and/or local Wildlife Trust are contacted

5 Species protected by the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2010
We strongly recommend that surveys for protected species (including, for example, great crested newts, reptiles, water voles, badgers and bats) should be carried out within the area affected by the development
If any protected species are found, the following should be considered

The species concerned,

The population level at the site affected by the proposal,

The direct and indirect effects of the development upon that species,

Full details of any mitigation or compensation that might be required,

Whether the impact is acceptable and/or licensable

In order to provide this information there may be a requirement for a survey at a particular time of year Surveys should always be carried out by suitably qualified and where necessary, licensed, consultants
The great crested newt, dormouse and all species of bats are European protected species such that it is illegal to intentionally kill, injure or otherwise disturb them If any of these species are found to be present you should also consult Natural England"s Wildlife Management and Licensing Unit in Bristol (Tel 0845 6014523) about licensing implications before any work can proceed
This proposal provides opportunities to incorporate features into the design which are beneficial to wildlife, such as the incorporation of roosting opportunities for bats or the installation of bird nest boxes You should consider securing measures to enhance the biodiversity of the site from the applicant, if it is minded to grant permission for this application This is in accordance with Paragraph 14 of Planning Policy Statement 9

6. Other features of nature conservation interest, e.g. habitats and species identified within the UK and County Biodiversity Action Plans.
Natural England advises that a habitat survey (analogous to Phase 2) is carried out on the site, in order to identify any important habitats present In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present The following should be considered

Any historical data for the site affected by the proposal (e g from previous surveys),

Additional surveys carried out as part of this proposal,

· The habitats and species present,

The status of these habitats and species (e g whether BAP priority habitat),

The direct and indirect effects of the development upon those habitats and species,

· Full details of any mitigation or compensation that might be required

The development should avoid adversely impacting the most important wildlife areas within the site, and should if possible provide opportunities for overall wildlife gain

7. Green Infrastructure
Natural England supports the inclusion of Green Infrastructure (GI) included in the development Natural England views the incorporation of Green Infrastructure, at a local and sub-regional level. as a *„multifunctional resource capable of delivering those ecological services and quality of life benefits required by the communities it serves and needed to underpin sustainability Its design and management should also respect and enhance the character and distinctiveness of an area with regard to habitats and landscape types"* Green Infrastructure should further *„thread through and surround the built environment and connect the urban area to its wider rural hinterland"*
GI could be incorporated into the development in the following ways

· Street trees can form an attractive and functional element of urban streets Planting should be of native species with a continuous canopy if possible This will maximise the habitat potential for birds and insects Street trees should also be planted as semi mature standards at around 10 years old, as at this age they are less easily vandalised

As a post-development consideration, expedient management operations should be avoided, particularly mowing and other vegetation trimming which unnecessarily reduce the value of such places to wildlife Although we appreciate that these features have a requirement to be managed, the timing, extent and frequency are important considerations

We would also strongly recommend the incorporation of green roofs these within this development Green roofs can both improve air quality, help in flood control, and support communities of plants and associated wildlife

The provision of allotments within the development sites might be a factor that you may wish to include

· Links to green networks or urban fringe areas should be explored to help promote the creation of a wider green infrastructure To this end, relevant green infrastructure strategies put in place by local authorities should be incorporated where appropriate

For further information, I would also like to draw your attention to the South East Green Infrastructure Framework that was finalised in July 2009
http://www.gos.gov.uk/497648/docs/171301/SEGIFramework_finaljul09.pdf

Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (Response provided via Entec)

With regard to potential receptors identified for the 3 sites, I would make the following comments

'Species of Conservation Importance' should include both species protected by legislation, and those listed as being of principal importance under Section 41 of the Natural Environment and Rural Communities Act 2006. These species should receive protection through planning as outlined in Planning Policy Statement 9, which states that

'Through policies in plans, local authorities should also conserve other important natural habitat types that have been identified in the Countryside and Rights of Way Act 2000 section 74 list, as being of principal importance for the conservation of biodiversity in England and identify opportunities to enhance and add to them.'

(As you may be aware, the list published under Section 41 of the NERC Act has now replaced the Section 74 list)

Further survey work should be undertaken to identify any populations of species of principal importance and necessary avoidance or mitigation measures, as well as measures to enhance these populations

'Statutory and non-statutory designated sites' I note that it has been identified that any potential damage to designated sites is unlikely to be significant. However, I would look for further detail to be provided within the EIA to assess this with regard to any potential indirect impacts, for example increased recreational pressure and changes in hydrology.
There is potential for increased recreational use, and other pressures from the proposed adjacent development, to have an impact on Gravenhill Wood LWS. I note that management is proposed for the woodland - since this is proposed as mitigation, I would be looking for this to be secured through a condition/obligation, and for an approved and funded management plan to be put in place. The masterplan provided for Graven Hill indicates that residential development is proposed in close proximity to the woodland. I would suggest that consideration is given in the EIA to the need to further buffer the development from the woodland

Ray Conservation Target Area
The proposed redevelopment is adjacent to the Ray Conservation Target Area (CTA). Conservation Target Areas identify the most important areas for wildlife conservation in Oxfordshire, where targeted conservation action will have the greatest benefit. The main aim within CTAs is to restore biodiversity at a landscape scale through the maintenance, restoration and creation of BAP priority habitats.
PPS9 requires that development provides biodiversity enhancements. I would therefore look for the EIA to demonstrate how the development would result in an overall enhancement of local biodiversity. In particular, I recommend that enhancements should be designed to help deliver the aims of the Ray CTA. The aims of the CTA are
Lowland meadow – management, restoration and creation (with a focus on MG4 hay meadows)
Floodplain grazing marsh - management, restoration and creation (with a focus on breeding waders)
Reedbed – creation
Ponds – creation (particularly of pond complexes)

Hedgerows – management (good management of existing hedgerows on short and longterm rotation, which will benefit brown and black hairstreaks and other wildlife)
Rivers – management and restoration (resource protection of watercourses to maintain and improve water quality)
BBOWT provide a lead on delivery of the Ray CTA through our Upper River Ray Living Landscapes Project, so we would be happy to discuss this further with you

Bicester Local History Society

- We are pleased to see that where appropriate, archaeological controls will be put in place, especially in the area around Graven Hill

- The western corner of the Graven Hill site is close to the Roman site of Alchester When archaeological work was done on the site in the 2002 – 2004 period, the archaeologist responsible for the work was concerned about the drop in water levels in the area thus allowing some artefacts to deteriorate before they can be retrieved It would be of benefit if hydrological assessments on the Graven Hill site could see whether the drop in water levels could be alleviated in any way?

- Will the present internal railway system be used solely for MOD purposes? Has the possibility of using some of the system to provide a transport (tramway) network link for the public to the Oxford / Bicester railway and/or the up rated Banbury / London line?

- Will there be an opportunity for Bicester Local History Society to have access to photograph and record the various sites before any development commences?

Oxfordshire County Council

Traffic and Transport

No comments on the transport section Para 6 1 1 refers to a Transport Assessment being undertaken the County Council previously supplied comments on the transport assessment scoping document (see email of 12 01 2011 from Mike Deadman to Bev Coupe)

Hydrology and water quality

The scoping report does not contain sufficient level of detailed information to enable a comprehensive response SuDS Design must be submitted before design of the site as it can affect the areas of construction

The planning application will we believe fall under the Flood and Water Management Act 2010; this states that if more than 2 properties or industrial developments drain to a joint SUDs (Sustainable Drainage) feature) they will be adopted by the Lead Flood Authority We are waiting for the Government to issue further guidance on the Act, which may change what we understand at the present time

The Act is programmed to start April 2011

The Act does state that Developers will be charged set fees for -

- checking the SUDs design of their development,
- supervision of SUDs being installed
- a commuted sum for the future maintenance of the SUDs

The fees for checking and supervision will be set by the Government

At the present no fees can be set before April 2011, but this may change

Land quality, geology and soils

Implications for the potential school site see below – the site for the proposed primary school would need to be fully remediated

Bio-diversity

The County ecologist comments that EIA scoping report has taken into account most of the relevant issues –the reference to the 'Biodiversity and Planning in Oxfordshire' guidance and the Graven Hill Local Wildlife Site is pleasing However, the development needs to be considered within the context of the Ray Conservation Target Area and we would expect this to be addressed in the EIA

a) Ray Conservation Target Area
A major strategic issue which has not been mentioned is that the development sites are close to the Ray Conservation Target Area, so the developments should be considered within the context of the aims of the Ray CTA Conservation Target Areas are the most important areas for wildlife in Oxfordshire where targeted conservation action will have the maximum benefit and is the mechanism by which Oxfordshire delivers its Biodiversity Action Plan (BAP) More information is available on the ONCF website http //www oncf org uk/biodiversity/cta html The sites proposed for development should contribute towards meeting the aims of the Ray CTA, which are lowland meadow management, restoration and creation (with a focus on MG4 hay meadows), floodplain grazing marsh management, restoration and creation (with a focus on breeding waders), pond creation (particularly of pond complexes), hedgerow management (good management of existing hedgerows on short and longterm rotation, which will benefit brown and black hairstreaks and other wildlife) and river management and restoration (resource protection of watercourses to maintain and improve water quality) If the development is going to result in any impacts on biodiversity which cannot be mitigated on-site, the Ray CTA is an area suitable for off-site compensation measures

b) Graven Hill Local Wildlife Site
As mentioned in the scoping report, Graven Hill is a Local Wildlife Site and ancient woodland According to PPS9, mitigation needs to be in place to minimise impacts and the benefit of the development would need to outweigh the harm to the LWS The scoping report states that the management of Graven Hill woodland would be designed to restrict public access to the most sensitive areas of the woodland and the provision of amenity green space within the built development would help minimise disturbance impacts to wildlife within the wood Depending on the outcome of the EIA, further mitigation / enhancement may be required For example, interpretation boards and the involvement of the local community in managing the woodland would help ensure that new residents appreciate the wildlife within the woodland There may also need to be off-site compensation if the impacts on the LWS cannot be fully mitigated The developers would be expected to produce a management plan for Graven Hill woodland and other green space within the developments and to fund the management and monitoring of these areas to ensure the delivery of green infrastructure and green space (including the LWS) in perpetuity

c) UK BAP priority habitat
Paragraph 6 6 13 states that apart from the ancient woodland on Graven Hill, the habitats within the site are not protected Although the other habitats within the site have no statutory or non-statutory designation (i e they are not a SSSI or LWS), they may still be protected through planning policy & the NERC Act if the results of the botanical survey state that they are UK BAP priority habitat (e g the hedgerows)

Cultural heritage

Oxfordshire County Archaeological Services have received copies of the geophysical survey and agree with the conclusions of section 6 7 of the EIA scoping report No further pre determination work will be required but further investigation may be required ahead of, and during the development depending on the final details of the scheme

Paragraph 6 7 18 states that

> 'Any archaeological works shall be to a Brief established by Defence Estates Historic Environment Adviser and conform to industry standards, as set out in the Institute for Archaeologists *Standard & Guidance for Archaeological Field Evaluation* (2008) '

As this proposal will be submitted as a planning application, Oxfordshire County Archaeological Services will need to prepare the design briefs for any further work and not the Defence Estates Advisor, although we will provide their advisor a copy for comments if required This paragraph will need to be changed to reflect this

Socio economics

a) Details of the mix, tenure and phasing of the development are required to enable forecasting of the likely numbers/age profile of the new residents An accurate population profile is needed to inform the assessment of the implications of the new housing for demands for services and identification of necessary mitigation measures which should be funded by the development

b) Some of the information in Table 6 24 on existing school provision is out of date and does not take account of the following factors which impact on capacity

- recent increases in the number of 4 year olds entering primary school (and which over time will filter through to the secondary schools)
- the impact of already permitted new housing in the Bicester catchment area
- troop movements into military bases at Bicester
- numbers of places in temporary accommodation
- the need to maintain an element of spare capacity for operational reasons to cope with fluctuations in year groups

Updated capacity information is available from the County Council, contact Linda Currie in the first instance

Proposed primary school site A suitable site for a 2 form entry (2FE) primary school will be needed, such site should be not less than 2 22ha of suitable, useable land and located in the heart of the residential area The site should be free of encumbrances (e g actual or claimed rights of way) and fully remediated, information of the geotechnical and topographic, proposed levels, flood risk assessments of the site would need to be provided The site would need to be serviced prior to being made available to the County Council at nil cost

c) In addition to the impacts on the services referred to in section 6 9 6 to 6 9 13, the residents of the new housing will generate additional demands for other services provided by the County Council including

- Special Educational Needs (SEN) places
- Early years/childrens centres
- Youth provision
- Library
- Adult learning

- Registration
- Day care services
- Fire and rescue
- Waste management
- Museum storage

The impacts of these additional demands on existing services and facilities and the need for mitigating measures should be assessed Contact Linda Currie for further information in the first instance

d) The EIA should consider both
- the direct impacts on the local economy in terms of creating new jobs which would help reduce out-commuting from the town
- how the proposed development would contribute to the development of a coherent economic strategy for Bicester alongside other employment development planned in the town The proposed development should complement other planned employment development with a view to raising the profile of Bicester, making it an attractive place for business to invest This will involve working with Cherwell DC, the County Council and other partners to deliver appropriate development in a timely way and of a type which will help change the image of the town in line with the eco-Bicester Vision document

e) The capacity of existing infrastructure - power supply, water supply, sewage treatment – reportedly poses problems in attracting business investment to Bicester The ability of these pieces of infrastructure to cope with the additional demands which would be generated by the proposed development should be assessed and where necessary, mitigating measures should be put in place In terms of energy production, consideration should be given to exploring links to the proposed Energy From Waste (EFW) plant at Ardley

f) High speed broadband consideration should be given to the potential for high speed broadband to be available to new businesses and homes from the earliest stages of the development

Thames Water
No comments received

English Heritage (Response provided via Entec)

I have had a quick look at the scoping report MoD Bicester is not a site that I have ever visited, so my grasp of the issues is limited

You've clearly covered the below-ground archaeological potential of the site, having discussed with Richard Oram I'm aware that the Graven Hill was the site of a Bolero hospital camp in World War II, although I understand that not much remains from this period The military railway also may be of significance, given its size I made some enquiries last year about the military history of the site, but these were inconclusive It really needs someone with a specialist knowledge of military infrastructure to investigate the history and record what survives

I'm copying to Chris Daniell at DE [Response provided by Will Holborow, Head of the Government Historic Estates Unit, English Heritage]

Cherwell District Council

Head of Planning Policy and Economic Development
Hydrology and Water Quality
6 2 3 For information- updated flooding information has been published by the EA since the Level 1 SFRA was completed

Biodiversity
As indicated by the County Ecologist and BBOWT, the report fails to refer to the Otmoor Conservation Target Area, which is in close proximity to the redevelopment area This should be taken into account in progressing the proposals

Other than this I have not identified any additional likely significant issues that would need to be addressed through the EIA

Design and Conservation Officer
There are no designated heritage assets within either site but, as the EIA Scoping Report identifies, there are a handful of grade II listed buildings within the vicinity of both sites These do not appear to be shown on Page 1 Site Constraints map on Iclipse and there is no notation in the key for statutorily listed buildings, only locally listed buildings These all need to be identified and the visual impact of the proposals on the setting of these should be assessed and the proposals amended to preferably avoid or at worst mitigate harm Night time impacts should be assessed in terms of visual intrusion and construction impacts should be assessed in terms of vibration from construction and construction traffic

There are no designated conservation areas within the vicinity of the sites, but how the impact of construction traffic on Bicester Town Centre conservation area will be mitigated (eg by routeing agreement) should be considered

The impact on sites of archaeological significance in the vicinity will need to be assessed and the opportunity taken to undertake investigations and make recordings in accordance with the advice of the County Archaeologist The route of Akeman Street, known to have passed through the Graven Hill site, should be commemorated within the master plan proposals as a transparent landscape
There is potential heritage interest at Graven Hill associated with Operation Bolero including a possible group of surface air raid shelters, Romney huts and a REME workshop block It is important to establish at this stage whether there is any heritage interest and if so whether this is a constraint to development Roger Thomas from English Heritage will be able to advise and should be contacted If a definitive answer cannot be obtained prior to submission then the master plan should allow for the retention of these buildings if heritage interest is later confirmed
Visual impact should be assessed from an agreed range of receptors which should include points some distance to the north to assess the impacts (including night time) of development creeping up the hillside and from the south to assess the daytime and night time impact of the employment buildings on the flat landscape

Landscape Officer
I have not at this stage made a detailed assessment of the sites I will reserve this for the EIA However I have made a site visit to familiarise myself with the proposals

Site A

The key opportunities and constraints identified provide a good basis for an EIA on the site and offer scope for visual improvement and improved biodiversity
There may be some visibility of the site from the footpath to the North of the site and this should be looked at in the EIA The surrounding land is very flat and large buildings do not

present the visual intrusion that they do in other areas, therefore in principle the capacity to accept development is generally good

Site C

Again the assessment for this is a fair summary of existing conditions and the potential for landscape and visual gains to the site The proximity of this site to existing residential development makes it more sensitive than site A in many respects and opportunities for improvement are welcome, particularly along the boundary with housing Visibility from footpaths to the NW and SW should be considered in the EIA

Graven Hill

I think the assessment of this site is also fair The physical nature of the site increases its sensitivity and this is recognised in the assessment Distant views into the site will be more significant for Graven Hill and these have been identified There should be more photomontages for this site than the others as this is where the nature of the development will provide greatest change to the existing conditions

In my opinion Section 6 8 of the Scoping Opinion represents a fair assessment of the landscape character of the sites in question and their surrounding landscapes
I am pleased to see that they have considered the demolition and construction stage as well as the final appearance

Environmental Protection Officer (Contaminated Land)
No comments received

Arboricultural Officer
No comments received

Ecology Officer
I have read through the biodiversity section of the report In general I believe they have highlighted the principal ecological issues I do however concur with the OCC ecologist that given the size of the area involved and as the sites touch the edge of the Ray CTA this should be taken into account CTA's are areas of opportunity for biodiversity with specific targets and therefore there may be considerable scope for this application to use these targets in their masterplanning and contribute towards them either on or off-site in order to achieve a net gain in biodiversity

The report makes little mention of UK BAP/Section 41 species and habitats and these need to be considered throughout in addition to protected species and habitats and given due weight in terms of appropriate mitigation

A full management plan with details of how it will be funded in the long-term for all the wildlife/green spaces on site will need to be produced particularly given the location of the Graven Hill LWS on site, the impact on which will be highly dependent on sympathetic long-term management

Anti Social Behaviour Officer (Noise)
The proposed measurement locations will provide satisfactory coverage

The above sections set out the Local Planning Authority's response to the request for a scoping opinion Some comments have taken a while to be received and I therefore apologise for the delay in responding Any further comments received will be forwarded in the meantime I trust that this information is of assistance to you in the formulation of the

Environmental Statement and should be treated as the Council's formal scoping opinion, made under the EIA Regulations 1999, Circular 02/99 and the Town and Country Planning (General Development Procedure) Order 1995

Yours sincerely

John Hoad
Strategic Director
Planning, Housing and Economy

Appendix C
Supporting Information

C.1 Considerate Contractor Scheme: Site Code of Considerate Practice

The Site Code of Considerate Practice forms the basis of all the Scheme's requirements.

Considerate

Everyone affected by the project should be advised before work starts. Nuisance caused by deliveries, traffic and parking should be minimised. Diversions should be clearly signed with special attention paid to the needs of traders and those with sight, hearing and mobility difficulties.

Environment

The potential environmental and ecological effects of site operations should be identified and evaluated, with appropriate action taken to minimise all forms of pollution. Every effort should be made to reduce, reuse and recycle waste. Materials should be obtained from sustainable sources, and local resources used where possible. The site should make a positive contribution to the natural environment.

Appearance

The site should be doing all it can to create an image of which the industry can be proud. The site perimeter, the offices and all welfare facilities should be clean, tidy and well presented, and all materials stored neatly. Waste, rubbish and litter should not be allowed to accumulate. Dusty operations should be managed to prevent any inconvenience. Damage caused by graffiti should be repaired quickly.

Good Neighbour

The site should have a positive influence on the local community. The site manager should interact proactively with residents, businesses, schools, etc. throughout the project to inform them about site activity and to pre-empt and avoid complaints. Any complaint should be logged and handled positively to achieve a satisfactory outcome for all concerned.

Respectful

Everyone on site should help to create a positive image and maintain respectable and safe standards of dress and behaviour. Improper conduct and language should be subject to severe disciplinary action. Pride in the management and appearance of the site, its temporary facilities and the surrounding area should be shown at all times.

Safety

Systems should be in place so that construction work is carried out with care and consideration for the safety of the public as well as for those visiting and working on site. No site should be a security risk to others.

Responsible

Considerate Constructors should be aware of their obligations to personnel, act in a professional and conscientious manner, and play a part in the development of the industry's future workforce.

Accountable

The site manager should promote the Scheme's aim of 'improving the image of construction'. Everyone associated with the site should understand and comply with the Site Code of Considerate Practice. The training and development needs for all on site should be identified and addressed.

C.2 Planning Policy Review

Table C.1 Statutory Planning Policy

Policy Reference	Policy	Relevant topic
National planning policy		
PPS 1 Delivering Sustainable Development (2005) ODPM	Describes the Government's policies for achieving sustainable development through the planning system. It considers the environmental, social and economic aspects of sustainable development.	All
PPS 3 Housing (2006) CLG	Sets out Government planning policy on housing including improving affordability and supply, in particular in rural areas.	All
PPS 4 Economic Development (2009) CLG	Sets out policy to support economic growth	Socio-economic & community
PPS 5 Planning for the Historic Environment (2010) CLG	Sets out Government planning policy on the conservation of the historic environment.	Cultural Heritage, Landscape
PPS 9 Biodiversity and Geological Conservation (2005) ODPM	Describes how biodiversity and geology will be protected through the planning system	Ecology
PPG 13 Transport (2001) ODPM	Describes Government policy on transport and planning	Traffic, Air Quality
PPG 17 Planning for Open Space, Sport and Recreation (2002) ODPM	Sets out Government policy on planning relating to open space, sport and recreation, including on how this should be dealt with in terms of planning applications	Socio-economic & Community
PPS 22: Renewable Energy (2004) ODPM	Planning Policy Statement 22 (PPS 22) sets out the Government's policies for renewable energy	Air quality
PPS 23 Planning and Pollution Control (2004) ODPM	Sets out the Government policy on planning relating to the consideration of the quality of land, air or water and potential impacts arising from new developments.	Air Quality, Water including Flood Risk, Agricultural Land Quality & Contaminated Land
PPG 24 Planning and Noise (1994)	Sets out Government policy on planning relating minimising the adverse impact of noise.	Noise and vibration
PPS 25: Development and Flood Risk (2010) CLG	Planning Policy Statement 25 (PPS 25) sets out the Government's spatial planning policy on development and flood risk.	Flood risk
Regional planning policy (South East Plan)		
Policy SP3: Urban Focus and Urban Renaissance	The prime focus for development in the South East should be urban areas, in order to foster accessibility to employment, housing, retail and other services, and avoid unnecessary travel. Local planning	Transport

Policy Reference	Policy	Relevant topic
	authorities will formulate policies to: i. concentrate development within or adjacent to the region's urban areas ii. seek to achieve at least 60% of all new development across the South East on previously developed land and through conversions of existing buildings iii. ensure that developments in and around urban areas, including urban infill/intensification and new urban extensions are well designed and consistent with the principles of urban renaissance and sustainable development iv. use strategic land availability assessments to identify the scope for redevelopment and intensification of urban areas, seeking opportunities for intensification around transport hubs and interchanges.	
Policy CC1: Sustainable Development	The principal objective of the Plan is to achieve and to maintain sustainable development in the region. Sustainable development priorities for the South East are identified as: i. achieving sustainable levels of resource use ii. ensuring the physical and natural environment of the South East is conserved and enhanced iii. reducing greenhouse gas emissions associated with the region iv. ensuring that the South East is prepared for the inevitable impacts of climate change v. achieving safe, secure and socially inclusive communities across the region, and ensuring that the most deprived people also have an equal opportunity to benefit from and contribute to a better quality of life.	Ecology, socio-economics
Policy CC6: Sustainable Communities and Character of the Environment	Actions and decisions associated with the development and use of land will actively promote the creation of sustainable and distinctive communities. This will be achieved by developing and implementing a local shared vision which: i. respects, and where appropriate enhances, the character and distinctiveness of settlements and landscapes throughout the region ii. uses innovative design processes to create a high quality built environment which promotes a sense of place. This will include consideration of accessibility, social inclusion, the need for environmentally sensitive development and crime reduction	Landscape and visual,
Policy NRM12: Combined Heat and Power	Local development documents and other policies should encourage the integration of combined heat and power (CHP), including mini and micro–CHP, in all developments and district heating infrastructure in large scale developments in mixed use. The use of biomass fuel should be investigated and promoted where possible. Local authorities using their wider powers should promote awareness of the benefits of mini and micro-CHP in the existing build stock.	Air quality
Adopted Local Plan 1996		
H4	The provision of housing schemes for the elderly and people with disabilities will be encouraged on sites within convenient reach of shops, community facilities and public transport. Proposals that do not meet these criteria will normally be resisted.	Socio-economics, transport

Policy Reference	Policy	Relevant topic
H5	Where there is a demonstrable lack of affordable housing to meet local needs, the district council will negotiate with developers to secure an element of affordable housing in substantial new residential development schemes. The district council will need to be satisfied that such affordable housing:- (i) is economically viable in terms of its ability to meet the need identified (ii) will be available to meet local needs long term through secure arrangements being made to restrict the occupancy of the development	Socio-economics
TR1	Before proposals for development are permitted the council will require to be satisfied that new highways, highway improvement works, traffic-management measures, additional public transport facilities or other transport measures that would be required as a consequence of allowing the development to proceed will be provided.	transport
TR7	Development that would regularly attract large commercial vehicles or large numbers of cars onto unsuitable minor roads will not normally be permitted.	Transport
TR10	Development that would generate frequent heavy-goods vehicle movements through residential areas or on unsuitable urban or rural roads will not be permitted. The council will resist proposals for the establishment of heavy-goods-vehicle operating centres where they would create traffic problems or adversely affect the amenity of residential areas or villages.	Transport
C1	The council will seek to promote the interests of nature conservation. development which would result in damage to or loss of sites of special scientific interest or other areas of designated wildlife or scientific importance will not normally be permitted. Furthermore, the council will seek to ensure the protection of sites of local nature conservation value. The potential adverse affect of development on such sites will be a material consideration in determining planning applications.	Ecology
C2	Development which would adversely affect any species protected by schedule 1, schedule 5 and schedule 8 of the 1981 Wildlife and Countryside Act, and by the E.C. habitats directive 1992 will not normally be permitted.	Ecology
C4	The Council will seek to promote the creation of new habitats. In urban areas the council will promote the interests of nature conservation within the context of new development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and recreation and would not conflict with other policies in the plan.	Ecology
C7	Development will not normally be permitted if it would cause demonstrable harm to the topography and character of the landscape.	Landscape and visual
C28	Control will be exercised over all new development, including conversions and extensions, to ensure that the standards of layout, design and external appearance, including the choice of external-finish materials, are sympathetic to the character of the urban or rural context of that development. In sensitive areas such as conservation areas, the area of outstanding natural Beauty and areas of high landscape value, development will be required to be of a high standard and the use of traditional local building materials will	landscape and visual

Policy Reference	Policy	Relevant topic
	normally be required	
C30	Design control will be exercised to ensure: (i) that new housing development is compatible with the appearance, character, layout, scale and density of existing dwellings in the vicinity; (iii) that new housing development or any proposal for the extension (in cases where planning permission is required) or conversion of an existing dwelling provides standards of amenity and privacy acceptable to the local planning authority.	landscape and visual
C13	The ironstone downs, the Cherwell Valley, the Thames Valley, North Ploughley, Muswell Hill and Otmoor are designated areas of high landscape value within which the council will seek to conserve and enhance the environment.	Landscape and visual
C17	The Council will seek opportunities to secure the enhancement of the urban fringe through tree and woodland planting on land within its ownership and on other land by negotiation or in connection with new development.	landscape and visual, ecology
ENV1	Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not normally be permitted.	Noise and vibration, air quality, land quality
ENV7	Development which will adversely affect to a material level, the water quality of surface or underground water bodies, including rivers, canals, lakes and reservoirs, as a result of directly attributable factors, will not be permitted.	Water quality
ENV12	Development on land which is known or suspected to be contaminated will only be permitted if: (i) adequate measures can be taken to remove any threat of contamination to future occupiers of the site (ii) the development is not likely to result in contamination of surface or underground water resources (iii) the proposed use does not conflict with the other policies in the plan.	Land quality
R12	The district council will normally require in connection with all new housing developments the minimum provision of 2.43 Hectares (6 acres) of public open space per 1,000 population. Generally, the council will require the open space to be provided within the development area and will not allow the provision to be made up of fragmented areas that are of little recreational use and which are expensive to maintain.	Socio-economics
EMP4	In the rural areas, proposals for employment generating development of the following types will normally be permitted: (a) within an existing acceptable employment site, including redevelopment; (b) conversion of an existing building or group of buildings (provided that the form, bulk and general design of the buildings concerned is in keeping with the surrounding area and, in the case of a building beyond the limits of a settlement, can be converted without major rebuilding or extension). (c) within, or adjoining settlements, for a minor extension to an existing acceptable employment site provided that:	landscape and visual, historic environment

Policy Reference	Policy	Relevant topic
	The proposal and any associated employment activities can be carried on without undue detriment to the appearance and character of the rural landscape and without harming the amenities of settlements or the special character and interest of a building of architectural or historic significance the policies of overall restraint of growth in the structure plan are not breached the proposal complies with the other policies in the plan.	

Table C.2 Non-statutory Planning Policy

Policy Reference	Policy	Relevant topic
Non Statutory Cherwell Local Plan 2011		
H1A	Criteria against which applications for new housing should be considered. (i) the availability of previously-developed sites and empty or under-used buildings and their suitability for housing use; (ii) the location and accessibility of the proposal to jobs, shops and services by modes other than the car, and the potential for improving such accessibility; (iii) the capacity of existing and potential infrastructure, including public transport, water and sewerage, other utilities and social facilities (such as schools and healthcare facilities) to absorb further development and the cost of adding further infrastructure; (iv) the ability to build communities to support new physical and social infrastructure and to provide sufficient demand to sustain appropriate local services and facilities;	Socio-economics
S1	Proposals that are likely to generate an increased demand for travel should be located in accordance with a sequential approach. First preference will be for a town centre location where suitable sites or buildings suitable for conversion are available, followed by an edge-of-centre site, and finally an out-of centre location can be considered, but only if it is accessible by a choice of means of transport.	Transport
TR1	All traffic generating development must contribute to achieving the objectives of the local transport plan.	Transport
TR2	Major generators of travel demand should be located in existing centres which are highly accessible by means other than the private car.	Transport
TR4	Before proposals for development are permitted the council will need to be satisfied that all appropriate mitigation measures required to support that development are identified within an implementation programme. Such measures will include highway improvements, traffic management measures, improved public transport and/or facilities, and measures to improve pedestrian and cycle accessibility.	Transport

Policy Reference	Policy	Relevant topic
EMP4	Proposals for employment generating development, including redevelopment, will be permitted within an existing acceptable employment site provided that:- (i) the proposal and any associated employment activities can be carried out without undue detriment to residential amenity, the highway network, village character, the appearance and character of the landscape and the environment generally including any buildings or features of designated importance; (ii) the proposal is for small firms (up to about 500 square metres) or for firms whose source of supply, commercial linkages, labour supply and markets make a specific location necessary for them; and (iii) the proposal will not give rise to excessive or inappropriate traffic and will wherever possible contribute to the general aim of reducing the need to travel by private car. A minor extension to an existing acceptable employment site within or immediately adjoining a village will be permitted provided the proposals comply with criteria (i) to (iii) above.	Transport, landscape and visual, historic environment
EN3	Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not be permitted.	Air quality, noise, odour
EN5	In determining planning applications, the council will have regard to the likely impact of the development on air quality as a result of its operational characteristics and the traffic generated by it. Development which would have a significant adverse impact on air quality will not be permitted. Wherever possible the council will seek to improve air quality through the control of development.	Air quality
EN6	In determining planning applications the council will seek to avoid unnecessary light pollution. Proposals for any external lighting scheme that requires planning permission will need to demonstrate that: (i) the lighting scheme is the minimum required for its intended use, (ii) light pollution is minimised, (iii) there is no detrimental impact on residential amenity, the character and appearance of the landscape, nature conservation or highway safety.	Light pollution
EN7	Development sensitive to noise generated by road traffic will be: (i) refused where external noise levels exceed laeq. 16hr = 72db and laeq 8hr =66db between 07:00-23:00 hrs and 23:00-7:00 hrs respectively. (ii) generally resisted where external noise levels between 07:00-23:00 hrs and 23:00-07:00 hrs fall into the ranges laeq 16hr = 63 to 72db and laeq 8 hr = 57 to 66db respectively. (iii) expected to achieve a specified internal acoustic environment when the external noise levels between 07:00-23:00 hrs and 23:00-07:00 hrs fall into the ranges laeq 16 hr = 55 to 63db and laeq 8 hr = 45 to 57db respectively.	Noise
EN8	Development sensitive to noise generated by rail traffic will be: (i) refused where external noise levels exceed laeq 16 hr = 74db between 07:00 - 23:00 hrs and laeq 8hr = 66db between 23:00 and 07:00 hrs.	Noise

Policy Reference	Policy	Relevant topic
	(ii) generally resisted where external noise levels between 07:00 - 23:00 and 23:00 - 07:00 fall into the ranges laeq 16 hr = 66 to 74db and laeq 8 hr = 59 to 66db respectively. (iii) expected to achieve a specified internal acoustic environment when external noise levels between 07:00 - 23:00 and 23:00 - 07:00 hrs fall into the ranges laeq 16 hr = 55 to 66 db and laeq 8 hr = 45 to 59 db respectively.	
EN9	Notwithstanding policies EN7 and EN8 development sensitive to vibration will be refused in locations where vibration levels are likely to affect the material comfort of end users.	Vibration
EN12	Development which will adversely affect to a material level, the water quality of surface or underground water bodies, including rivers, canals, lakes and reservoirs, as a result of directly attributable factors, will not be permitted.	Water quality
EN13	River corridors will be protected and wherever possible enhanced. Development proposals adjacent to watercourses should: (I) conserve existing areas of value and wherever possible restore the natural elements within corridors and margins; (ii) not have an adverse impact on nature conservation, fisheries, landscape, public access or water related activities; (iii) promote appropriate public access; (iv) identify appropriate locations for water related activities; (v) make adequate provision for maintenance; and (vi) make adequate provision for buffer zones.	Water quality, ecology
EN14	In areas at risk from flooding, new development, the intensification of existing development or land raising will not be permitted if the proposals would: (i) result in a net loss of flood plain storage; (ii) impede the flow of flood water; or (iii) increase the risk of flooding elsewhere.	Flooding
EN15	New development generating increased surface water run-off likely to result in an adverse impact to surface drains and watercourses, such as an increased risk of flooding, river channel instability or damage to habitats, will not be permitted unless the proposals include appropriate source control and/or attenuation measures. Developers will be expected to cover the costs of assessing the impact of development on run-off generation and of any appropriate mitigation works, including long term management.	Flooding and drainage
EN17	Development on land which is known or suspected to be contaminated will only be permitted if: (i) adequate measures can be taken to remove any threat of contamination to future occupiers of the site; (ii) the development is not likely to result in contamination of surface or underground water resources	Land quality
EN22	Development proposals will be expected to incorporate features of nature conservation value within the site. Features of value should be retained and enhanced wherever possible. The use of planning conditions or planning obligations will be sought to secure their	Ecology

Policy Reference	Policy	Relevant topic
	protection and management, or the provision of compensatory measures where appropriate.	
EN23	Before determining an application for development which may affect a known or potential site of nature conservation value, applicants will be required to submit an ecological survey to establish the likely impact on the nature conservation resource.	ecology
EN24	The council will seek to promote the interests of nature conservation through the control of development. Proposals which would result in damage to or loss of a site of ecological or geological value will not be permitted unless: (i) in the case of an internationally important site, there is no alternative solution and there are imperative reasons of over-riding public interest for the development; or (ii) in the case of a nationally important site, the reasons for the development clearly outweigh the ecological or geological value of the site and the national policy to safeguard the national network of such sites; or (iii) in the case of a site of regional or local importance for its ecological or geological value, the reasons for the development clearly outweigh the ecological or geological value of the site. In all cases where development is permitted, damage must be kept to a minimum. The council will use conditions or planning obligations to protect and enhance the site's ecological or geological interest and to provide mitigation and compensatory measures where appropriate.	ecology
EN25	Development which would adversely affect any species protected by schedule 1, schedule 5 and schedule 8 of the 1981 wildlife and countryside act, and by the EU habitats directive 1992, or its habitat will not be permitted.	Ecology
EN27	Development proposals should incorporate the creation of new habitats, particularly those concerning priority habitats or species, wherever possible. The council will promote the interests of nature conservation within the context of new development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and passive recreation.	Ecology
EN28	The council will seek to protect and enhance the ecological value, biodiversity and rural character of the following through the control of development: (i) the Oxford canal and river Cherwell and their associated corridors; (ii) the flood plain of the river Cherwell; (iii) salt way, Banbury; (iv) the flood plain of the river Bure and Langford stream, Bicester; (v) Otmoor and the flood plain of the river ray; (vi) species rich calcareous grassland at former RAF Upper Heyford.	Ecology
EN34	The council will seek to conserve and enhance the character and appearance of the landscape through the control of development. Proposals will not be permitted if they would: (i) cause undue visual intrusion into the open countryside;	Landscape and visual

Policy Reference	Policy	Relevant topic
	(ii) cause undue harm to important natural landscape features and topography; (iii) be inconsistent with local character; (iv) harm the setting of settlements, buildings, structures or other landmark features; (v) harm the historic value of the landscape.	
EN35	The council will seek to retain woodlands, trees, hedges, ponds, walls and any other features which are important to the character or appearance of the local landscape as a result of their ecological, historic or amenity value. Proposals which would result in the loss of such features will not be permitted unless their loss can be justified by appropriate mitigation and/or compensatory measures to the satisfaction of the council.	Landscape and visual, ecology,
EN37	In exercising its development control functions the council will welcome opportunities for countryside management projects where: (i) all important trees, woodland and hedgerows are retained; (ii) the ecological value of the site will be enhanced; and (iii) new tree and hedgerow planting using species native to the area and of local provenance is encouraged and subsequently managed.	Landscape and visual, ecology
EN39	Development should preserve listed buildings, their features and settings, and preserve or enhance the character or appearance of designated conservation areas, as defined on the proposals map. development that conflicts with these objectives will not be permitted.	Historic environment
EN44	Special care will be taken to ensure that development that is situated within the setting of a listed building respects the architectural and historic character of the building and its setting.	Historic environment
EN47	The council will promote sustainability of the historic environment through conservation, protection and enhancement of the archaeological heritage and its interpretation and presentation to the public. in particular it will: (i) seek to ensure that scheduled ancient monuments and other unscheduled sites of national and regional importance and their settings are permanently preserved; (ii) ensure that development which could adversely affect sites, structures, landscapes or buildings of archaeological interest and their settings will require an assessment of the archaeological resource through a desk-top study, and where appropriate a field evaluation; (iii) not permit development that would adversely affect archaeological remains and their settings unless the applicant can demonstrate that the archaeological resource will be physically preserved in-situ, or a suitable strategy has been put forward to mitigate the impact of development proposals; (iv) ensure that where physical preservation in- situ is neither practical nor desirable and sites are not scheduled or of national importance, the developer will be responsible for making appropriate provision for a programme of archaeological investigation, recording, analysis and publication that will ensure the site is preserved by record prior to destruction. such measures will be secured either by a planning agreement or by a suitable planning condition.	Historic environment

Policy Reference	Policy	Relevant topic
Draft Core Strategy		
Policy SD 6 Sustainable Drainage Systems (SUDS)	The use of sustainable drainage systems (SUDS) for the management of surface water run off generated by developments will be encouraged. Site specific Flood Risk Assessments should be used to determine how SUDS can be used on particular sites and to design appropriate systems.	Flood risk
Policy SD 8 Protection and Enhancement of Biodiversity and the Natural Environment	Protection and enhancement of biodiversity and the natural environment will be achieved by the following: In considering proposals for development, a net gain in biodiversity will be sought by protecting, managing, enhancing and extending existing resources, and by creating new resources. Development which would result in damage to or loss of a site of biodiversity or geological value of national importance will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site and the wider national network of SSSIs, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity. Development which would result in damage to or loss of a site of biodiversity or geological value of regional or local importance will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity. Development proposals will be expected to incorporate features to encourage biodiversity, and retain and where possible enhance existing features of nature conservation value within the site. Existing ecological networks should be identified and maintained to avoid habitat fragmentation, and ecological corridors should form an essential component of green infrastructure provision in association with new development to ensure habitat connectivity. A biodiversity survey and report will be required to accompany planning applications which may affect a site of known or potential ecological value. Planning conditions/obligations will be used to secure net gains in biodiversity by helping to deliver Biodiversity Action Plan targets and/or meeting the aims of Conservation Target Areas. Developments for which these are the principal aims will be viewed favourably.	Ecology
Policy SD 9 Conservation Target Areas	Where development is proposed within or adjacent to a Conservation Target Area biodiversity surveys and a report will be required to identify constraints and opportunities for biodiversity enhancement. Development which would prevent the aims of a Conservation Target Area being achieved will not be permitted. Where there is potential for development, planning conditions or obligations will be used to secure biodiversity enhancement to help achieve the aims of the Conservation Target Area.	Ecology
Policy SD 11 Local Landscape Protection and Enhancement	Opportunities will be sought to secure the enhancement of the character and appearance of the landscape, particularly in urban fringe locations, through the restoration, management or enhancement of existing landscapes, features or habitats and where appropriate the creation of new ones, including the planting of woodlands, trees and hedgerows. Development will be expected to respect and enhance local landscape character, securing appropriate mitigation where damage	Landscape and visual

Policy Reference	Policy	Relevant topic
	to local landscape character cannot be avoided. Proposals will not be permitted if they would: • Cause undue visual intrusion into the open countryside • Cause undue harm to important natural landscape features and topography • Be inconsistent with local character • Harm the setting of settlements, buildings, structures or other landmark features, or • Harm the historic value of the landscape. Development proposals should have regard to the information and advice contained in the Council's Countryside Design Summary Supplementary Planning Guidance, and the Oxfordshire Wildlife and Landscape Study (OWLS).	
Policy SD 13 The Built Environment	New development will be expected to complement and enhance the character of its context through sensitive siting, layout and high quality design. Where development is in the vicinity of any of the district's distinctive natural or historic assets, delivering high quality design will be essential. New development should: • Respect local topography and landscape features, including skylines, valley floors, significant trees, historic boundaries, landmarks, features or views, in particular within designated landscapes, within the Cherwell Valley and within conservation areas and their setting. • Preserve and enhance designated historic assets, features, areas and their settings, and ensure new development is sensitively sited and integrated • Respect the traditional pattern of routes, spaces, blocks, plots, enclosures and the form, scale and massing of buildings • Reflect or, in a contemporary design response, re-interpret local distinctiveness, including elements of construction, elevational detailing, windows and doors, building and surfacing materials and colour palette • Demonstrate an holistic approach to the design of the public realm following the principles set out in The Manual For Streets • Be compatible with up to date urban design and Secured By Design principles • Incorporate energy efficient design, whilst ensuring that the aesthetic implications of green technology are appropriate to the context (also see Policies SD 1 - 5 on climate change and renewable energy).	Landscape and visual, historic environment,
Policy I 2 Green Infrastructure Network	The district's green infrastructure network will be maintained and enhanced through the following measures: Pursuing opportunities for joint working to maintain and improve the green infrastructure network Protecting and enhancing existing sites and features of value to the green infrastructure network and improving connectivity between sites in accordance with policies on biodiversity and the natural environment (policy SD 8), conservation target areas (policy SD 9), open space, sport and recreation (policy I	Landscape and visual

Policy Reference	Policy	Relevant topic
	3), and adapting to climate change (policy SD 1). Providing new areas of multi-functional open space to address identified deficiencies in accordance with policies I 3 and I 4. Ensuring that green infrastructure network considerations are integral to the planning of new development. Green infrastructure master plans should be developed for strategic development sites and proposals should maximise the opportunity to maintain and extend green infrastructure links to form a multi-functional network of open space, connecting the towns to the urban fringe and the wider countryside beyond. Encouraging the use of sustainable drainage systems in new development in accordance with policy SD 6. Establishing a series of linked open spaces in Bicester and Banbury in accordance with policies BIC 5 and BAN 10.	
Policy I 3 Open Space, Sport and Recreation Provision	The Council will encourage partnership working to ensure that an appropriate quantity and quality of open space, sport and recreation provision is secured through the following measures: • Protecting existing sites of value; • Addressing existing deficiencies in provision through qualitative enhancement of existing provision, improving access to existing facilities or securing new provision; and • Ensuring that proposals for new development contribute to open space, sport and recreation provision commensurate to the need generated by the proposals. In determining the nature of new or improved provision the Council will consult with town and parish councils, together with potential users of the green space wherever possible, to ensure that provision meets local needs.	Socio-economics
Policy I 4 Local Standards of Provision	Development proposals will be required to contribute to the provision of open space, sport and recreation, together with secure arrangements for its management and maintenance. The amount, type and form of open space will be determined having regard to the nature and size of development proposed and the community needs likely to be generated by it. Provision should usually be made on site in accordance with the minimum standards of provision set out in Table 12 below. Where this is not possible or appropriate, a financial contribution towards suitable new provision or enhancement of existing facilities off site will be sought, secured through a legal agreement.	Socio-economics
Policy BIC 5 Meeting the Need for Open Space, Sport and Recreation in Bicester	As part of measures to address current and future deficiencies in open space, sport and recreation provision in the town we will: Seek to establish an urban edge park around the outskirts of the town, linking existing green spaces with public footpaths/cycleways to create a circular route with connections to the town centre and the countryside beyond. Development that would prejudice this objective will not be permitted.	Socio-economics
Policy H 4 Affordable Housing Target	At least 3300 new affordable homes (net) will be provided in Cherwell between 2006 and 2026 (165 homes per year). 2500 of these will be provided at Bicester and Banbury. 800 will be provided elsewhere. Existing properties acquired by Registered Social Landlords will be considered as being additional to these targets.	Socio-economics
Policy H 5 Affordable Housing	At Banbury and Bicester, all proposed developments that include 10 or more dwellings (gross), or which would be provided on sites	Socio-economics

Policy Reference	Policy	Relevant topic
Requirements	suitable for 10 or more dwellings (gross), will be expected to provide at least 30% as affordable homes on site. Where this policy would result in a requirement that part of an affordable home should be provided, a financial contribution of equivalent value will be required for that part only. Otherwise, financial contributions in lieu of on-site provision will only be acceptable in exceptional circumstances. All qualifying developments will be expected to provide 70% of the affordable housing as social rented dwellings and 30% as other forms of intermediate affordable homes. It is expected that these requirements will be met without the use of social housing grant. Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an economic viability assessment can be undertaken. Where development is proven to be unviable with the above requirements, negotiations with the promoters of development will take place. These negotiations will include consideration of: the mix and type of housing, the split between social rented and intermediate housing, the availability of social housing grant and the percentage of affordable housing to be provided.	
Policy E 1 Employment Development	The Council will, as a general principle, continue to protect existing employment land and buildings for employment (B class) uses. It will identify a range of new sites for employment uses in Development Plan Documents which:- Are, or will be accessible to the existing and proposed labour supply, Make efficient use of existing and underused sites and premises, by increasing the intensity of use on accessible sites, Make efficient use of previously-developed land wherever possible, Have good access, or can be made to have good access, by public transport, and Are in urban areas. Proposals within rural areas will only be supported where these meet local needs.	Socio-economics
Policy E 2 Supporting Urban Centres	Retail and other town centre uses will be directed towards the three urban centres of Banbury, Bicester and Kidlington in accordance with policies set out elsewhere within the Local Development Framework. Proposals for such uses outside of these centres will only be permitted where:- • There is a proven need for the proposal; • There are no available, suitable and viable sequentially preferable sites or buildings; • It would reduce the need to travel by private car; • The development is, or can be made, genuinely accessible and well served by a choice of means of transport, especially public transport, walking and cycling as well as by car; • It can be demonstrated that the proposal would not have a significant adverse impact on the vitality and viability of urban and existing local centres;	Socio-economics

Policy Reference	Policy	Relevant topic
	• The development is part of a new or expanded local centre proposed as part of strategic housing allocations in this Core Strategy.	

Appendix D
Traffic and Transport

This Appendix is intentionally blank

Defence Infrastructure Organisation

amec

Appendix E
Air Quality

Defence Infrastructure Organisation

amec

Table E.1 Traffic data used in the air quality assessment

Road	Link No	Base Speed (kmph)	Future Speed (kmph)	AADT 2007 Baseline	HGV%	AADT Future (2031) without development	HGV%	AADT Future (2031) with development	HGV%	Road Type
A41	1	96	96	204419	1%	252380	1%	262551	1%	A
Oxford Road (A41)	3	32	32	161944	0%	157308	0%	169670	1%	A
A41	4	72	72	197747	1%	274187	2%	287644	2%	A
B4100	5	48	48	99307	0%	93109	1%	110165	1%	B
Wretchwick Way	7	32	32	134317	1%	164421	1%	179645	1%	B
Aylesbury Road	8	72	64	207362	1%	245381	2%	262649	2%	A
Ploughley Road	9	48	48	32569	1%	44755	1%	49579	1%	B
B4011	10	96	96	53295	1%	90753	1%	90753	1%	B
Aylesbury Road	11	96	96	125078	1%	154089	2%	154613	2%	A
Middleton Stoney Road	14	32	32	79488	0%	115888	1%	117932	1%	B
Ploughley Road	18	48	48	39829	0%	67769	0	58400	0	B
Palmer Avenue	19	48	48	10478	2%	10478	2%	18532	3%	B

Defence Infrastructure Organisation

amec

Table E.2 Annual Mean NO_2 Results ($\mu g\ m^{-3}$)

Receptor	Link Ref	Base (2010)	Future Base (2031)	Future with Development (2031)	Change	Magnitude	Effect
Church Lane, Wendlebury	1	20.19	14.32	14.44	0.12	imperceptible	negligible
Caravan Park, A41	2	23.17	18.46	18.64	0.18	imperceptible	negligible
Kings End Roundabout	3	25.75	21.51	23.2	1.69	small	negligible
London Road	4	24.41	19.8	20.24	0.44	small	negligible
Kestral Way	5	24.2	19.04	19.55	0.51	small	negligible
Ravencroft	6	20.65	15.45	15.72	0.27	imperceptible	negligible
Wretchwick Lodge	7	21.22	16.72	16.96	0.24	imperceptible	negligible
Aylesbury Road	8	23.25	19.81	20.16	0.35	imperceptible	negligible
Stone Pit's Farm	9	23.33	20.38	20.4	0.02	imperceptible	negligible
Thame Road	10	19.37	17.01	17.01	<0.01	imperceptible	negligible
Ploughley Road, Ambrosden	11	16.09	12.61	13.94	1.33	small	negligible
SSSI Arncott Bridge Meadows	12	17.28	15.16	14.65	-0.51	small	negligible
Ploughly Road, Upper Arncott	13	15.25	12.81	12.42	-0.39	imperceptible	negligible
Ploughly Road, Upper Arncott	14	19.15	16.04	17.67	1.63	small	negligible

Table E.3 Annual Mean PM_{10} Results ($\mu g\ m^{-3}$)

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Church Lane, Wendlebury	1	20.98	19.77	19.8	0.03	imperceptible	negligible
Caravan Park, A41	2	19.46	18.27	18.3	0.05	imperceptible	negligible
Kings End Roundabout	3	20.74	19.12	19.4	0.24	imperceptible	negligible
London Road	4	18.92	17.49	17.6	0.11	imperceptible	negligible
Kestral Way	5	19.61	17.92	18.1	0.15	imperceptible	negligible

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Ravencroft	6	18.34	16.88	17.0	0.08	imperceptible	negligible
Wretchwick Lodge	7	17.90	16.57	16.6	0.05	imperceptible	negligible
Aylesbury Road	8	18.57	17.22	17.3	0.08	imperceptible	negligible
Stone Pit's Farm	9	19.37	18.23	18.2	0.01	imperceptible	negligible
Thame Road	10	18.00	17.09	17.1	<0.01	imperceptible	negligible
Ploughley Road, Ambrosden	11	17.06	15.89	16.0	0.13	imperceptible	negligible
SSSI Arncott Bridge Meadows	12	16.60	16.74	16.6	-0.15	imperceptible	negligible
Ploughly Road, Upper Arncott	13	15.79	15.82	15.7	-0.10	imperceptible	negligible
Ploughly Road, Upper Arncott	14	16.50	16.31	16.6	0.31	imperceptible	negligible

Table E.4 Number of exceedences of 24 hour Mean PM_{10} (35 days permitted exceedences of 50 $\mu g\ m^{-3}$) Results (days)

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Church Lane, Wendlesbury	1	<1	<1	<1	<1	imperceptible	negligible
Caravan Park, A41	2	<1	<1	<1	<1	imperceptible	negligible
Kings End Roundabout	3	<1	<1	<1	<1	imperceptible	negligible
London Road	4	<1	<1	<1	<1	imperceptible	negligible
Kestral Way	5	<1	<1	<1	<1	imperceptible	negligible
Ravencroft	6	<1	<1	<1	<1	imperceptible	negligible
Wretchwick Lodge	7	<1	<1	<1	<1	imperceptible	negligible
Aylesbury Road	8	<1	<1	<1	<1	imperceptible	negligible
Stone Pit's	9	<1	<1	<1	<1	imperceptible	negligible

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Farm							
Thame Road	10	<1	<1	<1	<1	imperceptible	negligible
Ploughley Road, Ambrosden	11	<1	<1	<1	<1	imperceptible	negligible
SSSI Arncott Bridge Meadows	12	<1	<1	<1	<1	imperceptible	negligible
Ploughly Road, Upper Arncott	13	<1	<1	<1	<1	imperceptible	negligible
Ploughly Road, Upper Arncott	14	<1	<1	<1	<1	imperceptible	negligible

Table E.5 Annual Mean $PM_{2.5}$ Results ($\mu g\ m^{-3}$)

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Church Lane, Wendlesbury	1	12.88	11.77	11.8	0.03	imperceptible	negligible
Caravan Park, A41	2	13.46	12.27	12.3	0.05	imperceptible	negligible
Kings End Roundabout	3	14.94	13.42	13.7	0.24	imperceptible	negligible
London Road	4	13.22	11.89	12.0	0.11	imperceptible	negligible
Kestral Way	5	13.91	12.32	12.5	0.15	imperceptible	negligible
Ravencroft	6	12.64	11.28	11.4	0.08	imperceptible	negligible
Wretchwick Lodge	7	12.20	10.97	11.0	0.05	imperceptible	negligible
Aylesbury Road	8	12.77	11.52	11.6	0.08	imperceptible	negligible
Stone Pit's Farm	9	13.57	12.53	12.5	0.01	imperceptible	negligible
Thame Road	10	12.30	11.49	11.5	<0.01	imperceptible	negligible
Ploughley Road, Ambrosden	11	11.16	10.09	10.2	0.13	imperceptible	negligible
SSSI Arncott Bridge Meadows	12	11.80	11.14	11.0	-0.15	imperceptible	negligible

Receptor	Ref	Base	Future Base	Future with Development	Change	Magnitude	Effect
Ploughly Road, Upper Arncott	13	10.99	10.22	10.1	-0.10	imperceptible	negligible
Ploughly Road, Upper Arncott	14	11.90	10.81	11.1	0.31	imperceptible	negligible

Appendix F
Noise and Vibration

Defence Infrastructure Organisation
amec

Defence Infrastructure Organisation

amec

F.1 Noise monitoring equipment

Kit 2 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 00541627 Calibration Date 11.08.10
Pre-amplifier:	Rion NH-21 Serial Number 11613 Calibration Date 11.08.10
Microphone:	Rion UC-53A Serial Number: 306431 Calibration Date 11.08.10

Kit 4 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 00541624 Calibration Date 18.06.10
Pre-amplifier:	Rion NH-21 Serial Number 13939 Calibration Date 18.06.10
Microphone:	Rion UC-53A Serial Number: 310266 Calibration Date 18.06.10

Kit 7 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 01141957 Calibration Date 18.01.11
Pre-amplifier:	Rion NH-21 Serial Number 13602 Calibration Date 18.01.11
Microphone:	Rion UC-53A Serial Number: 307764 Calibration Date 18.01.11

Kit 8 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 01141956 Calibration Date 18.02.11
Pre-amplifier:	Rion NH-21 Serial Number 13601 Calibration Date 18.02.11
Microphone:	Rion UC-53A Serial Number: 307763 Calibration Date 18.02.11

Kit 9 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 01141955 Calibration Date 11.03.10
Pre-amplifier:	Rion NH-21 Serial Number 13600 Calibration Date 11.03.10
Microphone:	Rion UC-53A Serial Number: 307762 Calibration Date 11.03.10

Kit 10 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 01141954 Calibration Date 18.02.11
Pre-amplifier:	Rion NH-21 Serial Number 13599 Calibration Date 18.02.11
Microphone:	Rion UC-53A Serial Number: 308756 Calibration Date 18.02.11

Kit 12 (Entec)

Sound Level Meter	Rion NL 31 Level Meter Serial Number 00583299 Calibration Date 21.02.11
Pre-amplifier:	Rion NH-21 Serial Number 27529 Calibration Date 21.02.11
Microphone:	Rion UC-53A Serial Number: 314474 Calibration Date 21.02.11

Calibrator (RION)

Calibrator:	Rion NC-74 Serial Number: 34251556 Calibration Date: 21.07.10

F.2 Noise monitoring results

Figure F2a - Noise Monitoring Results, MoD Bicester: Location C.1 Arncott, Plougley Road

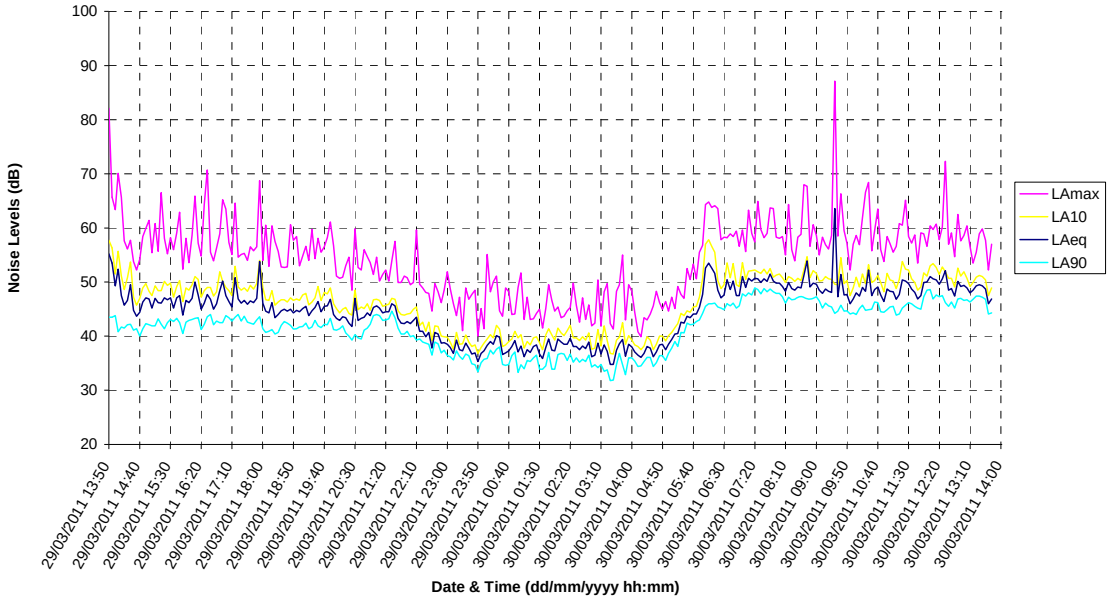


Figure F2b - Noise Monitoring Results, MoD Bicester: Location C.2 - Arncott, Brook Farm

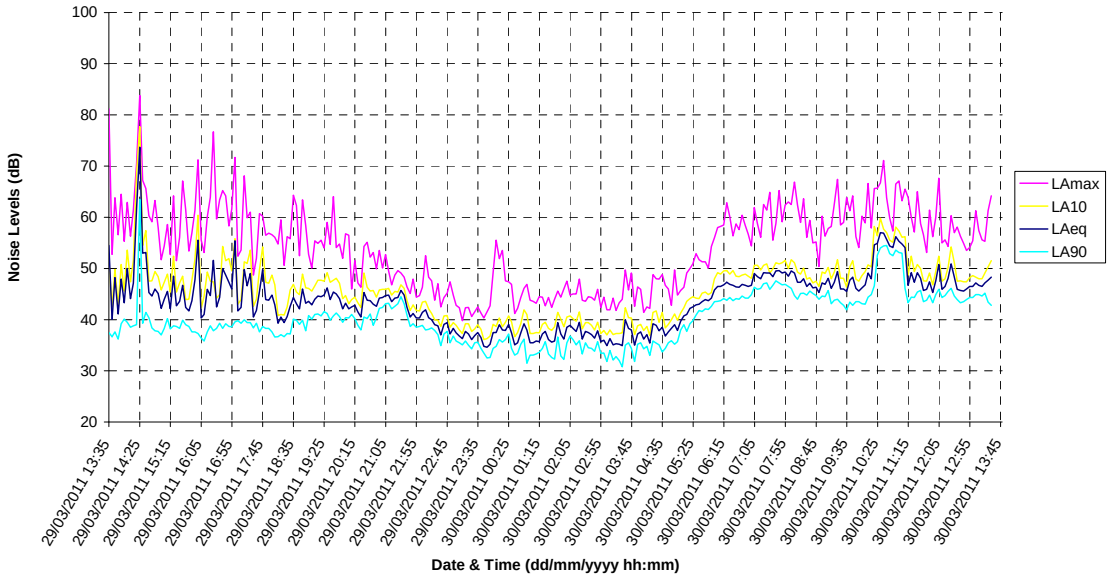


Figure F2c - Noise Monitoring Results, MoD Bicester: Location C.3, Arncott, Norris Road

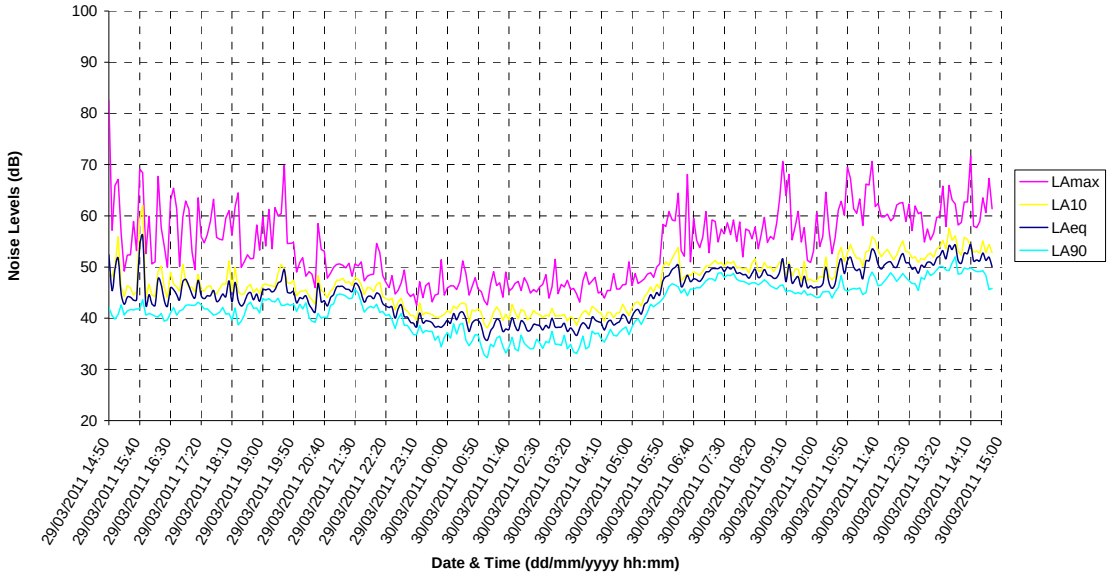


Figure F2d - Noise Monitoring Results, MoD Bicester: Location C.4, Arncott, Harper Close

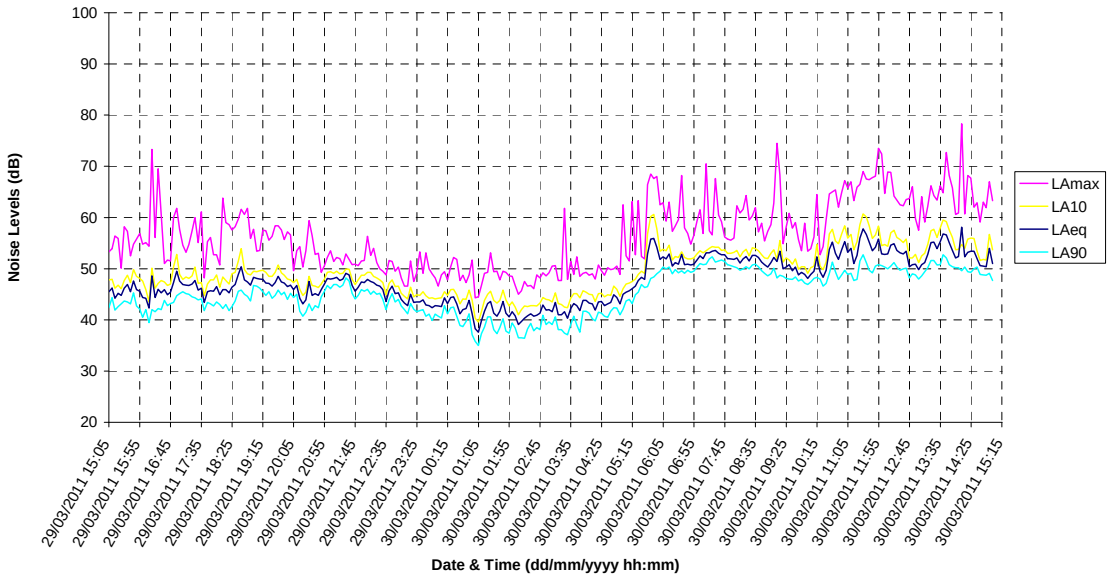


Figure F2e - Noise Monitoring Results, MoD Bicester: Location C.5, Ambrosden, MoD Rail Crossing

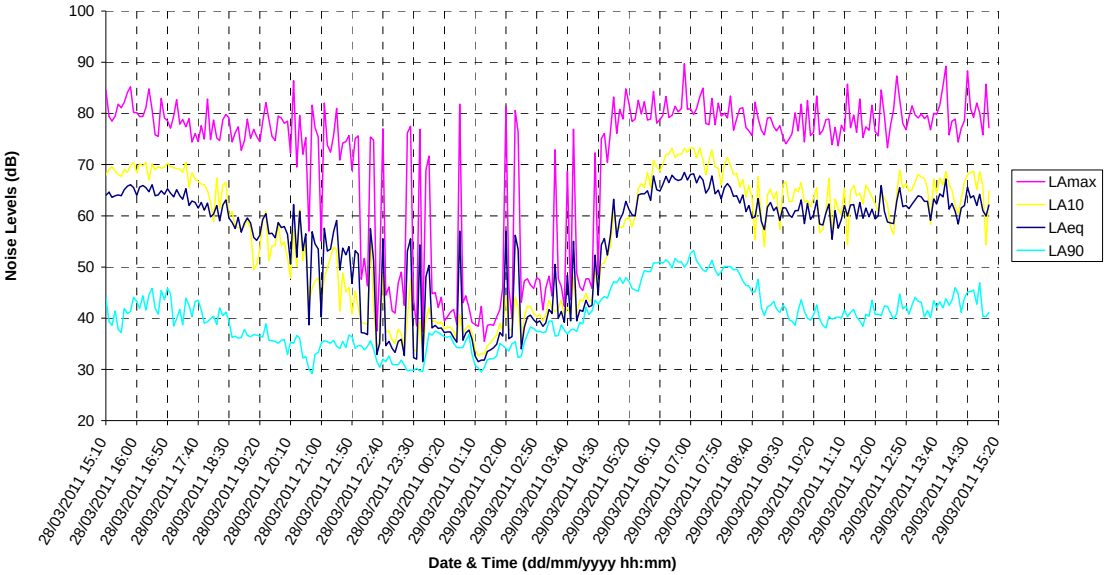


Figure F2f - Noise Monitoring Results, MoD Bicester: Location C.6, Ambrosden Farm

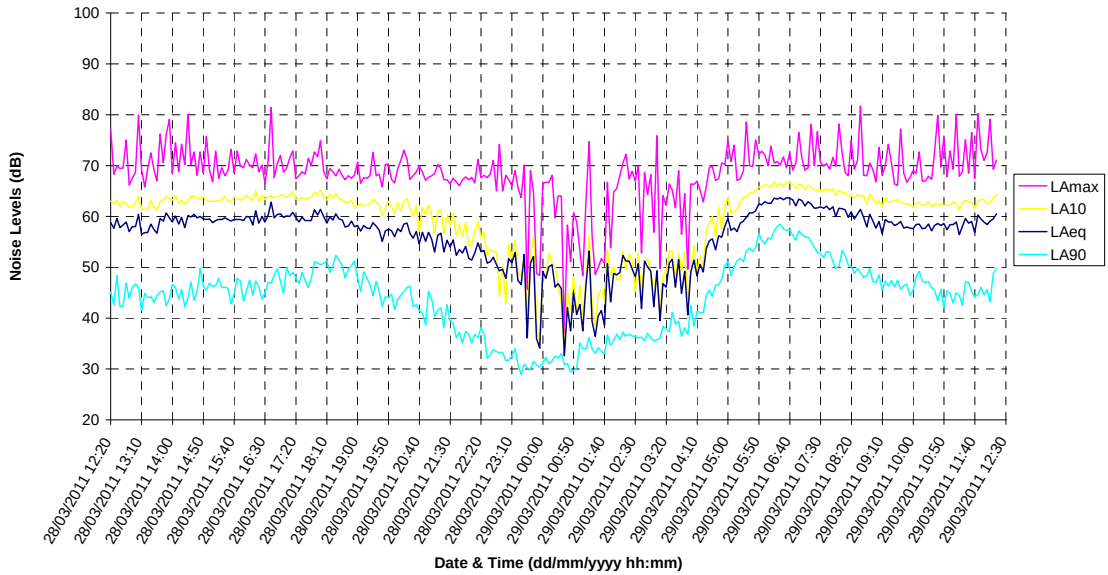


Figure F2g - Noise Monitoring Results, MoD Bicester: Location D/E 1, Landford Park Farm

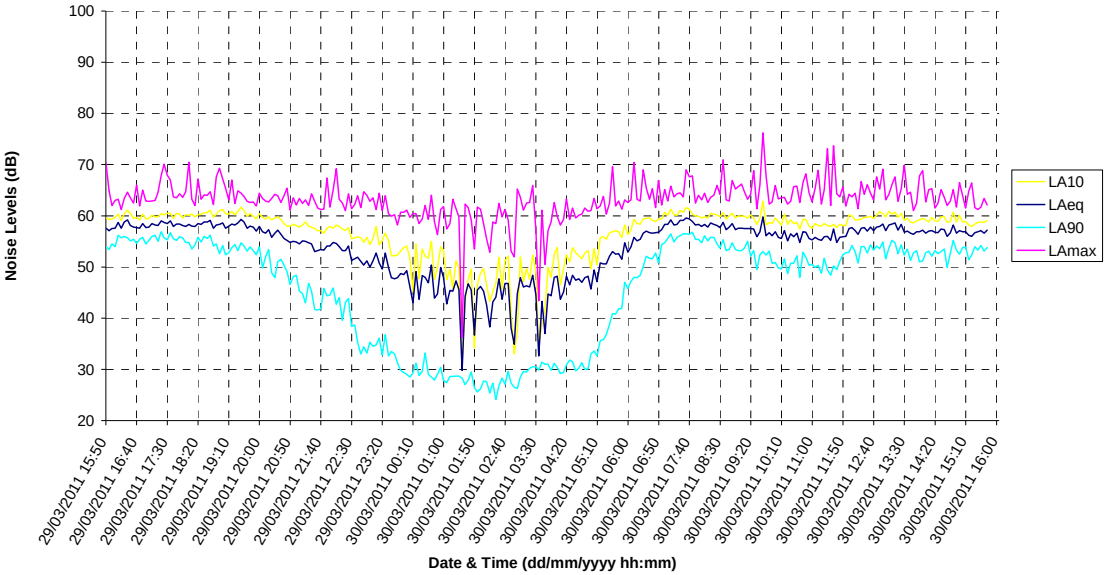


Figure F2h - Noise Monitoring Results, MoD Bicester: Location D/E 2, Landford Park Farm

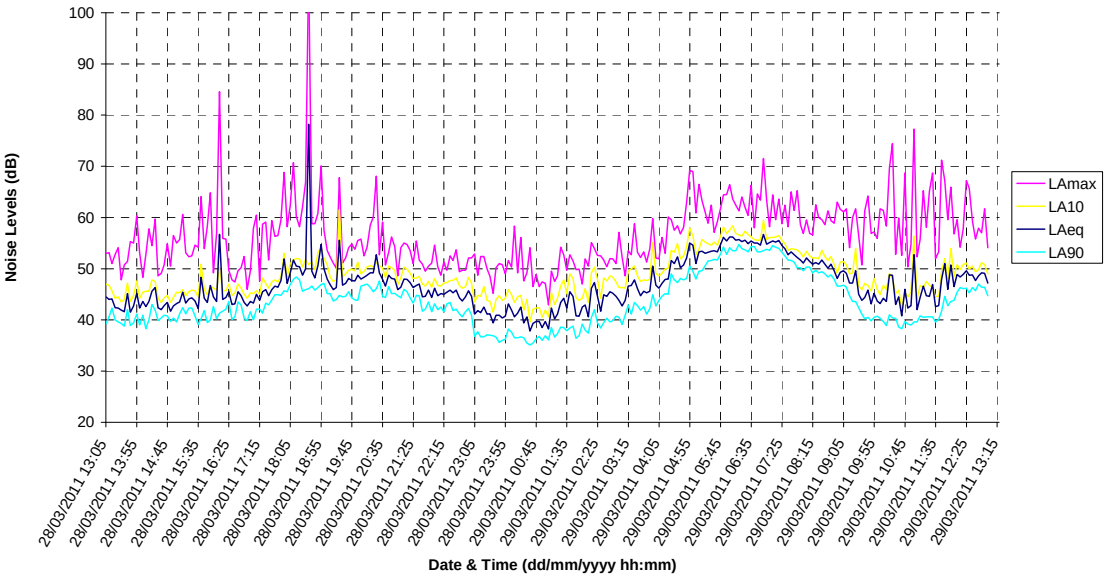


Figure F2i - Noise Monitoring Results, MoD Bicester: Location D/E 3, Mod Site D, Circular Road

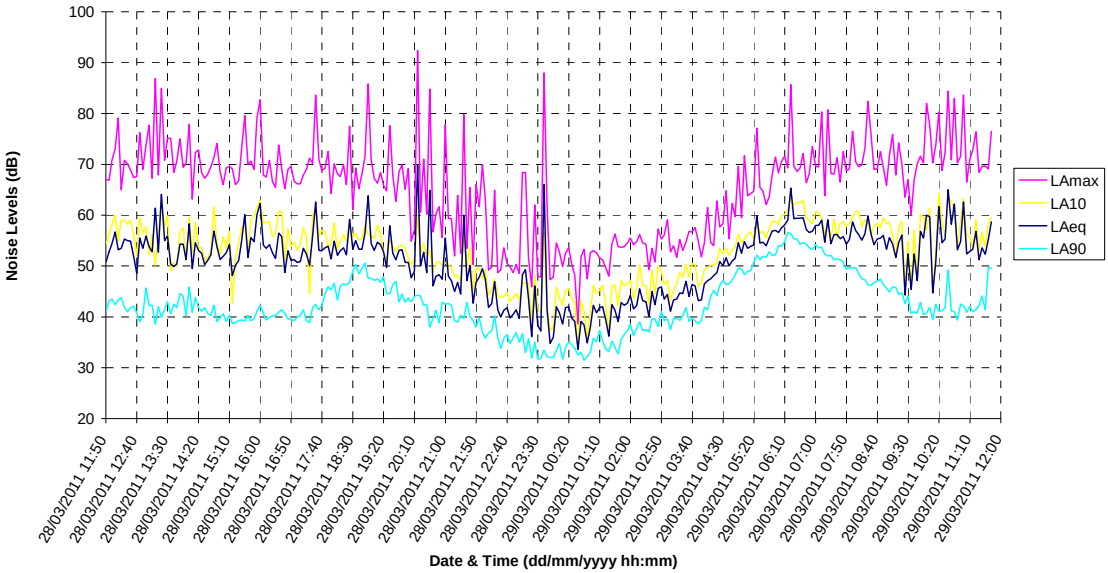


Figure F2j - Noise Monitoring Results, MoD Bicester: Location D/E 4, Bicester, 17 Kestrel Way

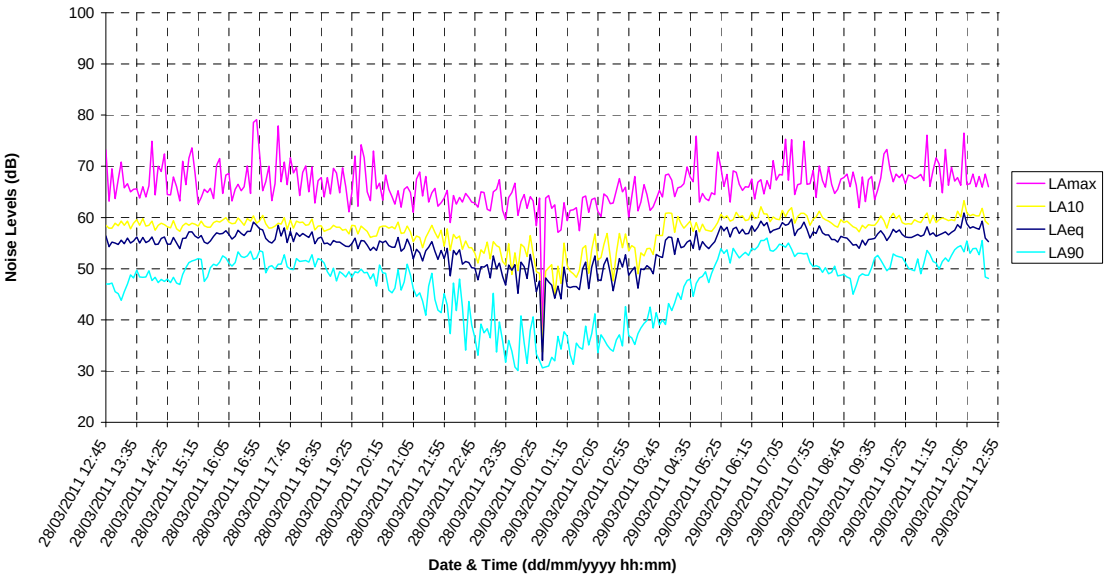
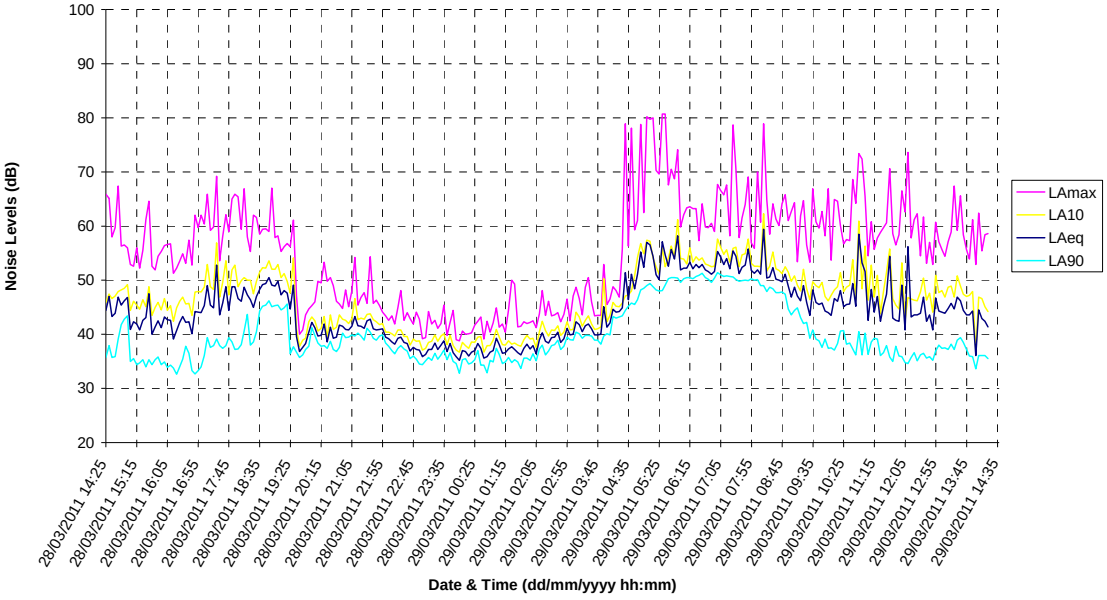


Figure F2k - Noise Monitoring Results, MoD Bicester: Location D/E 5, Mod Site D/E, Landford Lane



F.3 Road Traffic Noise (Scoping)

Table F3.1 Road traffic noise (scoping) - analysis of traffic data for potentially significant effects by road segment (daytime, 18hr)

			Baseline (2031)		With Development (2031)				
No.	**Name**	**Populated? (existing resi)**	**Total Vehicles**	**%HGV**	**Total Vehicles**	**%HGV**	**% Increase in Total Vehicles**	**%Increase in HGV Traffic**	**Potentially Significant Change in Traffic?**
1	A41 north of J9	YES	35628	8	37003	8	3.9	0	NO
2	A41south of Oxford Rd Junction	YES	45094	9	45719	9	1.4	0	NO
3	Oxford Rd north of Pingle Drive	YES	22252	3	24002	4	7.9	1	NO
4	A41 Boundary Way	YES	38831	10	40769	10	5.0	1	NO
5	London Rd B4100	YES	13126	5	15564	3	18.6	-2	NO
6	Neunkirchen Way (A4421)	YES	23189	6	25377	7	9.4	1	NO
7	A41 south of Neunkirchen Way	YES	34628	12	37128	12	7.2	0	NO
8	Ploughley Rd south of A41	YES	6342	4	7030	4	10.8	0	NO
9	B4011 south of A41	YES	8304	5	8366	7	0.8	2	NO
10	A41 east of B4011	YES	21680	15	21680	15	0.0	0	NO
11	Oxford Rd south of Pingle Drive	YES	23914	6	25977	7	8.6	1	NO
12	Middleton Stoney Rd west of Kings End	YES	16439	5	16751	6	1.9	1	NO
13	A41 between Pioneer Road and Ploughley Road	YES	34003	11	34690	12	2.0	1	NO
14	A41 between Ploughley Road and B4100	YES	28656	12	28844	13	0.7	1	NO
15	Ploughley Road between Palmer Avenue and Ambrosden	YES	9664	2	8308	2	-14.0	0	NO
16	Palmer Avenue between Ploughley Road and B4100	YES	2551	11	2651	16	3.9	5	NO

			Baseline (2031)		With Development (2031)				
No.	**Name**	**Populated? (existing resi)**	**Total Vehicles**	**%HGV**	**Total Vehicles**	**%HGV**	**% Increase in Total Vehicles**	**%Increase in HGV Traffic**	**Potentially Significant Change in Traffic?**
17	B4100 Between Palmer Avenue and A41	YES	12768	4	12868	6	0.8	2	NO

Table F3.2 Road traffic noise (scoping) - analysis of traffic data for potentially significant effects by road segment (night-time, pk hour)

			Baseline (2031)		With Development (2031)				
No.	**Name**	**Populated? (existing resi)**	**Total Vehicles**	**%HGV**	**Total Vehicles**	**%HGV**	**% Increase in Total Vehicles**	**%Increase in HGV Traffic**	**Potentially Significant Change in Traffic?**
1	A41 north of J9	YES	613	20	636	21	3.9	1	NO
2	A41south of Oxford Rd Junction	YES	776	22	786	22	1.4	0	NO
3	Oxford Rd north of Pingle Drive	YES	383	8	413	10	7.9	2	NO
4	A41 Boundary Way	YES	668	24	701	25	5.0	1	NO
5	London Rd B4100	YES	226	11	268	8	18.6	-3	NO
6	Neunkirchen Way (A4421)	YES	399	15	436	17	9.4	2	NO
7	A41 south of Neunkirchen Way	YES	596	30	639	29	7.2	-1	NO
8	Ploughley Rd south of A41	YES	109	11	121	10	10.8	-1	NO
9	B4011 south of A41	YES	143	13	144	18	0.8	5	NO
10	A41 east of B4011	YES	373	37	373	37	0.0	0	NO
11	Oxford Rd south of Pingle Drive	YES	411	14	447	17	8.6	3	NO
12	Middleton Stoney Rd west of Kings End	YES	283	12	288	14	1.9	2	NO

			Baseline (2031)		With Development (2031)				
No.	**Name**	**Populated? (existing resi)**	**Total Vehicles**	**%HGV**	**Total Vehicles**	**%HGV**	**% Increase in Total Vehicles**	**%Increase in HGV Traffic**	**Potentially Significant Change in Traffic?**
13	A41 between Pioneer Road and Ploughley Road	YES	585	28	597	29	2.0	1	NO
14	A41 between Ploughley Road and B4100	YES	493	30	496	32	0.7	2	NO
15	Ploughley Road between Palmer Avenue and Ambrosden	YES	48	2	239	0	401.9	-2	YES
16	Palmer Avenue between Ploughley Road and B4100	YES	47	8	64	32	36.3	25	YES
17	B4100 Between Palmer Avenue and A41	YES	181	8	198	16	9.4	8	NO

F.4 CRTN Calculations

Table F4.1 CRTN calculations (night-time, pkhr), Baseline 2031 -> With Development 2031

		Baseline (2031)				With Development (2031)				
No.	**Name**	**Total Vehicles**	**%HGV**	**Average Speed (km/h)**	**$L_{A10, 18hr}$ for segment (dB)**	**Total Vehicles**	**%HGV**	**Average Speed (km/h)**	**$L_{A10, 18hr}$ for segment (dB)**	**Noise level change (dB)**
15	Ploughley Road Between Palmer Avenue and Ambrosden	48	2	96.6	57.0	239	0	96.6	65.9	**8.9**
16	Palmer Avenue between Ploughley Road and B4100	47	8	96.6	57.9	64	32	96.6	62.9	**5.0**

Defence Infrastructure Organisation

amec

Appendix G
Community and socio-economics

This Appendix is intentionally blank.

Defence Infrastructure Organisation

amec

Appendix H
Historic Environment

Defence Infrastructure Organisation

amec

H.1 Planning Policy and Guidance Review

Introduction

PPS 5: Planning for the Historic Environment was published in March 2010. This sets out national planning policy for treatment of the historic environment in the development process and is accompanied by a practice guide, which sets out more detail on how the policies should be implemented. The overriding objectives of this national planning policy are set out as:

- To deliver sustainable development by ensuring that policies and decisions recognise the significance of heritage assets as a non-renewable resource which can offer wider social, economic and cultural benefits, but which can also be subject to intelligent management and change;
- To conserve heritage assets appropriate to their significance; and
- To contribute to our knowledge of the past.

PPS 5 is principally concerned with the treatment and conservation of those parts of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest. These are referred to as heritage assets and Appendix 2 further describes heritage assets as being a building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets may be designated or non-designated.

PPS 5 refers to heritage assets in terms of their 'significance', as discussed above. In line with EIA regulations, this ES also draws conclusions in terms of the significance of effects on the historic environment.

Legislative and Policy Implication

Direct Effects

Direct effects on assets can occur as a result of the loss of, or disturbance, to elements of the historic environment. Direct effects may therefore occur on any features that are known to be or could potentially be within areas where ground may be directly disturbed as a result of a proposed development. Any development has the potential to affect heritage assets, although particularly where this entails the disturbance of a 'greenfield' site, where archaeological remains are more likely to survive.

Under the relevant legislation, specific consent is normally required for works which directly affect scheduled monuments or listed buildings. PPS 5 (Policy HE9) states that there should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. There are no designated heritage assets within the development site.

The extent of effects on a heritage asset should be weighed against the merits and benefits of a proposed development and there will be times when it is appropriate to accept the total or partial loss of the significance of an asset. In such cases, Policy HE12 requires that measures to record

and advance understanding of the asset are implemented before it is lost. This may involve, for example, archaeological excavation or historic buildings recording and can be secured using a planning condition or legal agreement.

Indirect Effects

Indirect effects can occur as a result of changes that do not result in direct physical loss or damage to an asset, but affect them in other, often less tangible ways, for example, by altering the setting of a heritage asset or from effects on the preservation of remains which would not otherwise be physically affected (e.g. through changes to drainage). These can be short term (e.g. resulting from construction activities) or long term (e.g. resulting from new structures).

The Setting of Heritage Assets

PPS 5 defines the setting of an asset as:

> *"The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral."*

The supporting Practice Guide expands this definition, explicitly identifying the contribution of visual and other sensory perceptions to the 'experience' of the setting, noting that setting is more inclusive than the designed or 'intended' landscape around an asset and that, while the implications for public appreciation of an asset should be considered, the significance of the setting is independent on the ability of the public to access that asset or setting.

The Practice Guide states that all heritage assets have a setting, regardless of the form of the asset and whether or not they are designated, and that effects on the settings of heritage assets are a material consideration in the determination of a planning application. It further states that views of, or from, an asset play an important part in defining the setting of an asset, but that the way assets are experienced can also be influenced by factors such as noise, dust, vibration and by an understanding of any historic associations between places.

The concept of setting is addressed in legislation with respect to some classes of designated heritage asset. In addition to the provisions of PPS 5, the Planning (Listed Buildings and Conservation Areas) Act 1990 makes reference to the setting of listed buildings in Section 66(1), in that it includes a requirement to have special regard to the desirability of preserving the building or its setting in considering any proposed development. There is therefore a legal requirement to consider possible effects on the setting of Listed Buildings, though this falls short of a legal presumption that they need always be preserved.

Planning guidance advises that planning applications that may affect the setting of scheduled monuments or listed buildings should be referred to English Heritage; Environment Circular 01/01 sets out the types of development which should be notified to English Heritage by the Local Planning Authority (LPA). This includes applications which would affect both the physical structure of listed buildings and their setting.

Other Guidance

In addition to the policy context and legislative requirements, there are a number of guidance documents published by English Heritage. Those used in this assessment are:

- The Setting of Heritage Assets: English Heritage Guidance Consultation Draft;
- Seeing The History In The View: A Method for Assessing Heritage Significance within Views; and
- Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment.

Recent English Heritage draft guidance - The Setting of Heritage Assets - reflects on legislation and guidance including that in PPS 5 and aims "*…to ensure that judgements about the contribution of setting to the significance of heritage assets and about the implications of change are as objective and consistent as possible*." . It explains that "*setting is not fixed and may change as an asset and its surroundings evolve or as understanding of the asset improves*".

The guidance recommends that assessment of the impact of a proposed development should address the following three questions:

- Is a development of a particular type, scale, massing or prominence within the setting of an asset (or assets) likely to be acceptable or unacceptable in terms of the degree of harm to its significance?
- Is the precise location of the development likely to be a critical factor in determining whether the degree of harm to significance is acceptable or unacceptable?
- Are more detailed aspects of the development's design likely to be a critical factor in determining whether the degree of harm to significance is acceptable or unacceptable?

It goes on to identify considerations to be taken into account in answering the above questions, such as the magnitude of the change (including considerations of proximity, prominence and scale), the duration of change, the sensitivity of the assets to change, and the implications of noise movement, light and other factors.

An assessment of the effects on the setting of an asset should take account of and be proportionate to the significance of an asset and the degree to which this may be affected by a proposed development. It is therefore reasonable and necessary within an EIA to pay greater attention to the assessment of effects on the settings of heritage assets of the greatest significance (such as, designated assets, including Scheduled Monuments and Listed Buildings) and those on which there is more likely to be a significant effect (including those which are closer to the proposed development).

Changes to the setting of a heritage asset can occur as a result of intervisibility or direct views between the asset and the proposed development, or as a result of changes to the view of a feature from a third viewpoint. The latter may be more difficult to assess as there may be many viewpoints from which a proposed development and the location of a heritage asset form part of the same view. Therefore, it is important to identify relevant views, such as, those between

monuments which were intended to be intervisible or from points where the vista or sight line is relevant to the setting of a particular asset. The latter can be particularly relevant to Registered Parks and Gardens.

In the assessment of effects on setting, it is important to consider the eventual appearance of a proposed development, and how this will appear in views from those assets being assessed. This depends to a large extent on the distance between the proposed development and a given asset.

H.2 Designated Heritage Assets

Table H.1 Scheduled Monuments within 1km Study Area

Reference	Monument	Location
28138	Ambrosden Churchyard Cross	SP 6032 1940
OX18	Alchester Roman Site	SP 5727 2029
28148	Wretchwick Deserted Medieval Settlement	SP 5978 2149

Table H.2 Listed Buildings within 1km Study Area

Reference	Building	Grade	Location
243498	Church Of St Edburg	I	SP 5830 2227
243558	39 Market Square	II	SP 5857 2234
243566	30 Market Square	II	SP 5849 2234
243475	8 Causeway	II	SP 5841 2233
243570	Dovecote Approximately 50 Metres South Of Old Place Yard House	II	SP 5833 2219
243497	22 Church Street	II	SP 5824 2234
243529	Bicester Hall	II	SP 5861 2232
243569	Old Place Yard House	II	SP 5835 2224
243504	Kirby Memorial Approximately 14 Metres South Of Tower Of Church Of St Edburg	II	SP 5828 2226
243486	29 Causeway	II	SP 5835 2229
243500	Chest Tomb Approximately 20 Metres North Of Tower Of Church Of St Edburg	II	SP 5829 2230
243506	Bluecoats	II	SP 5823 2231
243562	35 Market Square	II	SP 5853 2234
243347	Merton Grounds Farmhouse	II	SP 5793 1909
243402	Miropa	II	SP 6102 1738
243567	29 And 29a Market Square	II	SP 5847 2234
243489	1 Chapel Street	II	SP 5848 2226
243509	9 And 11 Church Street	II	SP 5821 2233

Reference	Building	Grade	Location
243499	War Memorial Approximately 15 Metres North West Of Church Of St Edburg	II	SP 5828 2230
243563	34 Market Square	II	SP 5852 2234
243527	Lamsdale Cottage	II	SP 5865 2228
243531	The Hermitage And Attached Lock Up	II	SP 5867 2224
243400	12 Old Arncott Road	II	SP 6044 1931
243391	Church Of St Mary The Virgin	II*	SP 6030 1940
243481	9 And 11 Causeway	II	SP 5841 2232
243534	4 London Road	II	SP 5859 2229
243508	Six Bells Inn	II	SP 5822 2233
243398	19 Merton Road	II	SP 6031 1926
243501	King Memorial Approximately 12 Metres North Of Porch Of Church Of St Edburg	II	SP 5830 2230
243403	Manor Farmhouse	II	SP 6091 1822
243568	Lairg House	II	SP 5846 2233
243503	Sundial Approximately 22 Metres South Of Church Of St Edburg	II	SP 5830 2224
243395	Kennet House	II	SP 6032 1938
243557	Kings Arms Hotel	II	SP 5857 2233
243404	Wood Farm Cottage	II	SP 6109 1800
243491	2 And 4 Church Street	II	SP 5834 2233
243510	Swan Inn	II	SP 5820 2234
243536	Station House Approximately 15 Metres North West Of Level Crossing	II	SP 5872 2204
243484	25 Causeway	II	SP 5837 2230
243535	6 London Road	II	SP 5860 2229
243493	Number 8 Including Former Magistrates Courthouse	II	SP 5831 2232
243485	27 Causeway	II	SP 5836 2229
243495	Northampton House	II	SP 5826 2233
243399	9 Old Arncott Road	II	SP 6040 1934
243390	Gatepiers, Gates And Attached Walled Garden To East Of Church Of St Mary	II	SP 6032 1942
243397	Park Farmhouse	II	SP 6034 1927
243388	Wretchwick Lodge	II	SP 5923 2104
243526	2 Launton Road	II	SP 5864 2227
243496	The Limes	II	SP 5825 2234
243488	Bicester Snooker Club	II	SP 5848 2228

Reference	Building	Grade	Location
243571	The Old Priory And Attached Garden Walls	II*	SP 5842 2211
243561	Barclays Bank	II	SP 5854 2234
243502	Chest Tomb Approximately 10 Metres North Of Chancel Of Church Of St Edburg	II	SP 5832 2229
243480	7 Causeway	II	SP 5842 2232
243392	Churchyard Cross Approximately 8 Metres South East Of Chancel Of Church Of St Mary	II	SP 6033 1940
243389	Langford Park Farmhouse	II	SP 5838 2125
243559	38 Market Square	II	SP 5856 2234
243396	Holly Tree Cottage	II	SP 6019 1921
243482	13 Causeway	II	SP 5841 2231
243572	Stables Approximately 10 Metres To South Of The Old Priory	II	SP 5842 2208
243479	5 Causeway	II	SP 5843 2232
243533	2 London Road	II	SP 5859 2230
243505	The Old Vicarage	II*	SP 5825 2230
243393	King Memorial Approximately 10 Metres North Of Church Of St Mary	II	SP 6028 1943
243387	Barn Approximately 50 Metres South Of Wretchwick Farmhouse	II	SP 5979 2054
243530	9 London Road	II	SP 5865 2227
243492	Reynard Cottage	II	SP 5832 2232
243565	31 Market Square	II	SP 5849 2234
243564	33 Market Square	II	SP 5851 2234
243386	Wretchwick Farmhouse	II	SP 5982 2065
243573	Garden Walls Of The Old Priory And Bassett Lodge (Not Included)	II	SP 5839 2215
243401	Methodist Chapel	II	SP 6104 1737
243477	1 Causeway	II	SP 5844 2233
243494	10 And 12 Church Street	II	SP 5829 2232
243490	1-5 Church Lane	II	SP 5835 2226
243560	37 Market Square	II	SP 5855 2234
243394	Headstone Approximately 10 Metres South Of Tower Of Church Of St Mary	II	SP 6028 1939
243476	10 Causeway	II	SP 5839 2232
243478	3 Causeway	II	SP 5843 2233
243507	Crick House	II	SP 5822 2232
243483	23 Causeway	II	SP 5838 2230

H.3 Historic Environment Record

Table H.3 Recorded Features within 1km Study Area

HER Ref	Name	Period	Location
16723	29/29a Market Square, Bicester	Medieval to Post Medieval	SP 5849 2234
12532	Congregational Chapel, Merton Road	Post Medieval	SP 6051 1942
16212	No.17, The Causeway	Post Medieval	SP 5841 2228
601	Bicester London Road Station	Post Medieval	SP 5868 2196
16135	Bicester Minster and Priory as Evidenced at Proctor's Yard	Early Medieval/Dark Age to Medieval	SP 5837 2227
16701	?Roman Ditch	Roman to Post Medieval	SP 5802 2229
16825	Undated features from Ambrosden to Graven Hill pipeline	Unknown	SP 6009 1940
16933	Medieval features marking edge of King's End found S of Causeway	Medieval	SP 58390 22297
16990	Prehistoric to Medieval Features from Priory Road	Medieval	SP 58468 21974
26005	Possible Roman features found at London Road	Roman	SP 58630 21620
16163	Saxon Ditch on Chapel Street	Post Roman	SP 5845 2230
12779	Undated Earthwork and Possible Fishponds (W of Bicester-Wretchwick Road)	Medieval	SP 586 217
11500	Medieval Pottery, 8-16 London Road	Medieval to Post Medieval	SP 5863 2225
13593	Undated boundary ditch, Graven Hill	Unknown	SP 5853 2041
16958	Roman coin hoard from Wendlebury	Roman	SP 57800 20200
17419	Romano-British pottery and coin found in Langford Lane	Roman	SP 575 204
1805	Romano British pottery	Roman	SP 5796 1972
5727	Roman artefacts	Roman	SP 573 195
7534	Roman Coins	Roman	SP 5798 1972
7594	Roman coin	Roman	SP 5785 1990
7605	Roman Coin	Roman	SP 5812 1945
13922	Bronze Age spearhead	Middle Bronze Age	SP 5820 1921
16086	Bronze Age palstave	Bronze Age	SP 5760 1956
5122	Medieval pottery sherds	Medieval	SP 5724 2025
3066	Roman Samian pottery	Roman	SP 5741 2052
4462	Roman Finds (junction of Akeman Street and N/S Roman road)	Roman	SP 5727 2079

HER Ref	Name	Period	Location
4935	Roman Samian Pottery	Roman	SP 5699 2099
5726	Roman Lead/Bronze steelyard weight	Roman	SP 570 203
5985	Roman Lead weight	Roman	SP 5730 2037
9171	Roman coins	Roman	SP 5715 2042
9172	Roman coins and metal object	Roman	SP 5735 2023
10799	Roman Scale Armour (in field north of north wall of Alchester)	Roman	SP 5723 2050
15846	Roman to Post medieval pottery, tile and coins	Roman to Post Medieval	SP 5763 2190
4469	Late Iron Age Pottery	Late Iron Age to Roman	SP 5727 2081
7505	Neolithic axehead	Neolithic	SP 5836 2137
16031	Medieval Pottery	Medieval	SP 603 193
16728	Medieval Ridge and Furrow	Medieval	SP 5796 1905
5658	Ambrosden Park	Post Medieval	SP 598 192
16136	Land between Causeway and Bryon House	Post Medieval	SP 5843 2225
16310	Ridge and Furrow marks	Medieval	SP 5776 2099
8920	LINEAR MONUMENT Akeman Street (east section)	Roman	SP 5981 2043
8921	LINEAR MONUMENT Akeman Street (west section)	Roman	
8923	LINEAR MONUMENT Two Sections of a Roman Road on Otmoor	Roman	SP 5665 0734
8922	LINEAR MONUMENT Roman Road	Roman	
16998	Roman Field System at Merton Grounds Farm	Roman	SP 57848 19245
17337	Fourteenth Century building and related features recorded to the rear of 17-19 London Road, Bicester	Medieval	SP 58723 22230
17407	Roman and Saxon occupation evidence at 61 Priory Road	Roman to Post Medieval	SP 58510 22060
17454	Vague linear and curvilinear features east of Merton Grounds	Unknown	SP 5829 1910
26128	Mesolithic Flint scatter with Later Prehistoric and Roman Settlement features at Bicester Office Park	Early Mesolithic to Medieval	SP 57910 21631
26192	Double ditched rectangular enclosure at Alchester	Roman	SP 57647 20355
3257	Wretchwick Deserted Medieval Village	Medieval	SP 5980 2140
13904	Banjo Enclosure and Regular Aggregate Field System (300m S of Alchester; within SAM)	Roman	SP 571 198
15986	? Parade Ground (SE of Alchester Town)	Roman	SP 5790 1985

HER Ref	Name	Period	Location
15987	Roman Building and Artefacts (SE of Alchester)	Roman	SP 580 196
4594	Ambrosden Hall and Site of Passage	Post Medieval	SP 6014 1940
5024	Churchyard cross	Medieval	SP 6031 1943
5299	Post Medieval Mill	Post Medieval	SP 6050 1939
16213	Bronze Age to Iron Age Activity (A421 crossroads at Chesterton Lane)	Late Neolithic to Roman	SP 5684 2078
16214	Middle Iron Age to Roman Settlement (A421 crossroads at Chesterton Lane)	Middle Iron Age to Roman	SP 5713 2094
16215	Iron Age Settlement (A421 near crossroads at Chesterton Lane)	Middle Iron Age to Late Iron Age	SP 5735 2130
1583	Alchester Roman Town and Fort	Roman	SP 5724 2024
16137	Anglo Saxon and Medieval Settlement Behind the Kings Arms, Bicester	Early Medieval/Dark Age to Medieval	SP 5855 2225
558	Brick Works (site of)	Post Medieval	SP 589 219
1607	? Post Medieval Earthwork or Iron Age encampment	Post Medieval	SP 5900 2035
D1801	Post Medieval Pest House	Post Medieval	SP 586 219
10165	Site of Wretchwick Gate Toll House	Post Medieval	SP 587 217
11224	Post Medieval floated water meadow	Post Medieval	SP 578 212
12777	Toll House, S End of Chapel Road (site of)	Post Medieval	SP 5849 2205
1585	Bath House at Alchester	Roman	SP 5695 2030
1587	Iron Age and Romano-British Settlement Site B	Early Iron Age to Roman	SP 5722 2095
D10655	Site of Churchyard cross	Medieval	SP 5830 2231
12387	Medieval Causeway	Medieval	SP 5844 2235
15868	Medieval Inhumation	Medieval	SP 58356 22202
13746	Medieval Fishpond, Bicester Priory (site of)	Medieval	SP 583 222
1593	Site of St Edburga's Priory	Medieval	SP 5841 2217
3058	? Roman Stone Foundations	Roman	SP 5715 2080
3059	? Roman Stone Foundations, ? Villa	Roman	SP 5740 2065
3060	? Roman Building (site of)	Roman	SP 5750 2005
3061	Roman Inhumations	Roman	SP 5750 2020
3064	Roman Inhumations	Roman	SP 5740 2010
3065	? Romano/British Inhumation	Roman	SP 5738 2057
3067	? Roman Cremation	Roman	SP 5744 2047
4464	? Roman Linear Earthwork (almost parallel to N/S Roman road)	Roman	SP 5735 2100
4465	Undated Stone Wall (Southern perimeter of	Roman	SP 5729 2008

HER Ref	Name	Period	Location
	Alchester Roman town)		
11214	Roman trackway and ?settlement	Roman	SP 577 221
14001	Roman Cremation (Land east of Alchester)	Roman	SP 5760 2045
14292	Romano-British cemetery (Site C)	Roman	SP 5708 2102
15867	Roman settlement on Oxford Road	Roman	SP 5840 2171
5633	? Bronze Age Round Barrows	Bronze Age	SP 5748 2178
16120	Iron Age Enclosures at Bicester Fields Farm	Middle Iron Age to Late Iron Age	SP 592 221
12967	Undated Bridge Crossing	Unknown	SP 5786 2033
9382	Reputed Anglo Saxon Battle Site	Early Medieval/Dark Age	SP 584 204
16268	Roman and Anglo Saxon settlement evidence from the Causeway	Roman to Early Medieval/Dark Age	SP 5843 2231
16254	Possible Anglo Saxon Inhumation Cemetery at Church of the Immaculate Conception	Early Medieval/Dark Age	SP 5833 2236
5657	Manor House (reputed site of)	Medieval	SP 603 192
8921	LINEAR MONUMENT Akeman Street (west section)	Roman	
8923	LINEAR MONUMENT Two Sections of a Roman Road on Otmoor	Roman	SP 5665 0734
8922	LINEAR MONUMENT Roman Road	Roman	
8920	LINEAR MONUMENT Akeman Street (east section)	Roman	SP 5981 2043

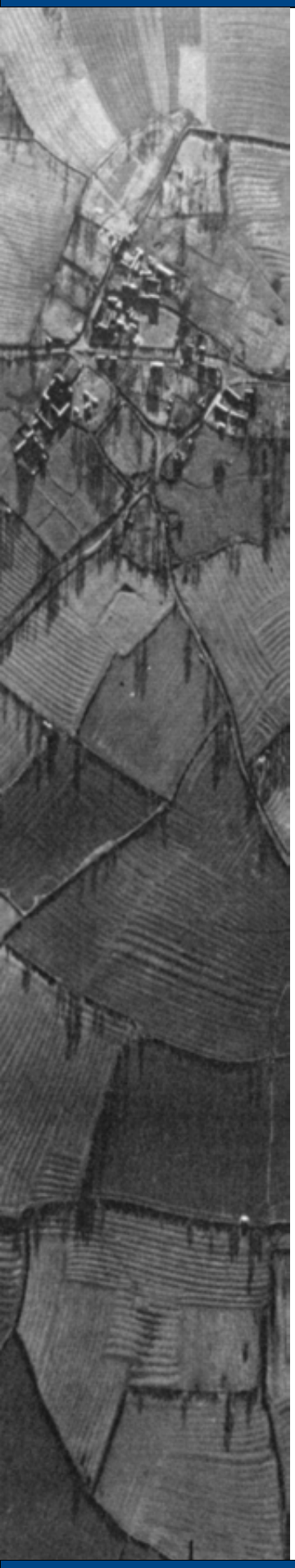
Table H.4 Recorded Archaeological Events within 1km Study Area

Ref	Event	Location
EOX1073	Merton Grounds Farm, Wendlebury	SP 5796 1905
EOX1077	Bicester Cottage Hospital, Kings End, Bicester	SP 5802 2229
EOX1085	61 Priory Road, Bicester - Evaluation Report	SP 5851 2206
EOX1094	Park Rise and Laburnum Close, Ambrosden - Evaluation Report	SP 6020 1946
EOX11	Rear of Nos 3,5, 9-13 Causeway	SP 5843 2231
EOX1102	29/29a Market Square, Bicester	SP 58 22
EOX1122	Anglo Saxon and Medieval Settlement at Chapel Street	SP 5850 2223
EOX1196	Deserted Medieval Settlement at Wretchwick, Ambrosden	SP 5941 2129

Ref	Event	Location
EOX121	11KV Refurbishment	SP 572 199
EOX1297	LINEAR Graven Hill to Ambrosden Replacement Water Pipeline and Tank	SP 5965 1988
EOX1355	Bicester Fields Farm	SP 5925 2223
EOX1521	An Archaeological Watching Brief at Vine Cottages, Causeway, Bicester, Oxfordshire	SP 58390 22297
EOX1614	Site visit to area N of Church Street	SP 58330 22365
EOX1676	Southern Electric 33Kv Refurbishment Headington to Bicester Overhead Line, Oxon: Arch'l WB and Excavation	SP 5780 1950
EOX1743	Evaluation at Priory Lane (phase 1)	SP 58468 21974
EOX1754	Evaluation at Merton Grounds Farm	SP 57848 19245
EOX1786	Excavations in the Extramural Settlement of Roman Alchester	SP 56840 20780
EOX1788	Excavations in the Extramural Settlement of Roman Alchester	SP 57098 20957
EOX1811	Excavations in the extramural Settlement of Roman Alchester	SP 57358 21300
EOX1832	Land off Laburnum Close, Ambrosden, Near Bicester, Oxfordshire: An Archaeological Evaluation.	SP 60200 19380
EOX1891	An Archaeological Excavation at 17, 17A & 19 London Road Bicester	SP 58723 22230
EOX1903	An Archaeological recording action at Merton Grounds Farm	SP 57848 19245
EOX1958	St David's Barracks, MOD, Bicester, Oxfordshire: An Archaeological Evaluation	SP 58262 20433
EOX1961	Roman and Saxon Features at 61 Priory Road, Bicester: Draft Publication Report	SP 58510 22060
EOX1993	Old Place Yard, Bicester: Geophysical Survey.	SP 58377 22195
EOX51	Old Police Station and Courthouse	SP 5832 2234
EOX510	The Old Stables	SP 5843 2209
EOX52	Land behind King's Arms Hotel	SP 5855 2225
EOX2051	Land off London Road, Bicester: Archaeological Evaluation	SP 5863 2162
EOX2058	An Archaeological Watching Brief at 4 Launton Road, Bicester	SP 58680 22280
EOX2151	London Road, Bicester, Oxfordshire: An Archaeological Desk Based Assessment	SP 5863 2162
EOX2155	Geophysical Survey Report, Langford Lane	SP 57640 20350
EOX2183	Evaluation at No 8-16 London Road	SP 5865 2225
EOX2184	Pre PPG 16 evaluation on the Causeway	SP 5844 2235
EOX2194	Bicester Office Park: Archaeological Trench Evaluation	SP 57910 21631
EOX23	Stable Blocks at Merton Grounds, Bicester	SP 5788 2036
EOX2346	Geophysical Survey at Langford Lane, Wendlebury	SP 5763 2035
EOX2347	An Assessment of the Results of a Geophysical Survey Undertaken at Langford Lane, Wendlebury	SP 5764 2035

Ref	Event	Location
EOX2354	An Archaeological Watching Brief at Land Adj to 1 Priory Terrace, Priory Lane, Bicester	SP 58443 22156
EOX2526	Land at King's Arms	SP 5855 2225
EOX2718	Land adj to Laburnum Close	SP 60195 19403
EOX2895	Wendlebury Road	SP 57406 21180
EOX2953	A421 Wendlebury-Bicester Dualling	SP 56557 20601
EOX2986	E Site, MOD, Bicester (Area A)	SP 5821 2102
EOX2987	E Site, MOD, Bicester (Area B)	SP 5860 2089
EOX2988	E Site, MOD, Bicester (Area C)	SP 5898 2125
EOX3042	Langford Park Farm, London Road	SP 58425 21329
EOX3087	LINEAR Whitelands Farm	SP 57881 21691
EOX33	Whitelands Farm, Bicester Leisure Park	SP 577 221
EOX36	Bicester Fields Farm	SP 591 222
EOX38	Bicester Library Extension	SP 583 222
EOX43	Arch Evaluation at Oxford Road	SP 582 218
EOX438	Sewage treatment works	SP 5776 2099
EOX44	Oxford Road, Bicester	SP 584 217
EOX449	Alchester Farm	SP 5712 2009
EOX45	Chapel Street to Rear of No 1 Causeway	SP 5845 2230
EOX46	Land between Causeway and Bryon House (Vine Cotts)	SP 5843 2225
EOX47	Bicester Fields Farm	SP 591 221
EOX48	Bicester Fields Farm	SP 592 222
EOX49	Happy Eater Forte Development	SP 5763 2190
EOX50	Bicester Retail Village (Phase 2B)	SP 580 219
EOX506	17 Causeway and Vine Cottages	SP 5841 2228
EOX508	The Old Vicarage	SP 5825 2231
EOX509	Courthouse and County Police Buildings	SP 5831 2232
EOX53	Land at Proctor's Yard	SP 5837 2227
EOX571	Chapel St Evaluation	SP 5845 2230
EOX721	Land at Proctor's Yard	SP 5837 2227
EOX928	Entrenchments at Ambrosden	SP 5900 2035
EOX954	Land adjoining Middleton Stoney Rd and Oxford Rd, Bicester	SP 5780 2220
EOX956	Proposed Community Hospital, Bicester	SP 5770 2210
EOX958	Arch'l Watching Brief at F-Station, Chesterton	SP 5713 2083

H.4 Geophysical Survey Reports



E Site MOD Bicester
Oxfordshire

MAGNETOMETER SURVEY REPORT

for

Entec UK Ltd

David Sabin and Kerry Donaldson

August 2010

Ref. no.332

ARCHAEOLOGICAL SURVEYS LTD

E Site MOD Bicester
Oxfordshire

Magnetometer Survey

for

Entec UK Ltd

Fieldwork by David Sabin and Kerry Donaldson
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

Survey date - **from 16th to 20th August 2010**
Ordnance Survey Grid Reference – **SP 586 209**

Printed on 100% recycled paper

Archaeological Surveys Ltd
PO Box 2862, Castle Combe, Chippenham, Wiltshire, SN14 7WZ
Tel: 01249 782234 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

A geophysical survey was carried out at E Site, MOD Bicester at the request of Entec UK Ltd on behalf of Defence Estates. The site has been identified by Defence Estates for possible residential redevelopment. As the majority of the site has been disturbed by buildings and infrastructure associated with the Graven Hill Depot, three areas were identified by Entec for geophysical survey. Area A (Fields 1-4), on the western edge of the site, lies within 250m of the Scheduled Monument of Alchester Roman town, and comprised four pasture fields suitable for geophysical survey. Area B (Field 5), was also a pasture field, while Area C (Field 6) had been a former sports field. The aim of the survey was to identify if any potential archaeological remains were present within the survey areas, especially with regard to any features extending eastwards from Alchester Roman town.

The detailed magnetometer survey located a number of positive linear anomalies within Field 1, closest to the archaeological remains associated with Alchester and its surrounding environs. These anomalies appear to relate to cut ditch-like features; however, it is not possible to determine if they are directly associated with any known archaeological remains. The remaining survey areas contained widespread magnetic debris and disturbance indicating the presence of buried strongly magnetic objects and material, as well as modern features such as services. With the exception of Field 1, no other anomalies of archaeological potential could be confidently identified although a number of anomalies of uncertain origin were located.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Entec, on behalf of Defence Estates, to undertake a magnetometer survey of an area of land at E Site, MOD Bicester, Oxfordshire. The site has been identified as potentially suitable for residential redevelopment. The survey forms part of an archaeological assessment of the site.

1.1.2 The geophysical survey was carried out according to the requirements of a Brief for geophysical survey issued by the Client (Entec, 2010). The majority of the site is used as a storage depot, containing buildings, hardstanding, roads and railway lines. It has been agreed by Defence Estates and the Oxfordshire County Planning Archaeologist that full pre-determination evaluation is not required, however, a geophysical survey should be targeted within areas suitable for survey, predominantly within the north western section of the site.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin, so that they may be assessed prior to development of the site. As the site lies some 500m north west of the Roman town of Alchester, it is an objective of the survey to determine if any associated archaeological features extend into the development area.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection. The survey and report generally follow the recommendations set out by: English Heritage, 2008, *Geophysical survey in archaeological field evaluation;* Institute for Archaeologists, 2002, *The use of Geophysical Techniques in Archaeological Evaluations*.

1.3 Site location, description and survey conditions

1.3.1 The site is located to the north of Graven Hill near Bicester, Oxfordshire and is centred on Ordnance Survey National Grid Reference (OS NGR) SP 586 209, see Figures 01 and 02.

1.3.2 The geophysical survey covers an area of approximately 13ha split within Areas A, B and C. Area A consists of approximately 10.5ha within Fields 1-4 which contain pasture with thistles and long grass. Area B consists of approximately 2ha within Field 5, which is also a pasture field with thistles , areas of thorn and uneven ground. Area C is approximately 0.5ha and has been labelled Field 6 for the purposes of the survey. The area is a former football pitch, now containing thistles and long grass.

1.3.3 The geophysical survey was hindered and restricted in places by tall grass, thistles and thorn bushes within all the survey areas. Weather conditions during the survey were variable with sunny periods and very heavy rain and high winds.

1.4 Site history and archaeological potential

1.4.1 The Brief issued by Entec (2010) outlines the archaeological potential of the site. There are no known sites or findspots within the site itself, however, the western edge of the site lies within 250m of the Roman Town of Alchester (SAM OX18). This includes the remains of a vexillation fort and town with a cemetery to the east and further Iron Age-Romano British settlement to the north. There is, therefore, some potential for archaeological features, associated with the Roman town of Alchester, to extend to within the site.

1.4.2 In the vicinity there is varying evidence for archaeological sites. It has been proposed that the site of Graven Hill is an Iron Age hill fort although there is no archaeological evidence to support this. The suggested line of the Roman road, Akeman Street, is believed to extend across the north of the site towards the Roman town of Alchester. To the north east of the site are the remains of the Deserted Medieval Village of Wretchwick (SAM 28148).

1.5 Geology and soils

1.5.1 The underlying geology over the majority of the site is Peterborough member of the Oxford Clay formation consisting of mudstone with Kellaways sand member across the northern and western parts of the site (BGS, 2010).

1.5.2 The overlying soils across the majority of the site are from the Denchworth association which are pelo-stagnogley soils. The soils across the western part of the site are from the Wickham 2 association which are typical stagnogley soils. They both consist of slowly permeable, seasonally waterlogged clayey soils (Soil Survey of England and Wales, 1983).

1.5.3 The geology and soils are considered to provide useful conditions for magnetic survey. Previous magnetometry surveys have located archaeological features in very similar conditions.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using Bartington Grad601-2 gradiometers. The instruments effectively measure a magnetic gradient

between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally.

2.2.2 The instruments are extremely sensitive and are able to measure magnetic variation to 0.01nanoTesla (nT), with an effective resolution of 0.03nT. The data are limited to ±100nT when surveying with the highest sensitivity. All readings are saved to an integral data logger for analysis and presentation.

2.2.3 The instruments are operated according to the manufacturer's instructions with consideration given to the local conditions. An adjustment procedure is required, prior to collection of data, in order to balance the sensors and remove the effects of the Earth's magnetic field; further adjustment is required during the survey due to instrument drift often associated with temperature change.

2.2.4 It can be very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that may be associated with large ferrous objects, geological/pedological features, 'magnetic debris' within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error often visible as striping within the data; this can be effectively removed by software processing and generally has little effect on the data unless extreme.

2.2.5 The Bartington gradiometers undergo regular servicing and calibration by the manufacturer. A current assessment of the instruments is shown in Table 1 below.

Sensor type	Bartington Grad - 01 – 1000
Date of calibration/service	August 2010 (sensors 084, 085) May 2009 (sensors 242, 356)
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instruments were considered to be in good working order prior to the survey, with no known faults or defects.

2.2.6 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids (900m^2) giving 3600 recorded measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 2008).

2.2.7 The survey grids were set out set out parallel to field boundaries in order to minimise partial grids. This was to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. The GPS is used in conjunction with Topcon's TopNet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system.

The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix C contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor; this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data are always analysed, as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

- clipping of the raw data at ±30nT to improve greyscale resolution,
- clipping of processed data at ±3nT to enhance low magnitude anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

Reference should be made to Appendix B for further information on the specific processes carried out on the data. Appendix C metadata includes details on the processing sequence used for each survey area.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area.

2.3.4 The main form of data display used in this report is the greyscale plot. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in ArcheoSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by ArcheoSurveyor from left to right. Prior to displaying against base mapping, raster graphics require a rotation in AutoCAD of 145.85°for Fields 1 and 2, 127.84°for Fields 3 and 4, 114.06°for Field 5 and 211.34°for Field 6 to restore north to the top of the image.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2009 and AutoCAD LT 2007, creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain

good graphical quality. Quality can be compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive, including raster images, is produced with this report allowing separate analysis if necessary, see Appendix D below.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over a total of 6 Fields within survey areas A, B and C, covering approximately 13ha. Geophysical anomalies located can be generally classified as positive linear responses of archaeological potential, positive and negative linear anomalies of an uncertain origin, linear anomalies of an agricultural origin, linear anomalies relating to land management, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines. Anomalies located within each survey area have been numbered and are described below with subsequent discussion in Section 4.

3.1.2 Data are considered to be of good quality with minor positional errors, caused by uneven ground, ruts, tall vegetation etc., unlikely to have degraded quality significantly. Magnetic disturbance has been caused by modern above ground ferrous objects.

3.1.3 The listing of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, a basic key is indicated to allow cross reference to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY 	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN 	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be

	produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG LAND DRAIN	Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates a ceramic land drain.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL AS-ABST MAG RIDGE AND FURROW	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 2: List and description of interpretation categories

3.2 Area A – Field 1

Field centred on OS NGR 457971, 220772, see Figures 03 – 08.

Anomalies of archaeological potential

(1) – Positive linear and curvilinear anomalies that appear to relate to cut ditch-like features with archaeological potential.

Anomalies with an uncertain origin

(2) – A positive linear anomaly, parallel with the boundary between Fields 1 and 2, appears to relate to a ditch-like feature. It may be associated with the field boundary.

(3) – Positive linear anomalies may relate to cut features or agricultural anomalies.

Anomalies with an agricultural origin

(4) – Parallel linear anomalies likely to relate to ridge and furrow.

Anomalies associated with magnetic debris

(5) – Patches of magnetic debris indicate the presence of magnetically thermoremnant material.

(6) – Strong discrete dipolar anomalies indicate the presence of ferrous objects within the topsoil.

Anomalies with a modern origin

(7) – A strong multiple dipolar linear anomaly is a response to a buried service.

(8) – Magnetic disturbance from ferrous material.

3.3 Area A – Field 2

Field centred on OS NGR 458034, 220730, see Figures 03 – 08.

Anomalies with an uncertain origin

(9) – Discrete positive anomalies may indicate pit-like features; however, it is not possible to determine if they are anthropogenic in origin.

Anomalies with an agricultural origin

(10) – Parallel linear anomalies relate to extant ridge and furrow.

(11) – Parallel linear anomalies, orthogonal to the ridge and furrow, appear also to have been caused by agricultural activity.

Anomalies associated with magnetic debris

(12) – A patch of magnetic debris, close to field entrance, is a response to magnetically thermoremnant material.

(13) – Strong discrete dipolar anomalies indicate the presence of ferrous objects within the topsoil.

Anomalies with a modern origin

(14) – Magnetic disturbance from ferrous material.

3.4 Area A – Field 3

Field centred on OS NGR 458242, 220961, see Figures 03 – 06 & 09 – 14.

Anomalies with an uncertain origin

(15) – Short, weakly positive linear anomalies of uncertain origin.

(16) – Discrete positive anomalies may indicate pit-like features; however, it is not possible to determine if they are anthropogenic in origin.

Anomalies associated with magnetic debris

(17) – Patches of magnetic debris indicate the presence of magnetically thermoremnant material.

(18) – Field 3 contains a large number of strong discrete dipolar anomalies, which indicate the presence of numerous ferrous objects within the topsoil.

Anomalies with a modern origin

(19) – Two strong multiple dipolar linear anomalies relate to buried services.

(20) – Magnetic disturbance from ferrous material.

3.5 Area A – Field 4

Field centred on OS NGR 458160, 221067, see Figures 03 – 06 & 09 – 14.

Anomalies with an uncertain origin

(21) – A weakly positive linear anomaly, parallel with and 50m away from the north eastern field boundary. It is possible that this is a continuation of anomaly (7) in Field 1, where it can be seen as strong multiple dipolar linear anomaly indicating an iron pipe; however, in Field 4, the lack of a strong response may indicate that this part of the pipe is either made from non-ferrous material or that it has been removed.

(22) – Positive linear anomalies, associated with anomaly (23), and located in a raised area of the field.

Anomalies associated with magnetic debris

(23) – Magnetic debris, associated with anomaly (22), has been caused by magnetically thermoremnant material. This type of anomaly may indicate the location of a former structure or it may be a response to dumped material and

ground disturbance.

(24) – The northernmost corner of the site contains very strong dipolar responses which indicate magnetically thermoremnant material with a high ferrous content. Large amount of iron slag were visible in this part of the field during survey.

(25) – Field 4 contains widespread strong discrete dipolar anomalies which indicate the presence of ferrous objects within the topsoil.

Anomalies with a modern origin

(26) – A strong multiple dipolar linear anomaly has been caused by a buried service which extends northwestwards from Field 3.

3.6 Area B – Field 5

Field centred on OS NGR 458601, 220912, see Figures 15 – 17.

Anomalies with an uncertain origin

(27) – Three parallel negative linear anomalies located on the eastern side of the survey area. It is difficult to be certain of the origin of these anomalies as the survey area contains widespread magnetic debris and visible evidence for ground make-up and disturbance.

Anomalies with an agricultural origin

(28) – Parallel linear anomalies are likely to relate to former ridge and furrow.

Anomalies associated with magnetic debris

(29) – Widespread patches of very strong magnetic debris indicate the presence of ferrous and other magnetically thermoremnant material.

(30) – Strong discrete dipolar anomalies which indicate the presence of ferrous objects within the topsoil.

Anomalies with a modern origin

(31) – Magnetic disturbance from ferrous material within the survey area.

3.7 Area C – Field 6

Field centred on OS NGR 458987, 221246, see Figures 18 – 20.

Anomalies with an uncertain origin

(32) – Three positive linear anomalies located in the southern part of the survey area, may indicate ditch-like features, although they may be associated with former cultivation.

(33) – Three linear or curvilinear anomalies located in the northern part of the survey area may be similar in origin to (32).

(34) – A positive linear anomaly in the centre of survey area may indicate a ditch-like feature.

Anomalies associated with land management

(35) – Multiple dipolar linear anomalies appear to relate to land drains.

Anomalies associated with magnetic debris

(36) – Strong discrete dipolar anomalies which indicate the presence of ferrous objects within the topsoil.

Anomalies with a modern origin

(37) – Strong multiple dipolar linear anomalies are likely to relate to buried services.

(38) – Magnetic disturbance from ferrous material within the survey area.

4 CONCLUSION

4.1.1 The detailed magnetometer survey located a number of positive linear anomalies considered to have archaeological potential within Field 1 of Area A, close to the western boundary of the site. The anomalies lie within 250m of the scheduled area of Alchester Roman town, and although a direct association cannot be made, they may indicate an extension of features into the extreme western part of the survey area.

4.1.2 The remaining fields within Area A do not appear to contain other anomalies of archaeological potential. Field 2 contains evidence for ridge and furrow, and Fields 3 and 4 contain widespread ferrous objects and very little evidence of cut features. Relatively high levels of magnetic material at the northern end of

Field 4 suggest some dumping or industrial activity in the vicinity. The high frequency of discrete dipolar response across Fields 3 and 4 may indicate magnetic material spread through episodic manuring.

4.1.3 Area B (Field 5) contains very strong magnetic responses indicating ferrous material is present in the near surface make-up. This survey area contains irregular undulations indicative of relatively recent ground disturbance, dumping or ground make-up, although there is some evidence for extant ridge and furrow earthworks in the southern part of the area.

4.1.4 Area C (Field 6) was a former sports pitch and several positive linear anomalies have been located; however, it is not possible to confidently determine their origin. The area also contains land drains and buried services as well as magnetic disturbance from surrounding metal fencing and goal posts.

5 REFERENCES

British Geological Survey, 2010. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://maps.bgs.ac.uk/geologyviewer/ [accessed 26/8/2010].

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.* 2nd ed. Swindon: English Heritage.

Entec, 2010. *MOD Bicester, Graven Hill, E Site: Specification for Geophysical Survey.* Unpublished typescript document.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IFA Paper No. 6. IFA, University of Reading.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 3 Midland and Western England.*

Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±1nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and can remove striping. The process can remove archaeological features that run along a traverse so data analysis is also carried out prior its application.

De-stagger

Compensates for small positional errors within data collection by shifting the position of the readings along each traverse by a specified amount. Data lost at the end of each traverse are extrapolated from adjacent value in the same row.

Deslope

Corrects for striping and distortion caused by metal objects/services etc.. The process calculates a curve based on a polynomial best fit mathematical function for each traverse. This curve is then subtracted from the actual data.

FFT (Fast Fourier Transform) spectral filtering

A mathematical process used to determine the frequency components of a traverse. Repetitive features, such as plough marks, produce characteristic spectral zones that can be suppressed allowing greyscale images to appear clearer.

Appendix C – survey and data information

Area A Field 1 raw data

COMPOSITE
Filename: J332-mag-Field1-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/08/2010
Assembled by: on 16/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 240 x 240
Survey Size (meters): 60 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 10.50
Mean: -3.85
Median: -0.77
Composite Area: 1.44 ha
Surveyed Area: 0.6689 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 13
1 Col:0 Row:2 07.xgd
2 Col:0 Row:3 08.xgd
3 Col:0 Row:4 15.xgd
4 Col:0 Row:5 16.xgd
5 Col:0 Row:6 17.xgd
6 Col:1 Row:0 01.xgd
7 Col:1 Row:1 02.xgd
8 Col:1 Row:2 03+05.xgd
9 Col:1 Row:3 04+06.xgd
10 Col:1 Row:4 09+13.xgd
11 Col:1 Row:5 10+14.xgd
12 Col:1 Row:6 11.xgd
13 Col:1 Row:7 12.xgd

Area A Field 1 processing

COMPOSITE
Filename: J332-mag-Field1-proc.xcp

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.75
Mean: -0.31
Median: 0.00

Area A Field 2 raw data

COMPOSITE
Filename: J332-mag-Field2-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/08/2010
Assembled by: on 16/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 210
Survey Size (meters): 120 m x 210 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.86
Mean: -0.28
Median: -0.10
Composite Area: 2.52 ha
Surveyed Area: 1.7849 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 27
1 Col:0 Row:0 13.xgd
2 Col:0 Row:1 14.xgd
3 Col:0 Row:2 15.xgd
4 Col:0 Row:3 16.xgd
5 Col:0 Row:4 17.xgd
6 Col:0 Row:5 18.xgd
7 Col:0 Row:6 19.xgd
8 Col:1 Row:0 09.xgd
9 Col:1 Row:1 10.xgd
10 Col:1 Row:2 11.xgd
11 Col:1 Row:3 12.xgd
12 Col:1 Row:4 20.xgd
13 Col:1 Row:5 21.xgd
14 Col:1 Row:6 22.xgd
15 Col:2 Row:0 05.xgd
16 Col:2 Row:1 06.xgd
17 Col:2 Row:2 07.xgd
18 Col:2 Row:3 08.xgd
19 Col:2 Row:4 23.xgd
20 Col:2 Row:5 24.xgd
21 Col:2 Row:6 25.xgd
22 Col:3 Row:0 01.xgd
23 Col:3 Row:1 02.xgd
24 Col:3 Row:2 03.xgd
25 Col:3 Row:3 04.xgd
26 Col:3 Row:4 26.xgd
27 Col:3 Row:5 27.xgd

Area A Field 2 processing

COMPOSITE
Filename: J332-mag-Field2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.87
Mean: 0.02
Median: 0.00

Processes: 12
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 15.xgd 16.xgd 17.xgd 18.xgd 19.xgd 11.xgd 12.xgd 20.xgd 21.xgd 22.xgd 07.xgd 08.xgd 23.xgd 24.xgd 25.xgd 03.xgd 04.xgd 26.xgd 27.xgd
4 DeStripe Median Traverse: Grids: 10.xgd 06.xgd
5 DeStripe Median Traverse: Grids: 09.xgd 05.xgd
6 DeStripe Median Traverse: Grids: 01.xgd 02.xgd
7 DeStripe Median Sensors: 14.xgd
8 Clip from -3.00 to 3.00 nT
9 De Stagger: Grids: 01.xgd Mode: Both By: 1 intervals
10 De Stagger: Grids: 17.xgd Mode: Both By: 1 intervals
11 De Stagger: Grids: 24.xgd Mode: Both By: 1 intervals
12 De Stagger: Grids: 02.xgd Mode: Both By: 1 intervals

Area A Field 3 raw data

COMPOSITE
Filename: J332-mag-Field3-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 18/08/2010
Assembled by: on 18/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 600 x 450
Survey Size (meters): 150 m x 450 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.66
Mean: -0.43
Median: -0.29
Composite Area: 6.75 ha
Surveyed Area: 4.6442 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 63
1 Col:0 Row:0 13.xgd
2 Col:0 Row:1 14.xgd
3 Col:0 Row:2 15.xgd
4 Col:0 Row:3 16.xgd
5 Col:0 Row:4 17.xgd
6 Col:0 Row:5 18.xgd
7 Col:0 Row:6 19.xgd
8 Col:0 Row:7 20.xgd
9 Col:0 Row:8 45.xgd
10 Col:0 Row:9 46.xgd
11 Col:0 Row:10 47.xgd
12 Col:0 Row:11 48.xgd
13 Col:0 Row:12 49.xgd
14 Col:0 Row:13 50.xgd
15 Col:0 Row:14 51.xgd
16 Col:1 Row:0 09.xgd
17 Col:1 Row:1 10.xgd
18 Col:1 Row:2 11.xgd
19 Col:1 Row:3 12.xgd
20 Col:1 Row:4 21.xgd
21 Col:1 Row:5 22.xgd
22 Col:1 Row:6 23.xgd
23 Col:1 Row:7 24.xgd
24 Col:1 Row:8 41.xgd
25 Col:1 Row:9 42.xgd
26 Col:1 Row:10 43.xgd
27 Col:1 Row:11 44.xgd
28 Col:1 Row:12 52.xgd
29 Col:1 Row:13 53.xgd
30 Col:1 Row:14 54.xgd
31 Col:2 Row:0 05.xgd
32 Col:2 Row:1 06.xgd
33 Col:2 Row:2 07.xgd
34 Col:2 Row:3 08.xgd
35 Col:2 Row:4 25.xgd
36 Col:2 Row:5 26.xgd
37 Col:2 Row:6 27.xgd
38 Col:2 Row:7 28.xgd
39 Col:2 Row:8 37.xgd
40 Col:2 Row:9 38.xgd
41 Col:2 Row:10 39.xgd
42 Col:2 Row:11 40.xgd
43 Col:2 Row:12 55.xgd
44 Col:2 Row:13 56.xgd
45 Col:2 Row:14 57.xgd
46 Col:3 Row:0 01.xgd
47 Col:3 Row:1 02.xgd
48 Col:3 Row:2 03.xgd
49 Col:3 Row:3 04.xgd
50 Col:3 Row:4 29.xgd
51 Col:3 Row:5 30.xgd
52 Col:3 Row:6 31.xgd
53 Col:3 Row:7 32.xgd
54 Col:3 Row:8 33.xgd
55 Col:3 Row:9 34.xgd
56 Col:3 Row:10 35.xgd
57 Col:3 Row:11 36.xgd
58 Col:3 Row:12 58.xgd
59 Col:3 Row:13 59.xgd
60 Col:3 Row:14 60.xgd
61 Col:4 Row:12 61.xgd
62 Col:4 Row:13 62.xgd
63 Col:4 Row:14 63.xgd

Area A Field 3 processing

COMPOSITE
Filename: J332-mag-Field3-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.12
Mean: 0.01
Median: 0.00

Processes: 7
1 Base Layer

2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 13.xgd 14.xgd 15.xgd 16.xgd 17.xgd 18.xgd 19.xgd 20.xgd 09.xgd 10.xgd 11.xgd 12.xgd 21.xgd 22.xgd 23.xgd 24.xgd 05.xgd 06.xgd 07.xgd 08.xgd 25.xgd 26.xgd 27.xgd 28.xgd 01.xgd 02.xgd 03.xgd 04.xgd 29.xgd 30.xgd 31.xgd 32.xgd
4 DeStripe Median Traverse: Grids: 47.xgd 48.xgd 49.xgd 50.xgd 51.xgd 43.xgd 44.xgd 52.xgd 53.xgd 54.xgd 39.xgd 40.xgd 55.xgd 56.xgd 57.xgd 35.xgd 36.xgd 58.xgd 59.xgd 60.xgd 61.xgd 62.xgd 63.xgd
5 DeStripe Median Traverse: Grids: 41.xgd 42.xgd 37.xgd 38.xgd 33.xgd 34.xgd
6 DeStripe Mean Traverse: Grids: 45.xgd 46.xgd
Threshold: 0.5 SDs
7 Clip from -3.00 to 3.00 nT

Area A Field 4 raw data

COMPOSITE
Filename: J332-mag-Field4-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 18/08/2010
Assembled by: on 18/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 600 x 450
Survey Size (meters): 150 m x 450 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.28
Mean: -0.43
Median: -0.15
Composite Area: 6.75 ha
Surveyed Area: 3.1239 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 49
1 Col:0 Row:0 01.xgd
2 Col:0 Row:1 02.xgd
3 Col:0 Row:2 03.xgd
4 Col:0 Row:3 04.xgd
5 Col:0 Row:4 08.xgd
6 Col:0 Row:5 09.xgd
7 Col:0 Row:6 10.xgd
8 Col:0 Row:7 11.xgd
9 Col:0 Row:8 20.xgd
10 Col:0 Row:9 21.xgd
11 Col:0 Row:10 22.xgd
12 Col:0 Row:11 23.xgd
13 Col:0 Row:12 36.xgd
14 Col:0 Row:13 37.xgd
15 Col:0 Row:14 38.xgd
16 Col:1 Row:1 05.xgd
17 Col:1 Row:2 06.xgd
18 Col:1 Row:3 07.xgd
19 Col:1 Row:4 12.xgd
20 Col:1 Row:5 13.xgd
21 Col:1 Row:6 14.xgd
22 Col:1 Row:7 15.xgd
23 Col:1 Row:8 24.xgd
24 Col:1 Row:9 25.xgd
25 Col:1 Row:10 26.xgd
26 Col:1 Row:11 27.xgd
27 Col:1 Row:12 39.xgd
28 Col:1 Row:13 40.xgd
29 Col:1 Row:14 41.xgd
30 Col:2 Row:4 16.xgd
31 Col:2 Row:5 17.xgd
32 Col:2 Row:6 18.xgd
33 Col:2 Row:7 19.xgd
34 Col:2 Row:8 28.xgd
35 Col:2 Row:9 29.xgd
36 Col:2 Row:10 30.xgd
37 Col:2 Row:11 31.xgd
38 Col:2 Row:12 42.xgd
39 Col:2 Row:13 43.xgd
40 Col:2 Row:14 44.xgd
41 Col:3 Row:8 32.xgd
42 Col:3 Row:9 33.xgd
43 Col:3 Row:10 34.xgd
44 Col:3 Row:11 35.xgd
45 Col:3 Row:12 45.xgd
46 Col:3 Row:13 46.xgd
47 Col:3 Row:14 47.xgd
48 Col:4 Row:13 48.xgd
49 Col:4 Row:14 49.xgd

Area A Field 4 processing

COMPOSITE
Filename: J332-mag-Field4-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.17
Mean: -0.06
Median: 0.00

Processes: 8
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 01.xgd 02.xgd 03.xgd 04.xgd 08.xgd 09.xgd 10.xgd 11.xgd 20.xgd 21.xgd 22.xgd 23.xgd 36.xgd 37.xgd 38.xgd 05.xgd 06.xgd 07.xgd 12.xgd 13.xgd 14.xgd 15.xgd 24.xgd 25.xgd 26.xgd 27.xgd 39.xgd 40.xgd 41.xgd 16.xgd 17.xgd 18.xgd 19.xgd 28.xgd 29.xgd 30.xgd 31.xgd 42.xgd 43.xgd 44.xgd
4 DeStripe Median Traverse: Grids: 32.xgd 33.xgd
5 DeStripe Median Traverse: Grids: 45.xgd 46.xgd 47.xgd
6 DeStripe Mean Traverse: Grids: 34.xgd 35.xgd
Threshold: 0.5 SDs
7 DeStripe Median Traverse: Grids: 48.xgd 49.xgd
8 Clip from -3.00 to 3.00 nT

Area B Field 5 raw data

COMPOSITE
Filename: J332-mag-Field5-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 19/08/2010
Assembled by: on 19/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 240
Survey Size (meters): 120 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 7.80
Mean: -1.14
Median: -0.05
Composite Area: 2.88 ha
Surveyed Area: 1.6358 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 29
1 Col:0 Row:0 26.xgd
2 Col:0 Row:1 27.xgd
3 Col:0 Row:2 28.xgd
4 Col:0 Row:3 29.xgd
5 Col:0 Row:4 19.xgd
6 Col:0 Row:5 20.xgd
7 Col:0 Row:6 21.xgd
8 Col:1 Row:0 22.xgd
9 Col:1 Row:1 23.xgd
10 Col:1 Row:2 24.xgd
11 Col:1 Row:3 25.xgd
12 Col:1 Row:4 15.xgd
13 Col:1 Row:5 16.xgd
14 Col:1 Row:6 17.xgd
15 Col:1 Row:7 18.xgd
16 Col:2 Row:1 04.xgd
17 Col:2 Row:2 05.xgd
18 Col:2 Row:3 06.xgd
19 Col:2 Row:4 11.xgd
20 Col:2 Row:5 12.xgd
21 Col:2 Row:6 13.xgd
22 Col:2 Row:7 14.xgd
23 Col:3 Row:1 01.xgd
24 Col:3 Row:2 02.xgd
25 Col:3 Row:3 03.xgd
26 Col:3 Row:4 07.xgd
27 Col:3 Row:5 08.xgd
28 Col:3 Row:6 09.xgd
29 Col:3 Row:7 10.xgd

Area B Field 5 processing

COMPOSITE
Filename: J332-mag-Field5-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.50
Mean: -0.18
Median: -0.03
Composite Area: 2.88 ha
Surveyed Area: 1.6357 ha

Area C Field 6 raw data

COMPOSITE
Filename: J332-mag-Field6-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 19/08/2010
Assembled by: on 19/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 240 x 120
Survey Size (meters): 60 m x 120 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 7.69
Mean: -0.25
Median: 0.42
Composite Area: 0.72 ha
Surveyed Area: 0.5997 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 8
1 Col:0 Row:0 01.xgd
2 Col:0 Row:1 02.xgd
3 Col:0 Row:2 03.xgd
4 Col:0 Row:3 04.xgd
5 Col:1 Row:0 05.xgd
6 Col:1 Row:1 06.xgd
7 Col:1 Row:2 07.xgd
8 Col:1 Row:3 08.xgd

Area C Field 6 processing

COMPOSITE
Filename: J332-mag-Field6-proc.xcp

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at Castle Combe, Wiltshire (see inside cover for address). Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site. Digital data are also supplied to the client on CD ROM, see below.

Surveys are reported on in hardcopy (recycled paper) using A4 for text and A3 for plots (all plots are scaled for A3). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.5.6.68 (geophysical data analysis),
- ProgeCAD Professional 2009 (report graphics),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.0.1 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Digital data are supplied on CD ROM which includes the following files:

- ArcheoSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as OpenOffice.org ODT file,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF,
- PDFs of all figures.

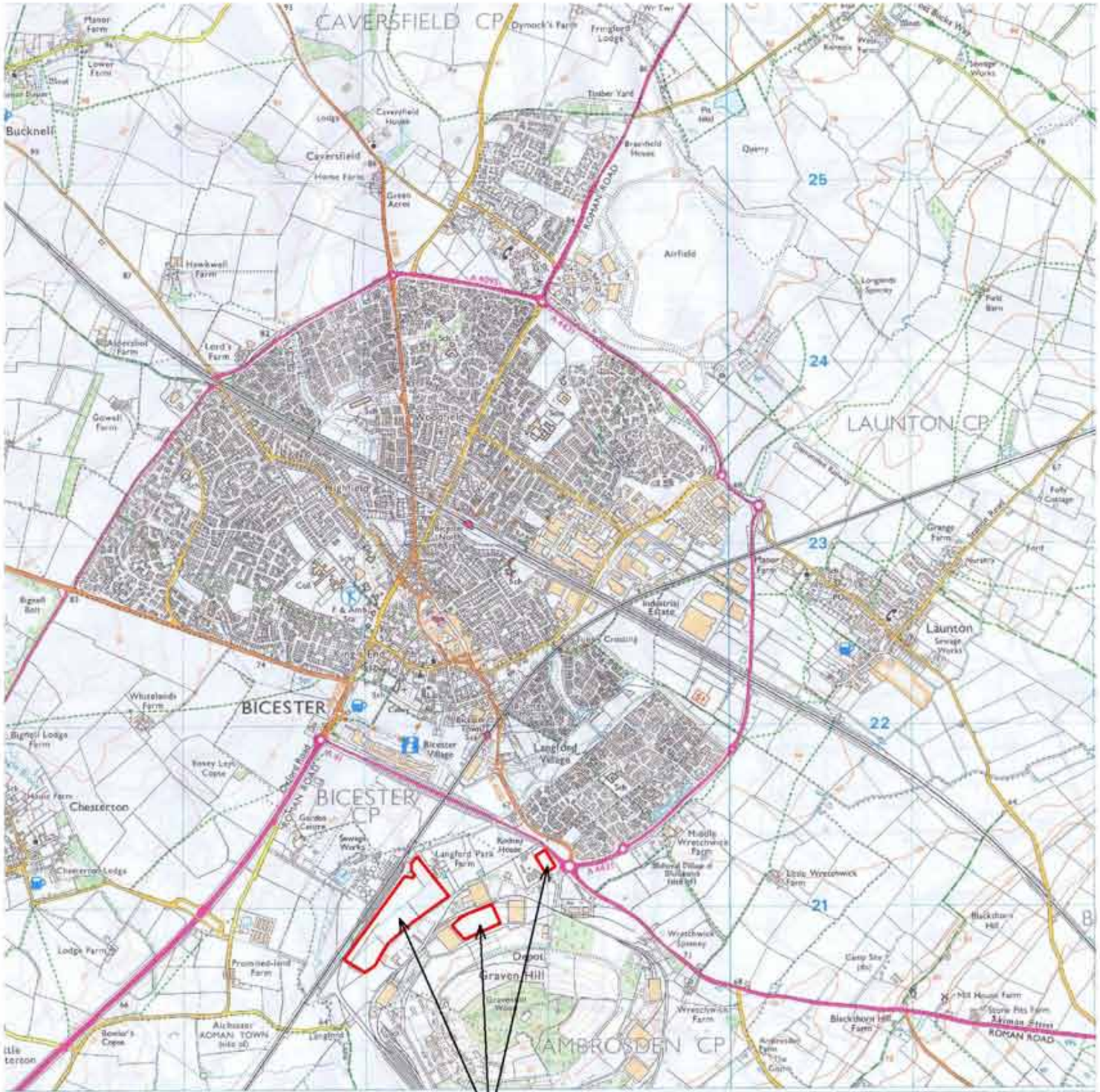
The CD ROM structure is formed from a tree of directories under the title J332 Bicester – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data and hold Grid, Composite and Graphic files with CSV composite data held in Export.

The CAD file contains externally referenced graphics that are rotated with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's e Transmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Map of survey area



● Survey location

Site centred on OS NGR
SP 586 209

SCALE 1:25 000

0m 500m 1000m

FIG 01

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Topcon TopNet correction data RTCMv2 format OSTN02 transformation

Survey grid size = 30m

Survey start and traverse direction

01 Grid reference number and filename

SCALE 1:5000

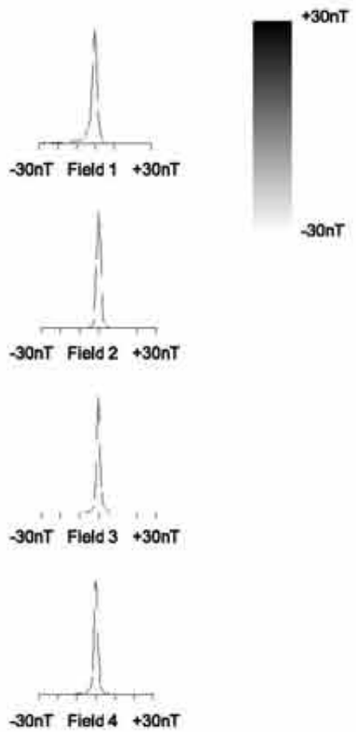
0m 100 200m

FIG 02

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area A



Area A

Field 4

Field 3

Field 1

Field 2

N

SCALE 1:2500

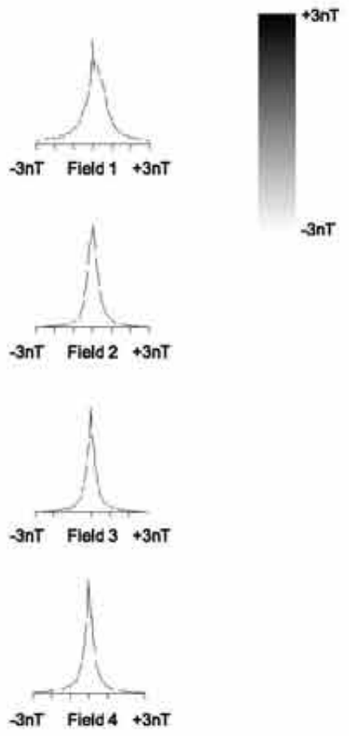
0m 50 100m

FIG 03

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester

Greyscale plot of processed magnetometer data - Area A
Fields 1 - 4



SCALE 1:2500

0m 50 100m

FIG 04

Area A

Field 1

Field 2

Field 3

Field 4

N

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area A Fields 1 - 4

- Positive linear anomaly - cut feature of possible archaeological origin
- Positive linear anomaly - possible cut feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

Area A

Field 1

Field 2

Field 3

Field 4

N

SCALE 1:2500

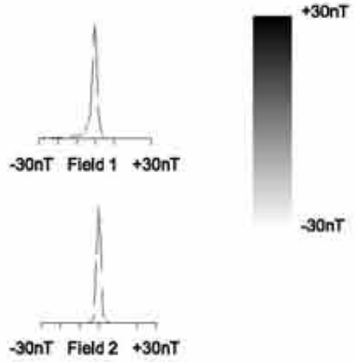
0m 50 100m

FIG 05

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area A
Fields 1 & 2



Field 1

Field 2

SCALE 1:1000

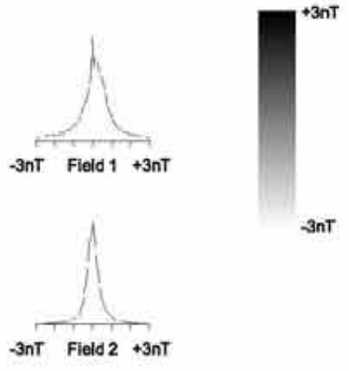
0m 10 20 30 40 50m

FIG 06

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester

Greyscale plot of processed magnetometer data - Area A
Fields 1 & 2



Field 1

Field 2

SCALE 1:1000

0m 10 20 30 40 50m

SCALE 1:500 @ A1 A3

FIG 07

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area A Fields 1 & 2

- Positive linear anomaly - cut feature of possible archaeological origin
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Linear anomaly - ridge and furrow
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

Field 1

Field 2

N

SCALE 1:1000

0m 10 20 30 40 50m

FIG 08

Area A

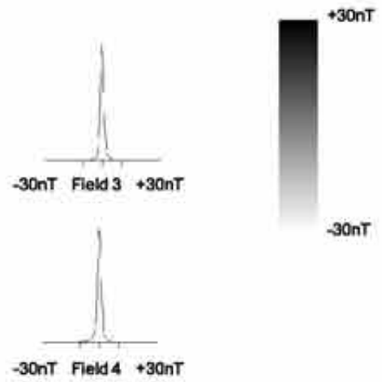
Field 4

Field 3

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area A Fields 3 & 4 west



SCALE 1:1250

0m 10 20 30 40 50m

FIG 09

Archaeological Surveys Ltd

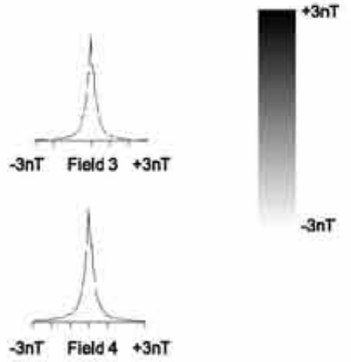
Geophysical Survey
E Site MOD Bicester

Area A

Field 4

Field 3

Greyscale plot of processed magnetometer data - Area A
Fields 3 & 4 west



SCALE 1:1250

0m 10 20 30 40 50m

SCALE 1:1250 AT A3

FIG 10

Area A

Field 4

Field 3

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area A Fields 3 & 4 west

- Positive linear anomaly - possible ditch-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

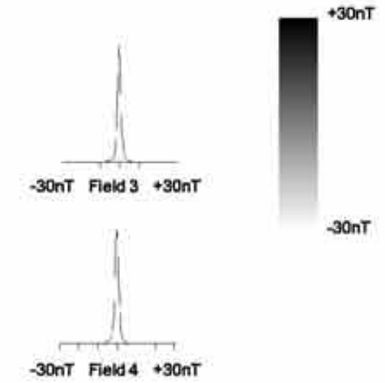
0m 10 20 30 40 50m

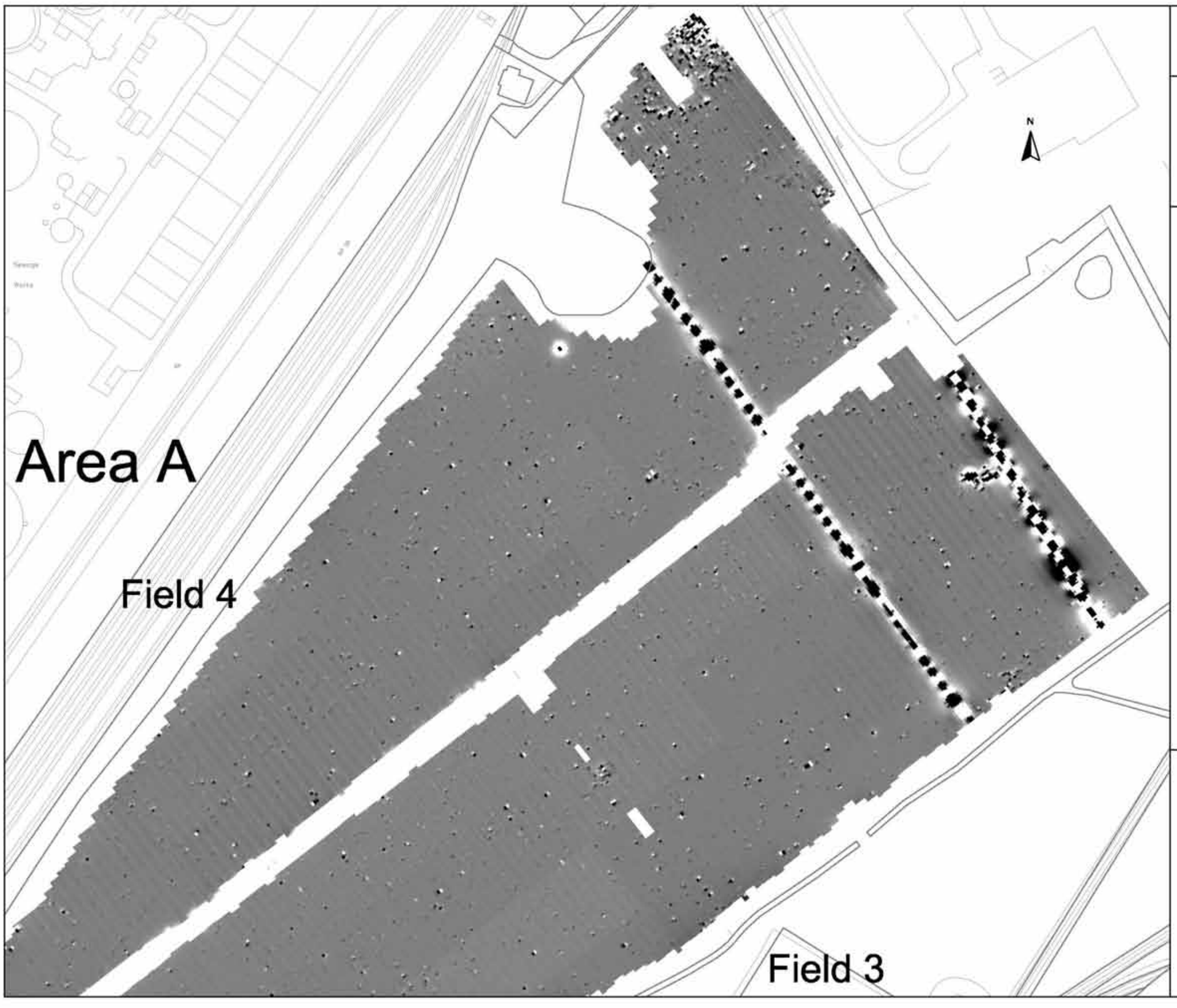
FIG 11

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area A
Fields 3 & 4 east





SCALE 1:1250

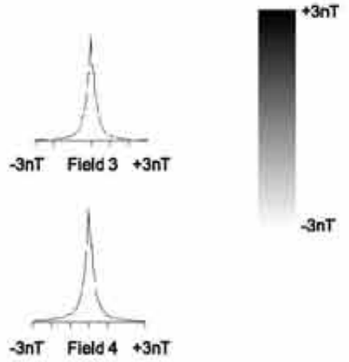
0m 10 20 30 40 50m

FIG 12

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of processed magnetometer data - Area A
Fields 3 & 4 east



Area A

Field 4

Field 3

N

SCALE 1:1250

0m 10 20 30 40 50m

FIG 13

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area A Fields 3 & 4 east

Area A

Field 4

Field 3

N

24
25
26
23
22
16
17
19
15
19
18
17
20
21
18

- Positive linear anomaly - possible ditch-like feature
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1250

0m 10 20 30 40 50m

SCALE 1:1250 @ A2 A3

FIG 14

Area B

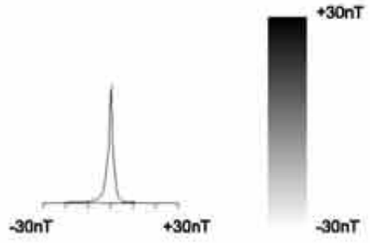
Field 5

N

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area B Field 5



SCALE 1:1000

0m 10 20 30 40 50m

SCALE 1:500 A1 A3

FIG 15

Area B

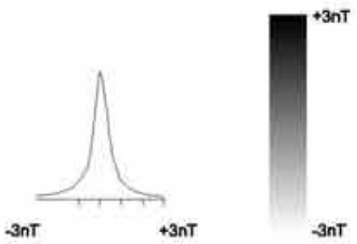
Field 5

N

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester

Greyscale plot of processed magnetometer data - Area B Field 5



SCALE 1:1000

0m 10 20 30 40 50m

SCALE 1:500 @ A1 @ A3

FIG 16

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area B Field 5

- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - ridge and furrow
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

Area B

Field 5

31

27

30

29

28

N

SCALE 1:1000

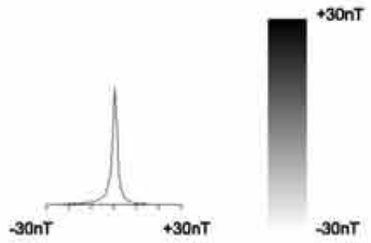
0m 10 20 30 40 50m

FIG 17

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Greyscale plot of raw magnetometer data - Area C
Field 6



Area C

Field 6

N

SCALE 1:1000

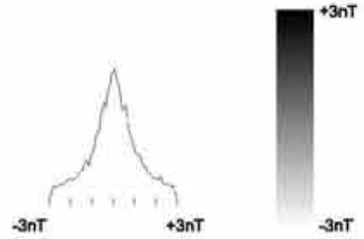
0m 10 20 30 40 50m

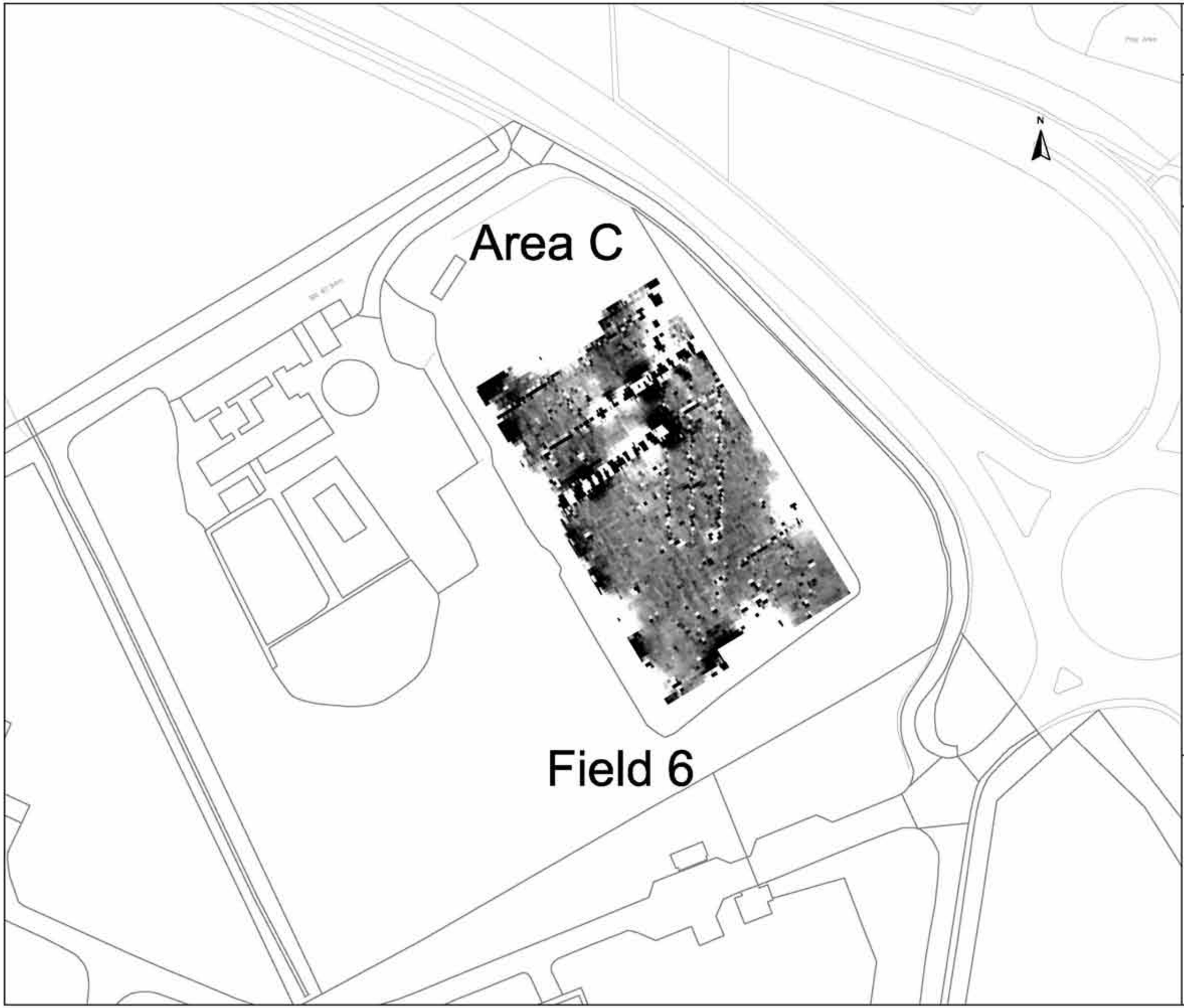
FIG 18

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester

Greyscale plot of processed magnetometer data - Area C
Field 6





SCALE 1:1000

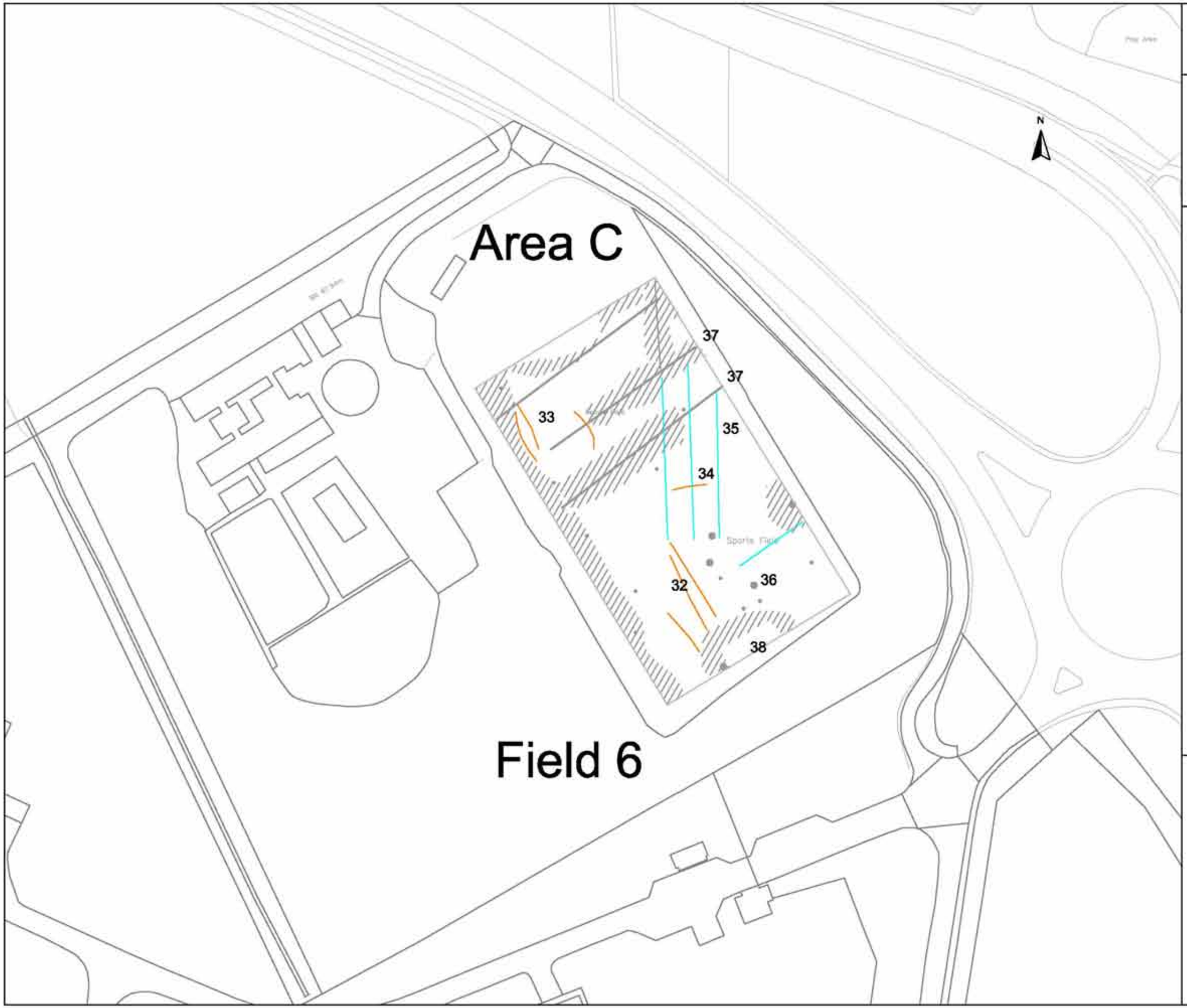
0m 10 20 30 40 50m

FIG 19

Archaeological Surveys Ltd

Geophysical Survey
E Site MOD Bicester
Oxfordshire

Abstraction and interpretation of magnetometer anomalies - Area C Field 6



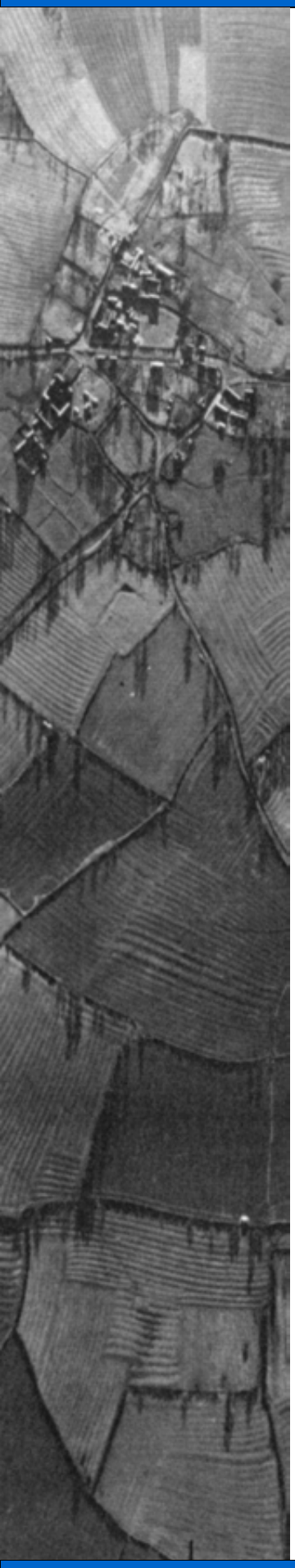
- Positive linear anomaly - possible ditch-like feature
- Positive linear anomaly - possible land drain
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE 1:500 @ A2 A3

FIG 20



MOD Bicester
Graven Hill
Oxfordshire

MAGNETOMETER SURVEY REPORT

for

Entec UK Ltd

David Sabin and Kerry Donaldson

January 2011

Ref. no.347

ARCHAEOLOGICAL SURVEYS LTD

MOD Bicester Graven Hill
Oxfordshire

Magnetometer Survey

for

Entec UK Ltd

Fieldwork by David Sabin, Jack Cousins, Francis Sabin & Richard Grove
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

Survey date - **from 22nd December 2010 to 26th January 2011**
Ordnance Survey Grid Reference – **SP 588 206**

Archaeological Surveys Ltd
PO Box 2862, Castle Combe, Chippenham, Wiltshire, SN14 7WZ
Tel: 01249 782234 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

A magnetometer survey was carried out at MOD Bicester, Graven Hill at the request of Entec UK Ltd on behalf of Defence Estates. The site has been identified by Defence Estates for possible residential redevelopment. The site covers approximately 30ha, and approximately half was surveyed using alternate 30m wide transects. The survey located widespread magnetic anomalies associated with the use of the site as a military establishment from WWII. Positive linear, curvilinear and discrete anomalies within Area H east, in the centre of the site, may have some potential to relate to former cut features. Further to the east, in Area I, a positive linear anomaly crosses the site from west to east, and is in the vicinity of a former field boundary and trackway that is marked further west on early Ordnance Survey mapping as the line of the Roman Akeman Street. However, it cannot be confidently determined that this anomaly relates directly to the Roman road.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Entec, on behalf of Defence Estates, to undertake a magnetometer survey of an area at MOD Bicester, Graven Hill, Oxfordshire. The site has been identified as potentially suitable for residential redevelopment. The survey forms part of an archaeological assessment of the site.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin, so that they may be assessed prior to development of the site.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection. The survey and report generally follow the recommendations set out by: English Heritage, 2008, *Geophysical survey in archaeological field evaluation;* and Institute for Archaeologists, 2002, *The use of Geophysical Techniques in Archaeological Evaluations*.

1.3 Site location, description and survey conditions

1.3.1 The site covers approximately 30ha within MOD Bicester surrounding Graven Hill, Oxfordshire and is centred on Ordnance Survey National Grid Reference (OS NGR) SP 589 206, see Figures 01 and 02.

1.3.2 The geophysical survey covers an area of approximately 14ha split within 9 fields and labelled Areas D to J. The survey was carried out over an approximate 50% sample using 30m alternate traverses oriented north to

south across the site.

1.3.3 Area D consists of approximately 1.6ha of grassland, Area E consists of approximately 1.2ha of grass, Area F is approximately 0.8ha grass and Area G is approximately 0.9ha within a sports field. Area H is approximately 4.7ha, split within three separate fields; Area H east, north and west. Area I is approximately 2.3ha of grass and Area J is approximately 2.2ha also on grass. The grassed areas are frequently used for army training and are maintained by periodic grazing and mowing.

1.3.4 The geophysical survey was hindered and restricted in places by tall grass, thistles and thorn bushes. Weather conditions during the survey were variable but often very cold with periods of snow.

1.4 Site history and archaeological potential

1.4.1 There are no known sites or findspots within the site itself; however, the western edge of the site lies within 750m of the Roman Town of Alchester (SAM OX18). This includes the remains of a vexillation fort and town with a cemetery to the east and further Iron Age-Romano British settlement to the north.

1.4.2 A previous geophysical survey carried out within E Site immediately to the north, located a number of geophysical anomalies close to the edge of the site that may relate to archaeological features (Archaeological Surveys, 2010).

1.4.3 In the vicinity, there is varying evidence for archaeological sites. It has been proposed that the site of Graven Hill is an Iron Age hill fort although there is no archaeological evidence to support this. The suggested line of the Roman road, Akeman Street, is believed to extend across the north of the site towards the Roman town of Alchester. To the north east of the site are the remains of the Deserted Medieval Village of Wretchwick (SAM 28148).

1.4.4 The site has been in military use since WWII where it was part of the US Army “Operation Bolero”. Several Nissen hut and Romney hut camps were established as well as a depot. It was subsequently used for housing German prisoners of war (Thomas, 2003).

1.5 Geology and soils

1.5.1 The underlying geology over the northern and southern parts of the site (Areas D, E, F and G and the northern half of Areas H and I) is the Peterborough member of the Oxford Clay formation consisting of mudstone, with the Stewartby member of the Oxford Clay formation underlying the rest of the site (Area J and the southern half of Areas H and I) (BGS, 2010).

1.5.2 The overlying soils across the site are from the Denchworth association which are pelo-stagnogley soils. They consist of slowly permeable, seasonally

waterlogged clayey soils (Soil Survey of England and Wales, 1983).

1.5.3 The geology and soils are considered to provide useful conditions for magnetic survey. Previous magnetometry surveys have located archaeological features in very similar conditions.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using Bartington Grad601-2 gradiometers. The instruments effectively measure a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally.

2.2.2 The instruments are extremely sensitive and are able to measure magnetic variation to 0.01nanoTesla (nT), with an effective resolution of 0.03nT. The data are limited to ±100nT when surveying with the highest sensitivity. All readings are saved to an integral data logger for analysis and presentation.

2.2.3 The instruments are operated according to the manufacturer's instructions with consideration given to the local conditions. An adjustment procedure is required, prior to collection of data, in order to balance the sensors and remove the effects of the Earth's magnetic field; further adjustment is required during the survey due to

instrument drift often associated with temperature change.

2.2.4 It can be very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that may be associated with large ferrous objects, geological/pedological features, 'magnetic debris' within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error often visible as striping within the data; this can be effectively removed by software processing and generally has little effect on the data unless extreme.

2.2.5 The Bartington gradiometers undergo regular servicing and calibration by the manufacturer. A current assessment of the instruments is shown in Table 1 below.

Sensor type and serial numbers	Bartington Grad - 01 – 1000 Nos. 084, 085, 242 and 396
Date of certified calibration/service	Sensors 084 and 085 - 6th August 2010 (due Aug 2012) Sensors 242 and 396 - 3rd December 2009 (due Dec 2011)
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instruments were considered to be in good working order prior to the survey, with no known faults or defects.

2.2.6 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids (900m²) giving 3600 recorded measurements per grid. The site was sampled at 50% by surveying alternate 30m wide transects oriented north to south. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 2008).

2.2.7 The survey grids were set out set out parallel to field boundaries in order to minimise partial grids. This was to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. The GPS is used in conjunction with Topcon's TopNet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system. The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix C

contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor; this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data are always analysed, as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

- clipping of the raw data at ±30nT to improve greyscale resolution,
- clipping of processed data at either ±5nT or ±2nT to enhance low magnitude anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

Reference should be made to Appendix B for further information on the specific processes carried out on the data. Appendix C metadata includes details on the processing sequence used for each survey area.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area.

2.3.4 The main form of data display used in this report is the greyscale plot. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in ArcheoSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by ArcheoSurveyor from left to right. Prior to displaying against base mapping, raster graphics require a rotation in AutoCAD of 90° to restore north to the top of the i mage.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2009 and AutoCAD LT 2007, creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. Quality can be compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive, including raster images, is produced with this report allowing separate analysis if necessary, see Appendix D below.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over nine fields within labelled D to G with Area H split into east, north and west. Geophysical anomalies located can be generally classified as positive and negative linear anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines. Anomalies located within each survey area have been numbered and are described below with subsequent discussion in Section 4.

3.1.2 Data are considered to be of good quality with minor positional errors, caused by uneven ground, ruts, tall vegetation etc., unlikely to have degraded quality significantly. Magnetic disturbance has been caused by modern above ground ferrous objects.

3.1.3 The listing of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, a basic key is indicated to allow cross reference to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG NEG LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG BOUNDARY	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation.
Anomalies with an agricultural origin AS-ABST MAG RIDGE AND FURROW	The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.

Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE	The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 2: List and description of interpretation categories

3.2 Area D

Field centred on OS NGR 458435, 220635, see Figures 05 & 06.

Anomalies with an uncertain origin

(1) – The survey area contains several positive linear anomalies with no coherent pattern. The area was part of the WWII US Army “Bolero” camp and subsequent POW camp, spread over the site of Graven Hill. It is likely that these are associated with this use of the site, although this is not certain.

Anomalies associated with magnetic debris

(2) – Widespread patches of magnetic debris indicate the presence of magnetically thermoremnant material likely to be associated with demolished Nissen and Romney huts and associated infrastructure .

Anomalies with a modern origin

(3) – Magnetic disturbance from buried services and other ferrous material.

3.3 Area E

Field centred on OS NGR 458860, 220830, see Figures 06 & 07.

Anomalies with an uncertain origin

(4) – Positive linear anomalies may be associated with the wartime use of the site, although this is not certain.

Anomalies associated with magnetic debris

(5) – Widespread patches of magnetic debris indicate the presence of magnetically thermoremnant material likely to be associated with the wartime use of the site.

Anomalies with a modern origin

(6) – Magnetic disturbance from buried services and other ferrous material.

3.4 Area F

Field centred on OS NGR 459365, 220770, see Figures 09 & 10.

Anomalies associated with land management

(7) – A positive linear anomaly possibly associated with a former land boundary marked on 19th century Ordnance Survey mapping.

Anomalies with an agricultural origin

(8) – Linear anomalies are likely to relate to former ridge and furrow.

Anomalies associated with magnetic debris

(9) – Widespread patches of magnetic debris indicate the presence of magnetically thermoremnant material.

3.5 Area G

Field centred on OS NGR 459215, 220110, see Figures 11 & 12.

Anomalies with an uncertain origin

(10) – Area G contains many discrete positive and positive and negative linear and possible rectilinear anomalies. It is not possible to determine the origin of these anomalies from their morphology. The survey area has been in use as a sports field and it is possible that some of these anomalies are associated with this use,

but this is uncertain.

Anomalies associated with magnetic debris

(11) – Magnetic debris indicates the presence of magnetically thermoremnant material, some of which is associated with the use of the site as a sports field.

3.6 Area H north

Field centred on OS NGR 458800, 220715, see Figures 13 & 14.

Anomalies with an uncertain origin

(12) – A series of very weakly positive linear anomalies, located in the central part of the survey area, may be associated with former agricultural activity.

Anomalies associated with magnetic debris

(13) – Magnetic debris is located over much of the survey area and relates to material likely to have been associated with former wartime use of the site.

Anomalies with a modern origin

(14) – The survey area contains several strong multiple dipolar linear anomalies relating to buried services probably associated with the wartime military camp.

3.7 Area H west

Field centred on OS NGR 458660, 221560, see Figures 13 & 14.

Anomalies with an uncertain origin

(15) – Positive linear and curvilinear anomalies likely to be associated with other material within the survey area derived from the WWII camp on, and adjacent, to the site.

Anomalies associated with magnetic debris

(16) – Widespread patches of very strong magnetic debris indicate the presence of ferrous and other magnetically thermoremnant material.

Anomalies with a modern origin

(17) – Magnetic disturbance from ferrous material and buried services.

3.8 Area H east

Field centred on OS NGR 459005, 220590, see Figures 15 &16.

Anomalies with an uncertain origin

(18) – Positive linear, curvilinear and discrete anomalies located in the southern part of the area. These may indicate cut features, such as ditches and pits.

(19) – Weak positive linear anomalies, located in the south eastern part of the survey area, may have a similar origin to anomalies (18), but this is not certain.

(20) – Very weak positive linear anomalies with an uncertain origin.

(21) – A positive linear anomaly in the vicinity of anomalies (18) may be associated. However, it appears to terminate with a strong dipolar anomaly, indicating ferrous material.

3.9 Area I

Field centred on OS NGR 459275, 220605, see Figures 17 & 18.

Anomalies with an uncertain origin

(22) – A relatively strongly positive linear anomaly, with some associated negative response, crosses the survey area oriented west to east. This anomaly is in the vicinity of a break of slope within the field and is marked as the route of the Roman road, Akeman Street on former Ordnance Survey mapping. This was subsequently removed between 1975 and 1989.

(23) – Positive linear anomalies, partially obscured by the widespread magnetic debris, may be associated with the modern use of the site.

Anomalies associated with magnetic debris

(24) – Widespread patches of very strong magnetic debris indicate the presence of ferrous and other magnetically thermoremnant material. This is likely to be derived from military buildings removed sometime after 1976.

Anomalies with a modern origin

(25) – Magnetic disturbance from ferrous material and buried services associated with former military buildings.

3.10 Area J

Field centred on OS NGR 459215, 220360, see Figures 19 & 20.

Anomalies associated with magnetic debris

(26) – Widespread patches of very strong magnetic debris indicate the presence of ferrous and other magnetically thermoremnant material derived from former military buildings.

Anomalies with a modern origin

(27) – Magnetic disturbance from ferrous material and buried services.

4 DISCUSSION

4.1.1 The detailed magnetometer survey located widespread magnetic debris and disturbance caused by material associated with demolished buildings. The Graven Hill site was used during WWII as part of the US Army "Operation Bolero" and the site housed the central ordnance depot and camps made up of collections of Nissen and Romney huts. These appear to have been used for German prisoners of war working parties attached to the wartime depot (Thomas, 2003).

4.1.2 All the survey areas contain evidence for this occupation of the site, and the debris and disturbance may have obscured lower magnitude anomalies. The majority of the survey areas also contain positive linear anomalies and it is possible that the relate to the military use of the site. However, they either do not have coherent morphology, or they are weak or partially obscured and so their origin cannot be determined.

4.1.3 Within Area H (east) in the central part of the site, the magnetic debris is less abundant and several positive linear, curvilinear and discrete anomalies have been located. It is possible that these relate to cut features with some archaeological potential, although a modern origin cannot be ruled out. Within Area I to the east, a positive linear anomaly extends from east to west across the northern part of the survey area. A former trackway and field boundary is marked in this position on early Ordnance Survey mapping, and the western extension of this is marked as the route of Akeman Street. It is possible that this anomaly is associated with the boundary feature.

4.1.4 Area G, to the south of the site, occupies a sports field, with evidence for terracing. The survey area contains widespread positive and negative anomalies and although it is possible that they relate to the modern use of the site, their origin cannot be confidently determined.

5 CONCLUSION

5.1.1 The magnetometer survey located widespread highly magnetic anomalies derived from former military buildings that occupied the site, during and after WWII. This magnetic debris and disturbance may have obscured lower magnitude anomalies, and although positive linear anomalies do exist in the majority of the survey areas, they cannot be confidently interpreted.

5.1.2 Several positive linear, curvilinear and discrete anomalies located in the centre of the site (Area H east) may relate to cut features. Their morphology prevents confident interpretation beyond the possibility that they are related to ditch-like and pit-like features.

5.1.3 In Area I, to the east, a positive linear anomaly crosses the site in the vicinity of a former field boundary associated with a trackway indicated on early Ordnance Survey mapping. The projected line westwards of this feature is marked as the route of Roman Akeman Street on former Ordnance Survey mapping; however, parts of the anomaly are strongly enhanced suggesting the presence of ferrous material perhaps related to services or fencing.

6 REFERENCES

Archaeological Surveys, 2010. *E Site, MOD Bicester, Oxfordshire. Magnetometer Survey Report. Ref 332.* Unpublished typescript report.

British Geological Survey, 2010. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://maps.bgs.ac.uk/geologyviewer/ [accessed 26/2/2010].

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.* 2nd ed. Swindon: English Heritage.

Entec, 2010. *MOD Bicester, Graven Hill, E Site: Specification for Geophysical Survey.* Unpublished typescript document.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IFA Paper No. 6. IFA, University of Reading.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 4 Eastern England.*

Thomas, R.J.C., 2003. *Twentieth Century Military Recording Project. Prisoner of War Camps (1939-1945).* English Heritage.

Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±1nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and can remove striping. The process can remove archaeological features that run along a traverse so data analysis is also carried out prior its application.

De-stagger

Compensates for small positional errors within data collection by shifting the position of the readings along each traverse by a specified amount. Data lost at the end of each traverse are extrapolated from adjacent value in the same row.

Deslope

Corrects for striping and distortion caused by metal objects/services etc.. The process calculates a curve based on a polynomial best fit mathematical function for each traverse. This curve is then subtracted from the actual data.

FFT (Fast Fourier Transform) spectral filtering

A mathematical process used to determine the frequency components of a traverse. Repetitive features, such as plough marks, produce characteristic spectral zones that can be suppressed allowing greyscale images to appear clearer.

Appendix C – survey and data information

Area A Field 1 raw data

COMPOSITE
Filename: J332-mag-Field1-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/08/2010
Assembled by: on 16/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 240 x 240
Survey Size (meters): 60 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 10.50
Mean: -3.85
Median: -0.77
Composite Area: 1.44 ha
Surveyed Area: 0.6689 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 13
1 Col:0 Row:2 07.xgd
2 Col:0 Row:3 08.xgd
3 Col:0 Row:4 15.xgd
4 Col:0 Row:5 16.xgd
5 Col:0 Row:6 17.xgd
6 Col:1 Row:0 01.xgd
7 Col:1 Row:1 02.xgd
8 Col:1 Row:2 03+05.xgd
9 Col:1 Row:3 04+06.xgd
10 Col:1 Row:4 09+13.xgd
11 Col:1 Row:5 10+14.xgd
12 Col:1 Row:6 11.xgd
13 Col:1 Row:7 12.xgd

Area A Field 1 processing

COMPOSITE
Filename: J332-mag-Field1-proc.xcp

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.75
Mean: -0.31
Median: 0.00

Area A Field 2 raw data

COMPOSITE
Filename: J332-mag-Field2-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/08/2010
Assembled by: on 16/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 210
Survey Size (meters): 120 m x 210 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.86
Mean: -0.28
Median: -0.10
Composite Area: 2.52 ha
Surveyed Area: 1.7849 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 27
1 Col:0 Row:0 13.xgd
2 Col:0 Row:1 14.xgd
3 Col:0 Row:2 15.xgd
4 Col:0 Row:3 16.xgd
5 Col:0 Row:4 17.xgd
6 Col:0 Row:5 18.xgd
7 Col:0 Row:6 19.xgd
8 Col:1 Row:0 09.xgd
9 Col:1 Row:1 10.xgd
10 Col:1 Row:2 11.xgd
11 Col:1 Row:3 12.xgd
12 Col:1 Row:4 20.xgd
13 Col:1 Row:5 21.xgd
14 Col:1 Row:6 22.xgd
15 Col:2 Row:0 05.xgd
16 Col:2 Row:1 06.xgd
17 Col:2 Row:2 07.xgd
18 Col:2 Row:3 08.xgd
19 Col:2 Row:4 23.xgd
20 Col:2 Row:5 24.xgd
21 Col:2 Row:6 25.xgd
22 Col:3 Row:0 01.xgd
23 Col:3 Row:1 02.xgd
24 Col:3 Row:2 03.xgd
25 Col:3 Row:3 04.xgd
26 Col:3 Row:4 26.xgd
27 Col:3 Row:5 27.xgd

Area A Field 2 processing

COMPOSITE
Filename: J332-mag-Field2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.87
Mean: 0.02
Median: 0.00

Processes: 12
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 15.xgd 16.xgd 17.xgd 18.xgd 19.xgd 11.xgd 12.xgd 20.xgd 21.xgd 22.xgd 07.xgd 08.xgd 23.xgd 24.xgd 25.xgd 03.xgd 04.xgd 26.xgd 27.xgd
4 DeStripe Median Traverse: Grids: 10.xgd 06.xgd
5 DeStripe Median Traverse: Grids: 09.xgd 05.xgd
6 DeStripe Median Traverse: Grids: 01.xgd 02.xgd
7 DeStripe Median Sensors: 14.xgd
8 Clip from -3.00 to 3.00 nT
9 De Stagger: Grids: 01.xgd Mode: Both By: 1 intervals
10 De Stagger: Grids: 17.xgd Mode: Both By: 1 intervals
11 De Stagger: Grids: 24.xgd Mode: Both By: 1 intervals
12 De Stagger: Grids: 02.xgd Mode: Both By: 1 intervals

Area A Field 3 raw data

COMPOSITE
Filename: J332-mag-Field3-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 18/08/2010
Assembled by: on 18/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 600 x 450
Survey Size (meters): 150 m x 450 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.66
Mean: -0.43
Median: -0.29
Composite Area: 6.75 ha
Surveyed Area: 4.6442 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 63
1 Col:0 Row:0 13.xgd
2 Col:0 Row:1 14.xgd
3 Col:0 Row:2 15.xgd
4 Col:0 Row:3 16.xgd
5 Col:0 Row:4 17.xgd
6 Col:0 Row:5 18.xgd
7 Col:0 Row:6 19.xgd
8 Col:0 Row:7 20.xgd
9 Col:0 Row:8 45.xgd
10 Col:0 Row:9 46.xgd
11 Col:0 Row:10 47.xgd
12 Col:0 Row:11 48.xgd
13 Col:0 Row:12 49.xgd
14 Col:0 Row:13 50.xgd
15 Col:0 Row:14 51.xgd
16 Col:1 Row:0 09.xgd
17 Col:1 Row:1 10.xgd
18 Col:1 Row:2 11.xgd
19 Col:1 Row:3 12.xgd
20 Col:1 Row:4 21.xgd
21 Col:1 Row:5 22.xgd
22 Col:1 Row:6 23.xgd
23 Col:1 Row:7 24.xgd
24 Col:1 Row:8 41.xgd
25 Col:1 Row:9 42.xgd
26 Col:1 Row:10 43.xgd
27 Col:1 Row:11 44.xgd
28 Col:1 Row:12 52.xgd
29 Col:1 Row:13 53.xgd
30 Col:1 Row:14 54.xgd
31 Col:2 Row:0 05.xgd
32 Col:2 Row:1 06.xgd
33 Col:2 Row:2 07.xgd
34 Col:2 Row:3 08.xgd
35 Col:2 Row:4 25.xgd
36 Col:2 Row:5 26.xgd
37 Col:2 Row:6 27.xgd
38 Col:2 Row:7 28.xgd
39 Col:2 Row:8 37.xgd
40 Col:2 Row:9 38.xgd
41 Col:2 Row:10 39.xgd
42 Col:2 Row:11 40.xgd
43 Col:2 Row:12 55.xgd
44 Col:2 Row:13 56.xgd
45 Col:2 Row:14 57.xgd
46 Col:3 Row:0 01.xgd
47 Col:3 Row:1 02.xgd
48 Col:3 Row:2 03.xgd
49 Col:3 Row:3 04.xgd
50 Col:3 Row:4 29.xgd
51 Col:3 Row:5 30.xgd
52 Col:3 Row:6 31.xgd
53 Col:3 Row:7 32.xgd
54 Col:3 Row:8 33.xgd
55 Col:3 Row:9 34.xgd
56 Col:3 Row:10 35.xgd
57 Col:3 Row:11 36.xgd
58 Col:3 Row:12 58.xgd
59 Col:3 Row:13 59.xgd
60 Col:3 Row:14 60.xgd
61 Col:4 Row:12 61.xgd
62 Col:4 Row:13 62.xgd
63 Col:4 Row:14 63.xgd

Area A Field 3 processing

COMPOSITE
Filename: J332-mag-Field3-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.12
Mean: 0.01
Median: 0.00

Processes: 7
1 Base Layer

2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 13.xgd 14.xgd 15.xgd 16.xgd 17.xgd 18.xgd 19.xgd 20.xgd 09.xgd 10.xgd 11.xgd 12.xgd 21.xgd 22.xgd 23.xgd 24.xgd 05.xgd 06.xgd 07.xgd 08.xgd 25.xgd 26.xgd 27.xgd 28.xgd 01.xgd 02.xgd 03.xgd 04.xgd 29.xgd 30.xgd 31.xgd 32.xgd
4 DeStripe Median Traverse: Grids: 47.xgd 48.xgd 49.xgd 50.xgd 51.xgd 43.xgd 44.xgd 52.xgd 53.xgd 54.xgd 39.xgd 40.xgd 55.xgd 56.xgd 57.xgd 35.xgd 36.xgd 58.xgd 59.xgd 60.xgd 61.xgd 62.xgd 63.xgd
5 DeStripe Median Traverse: Grids: 41.xgd 42.xgd 37.xgd 38.xgd 33.xgd 34.xgd
6 DeStripe Mean Traverse: Grids: 45.xgd 46.xgd
Threshold: 0.5 SDs
7 Clip from -3.00 to 3.00 nT

Area A Field 4 raw data

COMPOSITE
Filename: J332-mag-Field4-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 18/08/2010
Assembled by: on 18/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 600 x 450
Survey Size (meters): 150 m x 450 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 5.28
Mean: -0.43
Median: -0.15
Composite Area: 6.75 ha
Surveyed Area: 3.1239 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 49
1 Col:0 Row:0 01.xgd
2 Col:0 Row:1 02.xgd
3 Col:0 Row:2 03.xgd
4 Col:0 Row:3 04.xgd
5 Col:0 Row:4 08.xgd
6 Col:0 Row:5 09.xgd
7 Col:0 Row:6 10.xgd
8 Col:0 Row:7 11.xgd
9 Col:0 Row:8 20.xgd
10 Col:0 Row:9 21.xgd
11 Col:0 Row:10 22.xgd
12 Col:0 Row:11 23.xgd
13 Col:0 Row:12 36.xgd
14 Col:0 Row:13 37.xgd
15 Col:0 Row:14 38.xgd
16 Col:1 Row:1 05.xgd
17 Col:1 Row:2 06.xgd
18 Col:1 Row:3 07.xgd
19 Col:1 Row:4 12.xgd
20 Col:1 Row:5 13.xgd
21 Col:1 Row:6 14.xgd
22 Col:1 Row:7 15.xgd
23 Col:1 Row:8 24.xgd
24 Col:1 Row:9 25.xgd
25 Col:1 Row:10 26.xgd
26 Col:1 Row:11 27.xgd
27 Col:1 Row:12 39.xgd
28 Col:1 Row:13 40.xgd
29 Col:1 Row:14 41.xgd
30 Col:2 Row:4 16.xgd
31 Col:2 Row:5 17.xgd
32 Col:2 Row:6 18.xgd
33 Col:2 Row:7 19.xgd
34 Col:2 Row:8 28.xgd
35 Col:2 Row:9 29.xgd
36 Col:2 Row:10 30.xgd
37 Col:2 Row:11 31.xgd
38 Col:2 Row:12 42.xgd
39 Col:2 Row:13 43.xgd
40 Col:2 Row:14 44.xgd
41 Col:3 Row:8 32.xgd
42 Col:3 Row:9 33.xgd
43 Col:3 Row:10 34.xgd
44 Col:3 Row:11 35.xgd
45 Col:3 Row:12 45.xgd
46 Col:3 Row:13 46.xgd
47 Col:3 Row:14 47.xgd
48 Col:4 Row:13 48.xgd
49 Col:4 Row:14 49.xgd

Area A Field 4 processing

COMPOSITE
Filename: J332-mag-Field4-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.17
Mean: -0.06
Median: 0.00

Processes: 8
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 01.xgd 02.xgd 03.xgd 04.xgd 08.xgd 09.xgd 10.xgd 11.xgd 20.xgd 21.xgd 22.xgd 23.xgd 36.xgd 37.xgd 38.xgd 05.xgd 06.xgd 07.xgd 12.xgd 13.xgd 14.xgd 15.xgd 24.xgd 25.xgd 26.xgd 27.xgd 39.xgd 40.xgd 41.xgd 16.xgd 17.xgd 18.xgd 19.xgd 28.xgd 29.xgd 30.xgd 31.xgd 42.xgd 43.xgd 44.xgd
4 DeStripe Median Traverse: Grids: 32.xgd 33.xgd
5 DeStripe Median Traverse: Grids: 45.xgd 46.xgd 47.xgd
6 DeStripe Mean Traverse: Grids: 34.xgd 35.xgd
Threshold: 0.5 SDs
7 DeStripe Median Traverse: Grids: 48.xgd 49.xgd
8 Clip from -3.00 to 3.00 nT

Area B Field 5 raw data

COMPOSITE
Filename: J332-mag-Field5-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 19/08/2010
Assembled by: on 19/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 240
Survey Size (meters): 120 m x 240 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 7.80
Mean: -1.14
Median: -0.05
Composite Area: 2.88 ha
Surveyed Area: 1.6358 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 29
1 Col:0 Row:0 26.xgd
2 Col:0 Row:1 27.xgd
3 Col:0 Row:2 28.xgd
4 Col:0 Row:3 29.xgd
5 Col:0 Row:4 19.xgd
6 Col:0 Row:5 20.xgd
7 Col:0 Row:6 21.xgd
8 Col:1 Row:0 22.xgd
9 Col:1 Row:1 23.xgd
10 Col:1 Row:2 24.xgd
11 Col:1 Row:3 25.xgd
12 Col:1 Row:4 15.xgd
13 Col:1 Row:5 16.xgd
14 Col:1 Row:6 17.xgd
15 Col:1 Row:7 18.xgd
16 Col:2 Row:1 04.xgd
17 Col:2 Row:2 05.xgd
18 Col:2 Row:3 06.xgd
19 Col:2 Row:4 11.xgd
20 Col:2 Row:5 12.xgd
21 Col:2 Row:6 13.xgd
22 Col:2 Row:7 14.xgd
23 Col:3 Row:1 01.xgd
24 Col:3 Row:2 02.xgd
25 Col:3 Row:3 03.xgd
26 Col:3 Row:4 07.xgd
27 Col:3 Row:5 08.xgd
28 Col:3 Row:6 09.xgd
29 Col:3 Row:7 10.xgd

Area B Field 5 processing

COMPOSITE
Filename: J332-mag-Field5-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.50
Mean: -0.18
Median: -0.03
Composite Area: 2.88 ha
Surveyed Area: 1.6357 ha

Area C Field 6 raw data

COMPOSITE
Filename: J332-mag-Field6-raw.xcp

Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 19/08/2010
Assembled by: on 19/08/2010
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 240 x 120
Survey Size (meters): 60 m x 120 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 7.69
Mean: -0.25
Median: 0.42
Composite Area: 0.72 ha
Surveyed Area: 0.5997 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Source Grids: 8
1 Col:0 Row:0 01.xgd
2 Col:0 Row:1 02.xgd
3 Col:0 Row:2 03.xgd
4 Col:0 Row:3 04.xgd
5 Col:1 Row:0 05.xgd
6 Col:1 Row:1 06.xgd
7 Col:1 Row:2 07.xgd
8 Col:1 Row:3 08.xgd

Area C Field 6 processing

COMPOSITE
Filename: J332-mag-Field6-proc.xcp

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at Castle Combe, Wiltshire (see inside cover for address). Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site. Digital data are also supplied to the client on CD ROM, see below.

Surveys are reported on in hardcopy (recycled paper) using A4 for text and A3 for plots (all plots are scaled for A3). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.5.9.4 (geophysical data analysis),
- ProgeCAD Professional 2009 (report graphics),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.0.1 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Digital data are supplied on CD ROM which includes the following files:

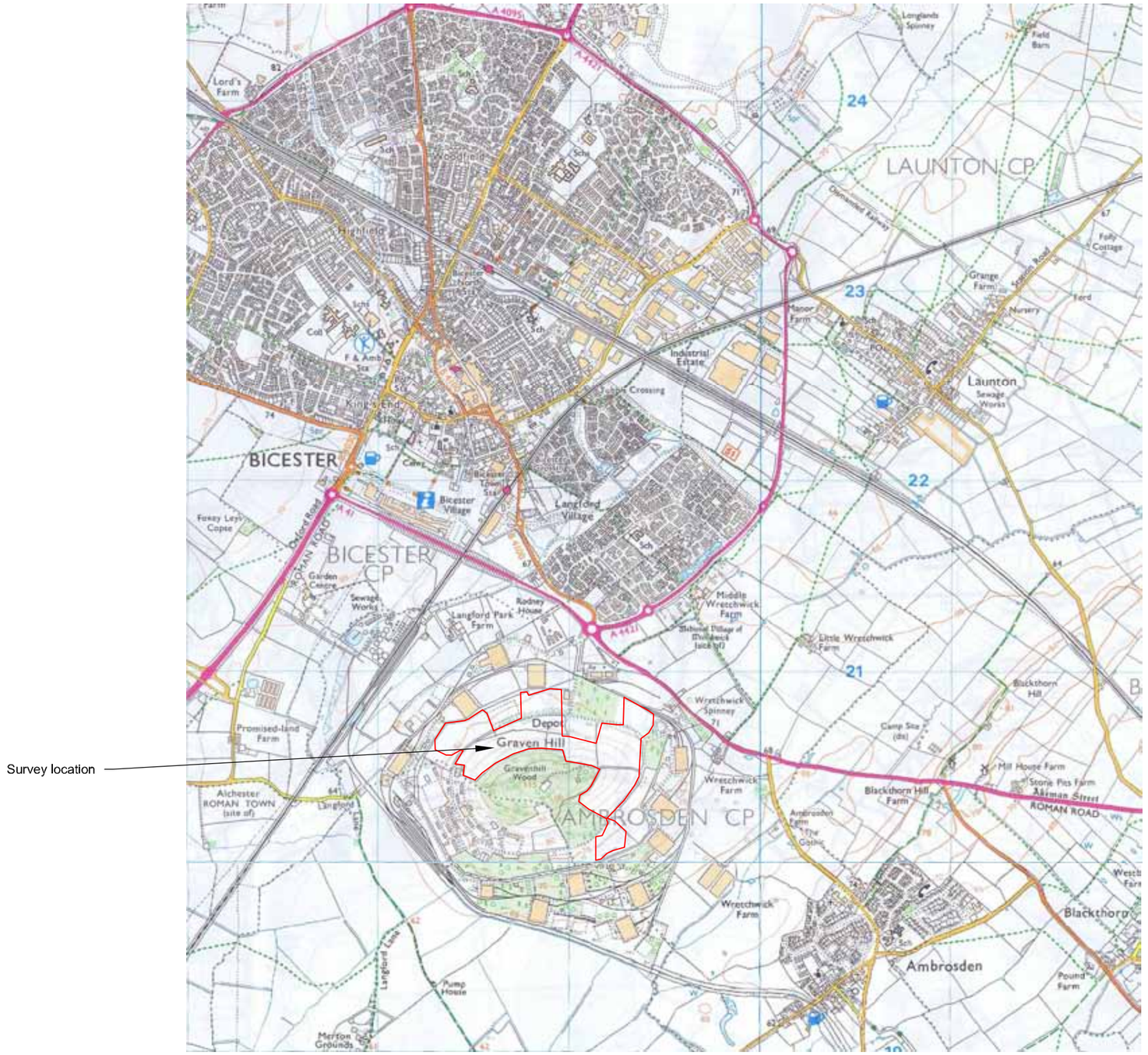
- ArcheoSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as OpenOffice.org ODT file,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF,
- PDFs of all figures.

The CD ROM structure is formed from a tree of directories under the title J347 Bicester – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data and hold Grid, Composite and Graphic files with CSV composite data held in Export.

The CAD file contains externally referenced graphics that are rotated with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's e Transmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill



Survey location

Map of survey area

● Survey location

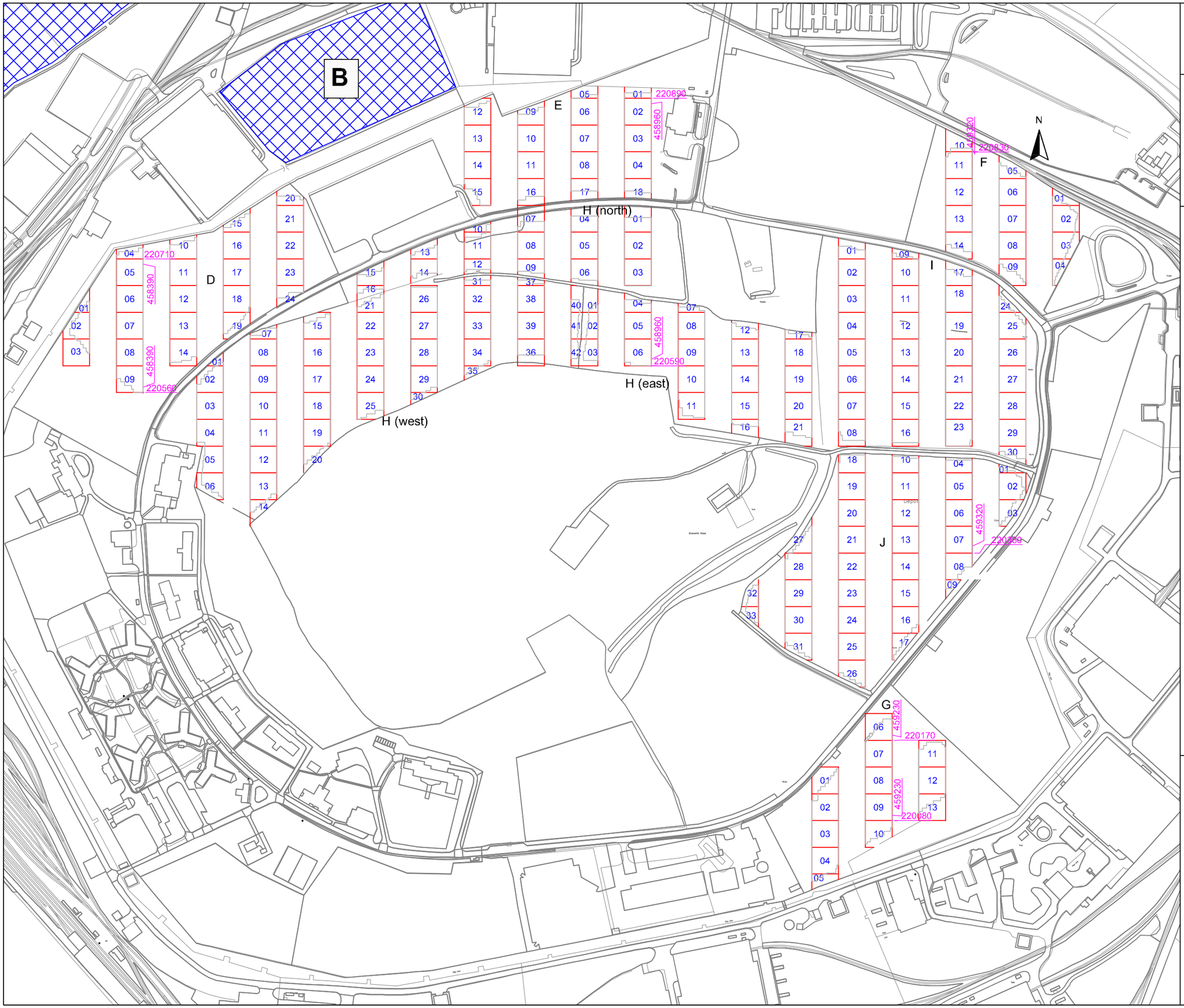
Site centred on OS NGR
SP 589 205

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Topcon TopNet correction data RTCMv2 format OSTN02 transformation

Survey grid size = 30m

Survey start and traverse direction

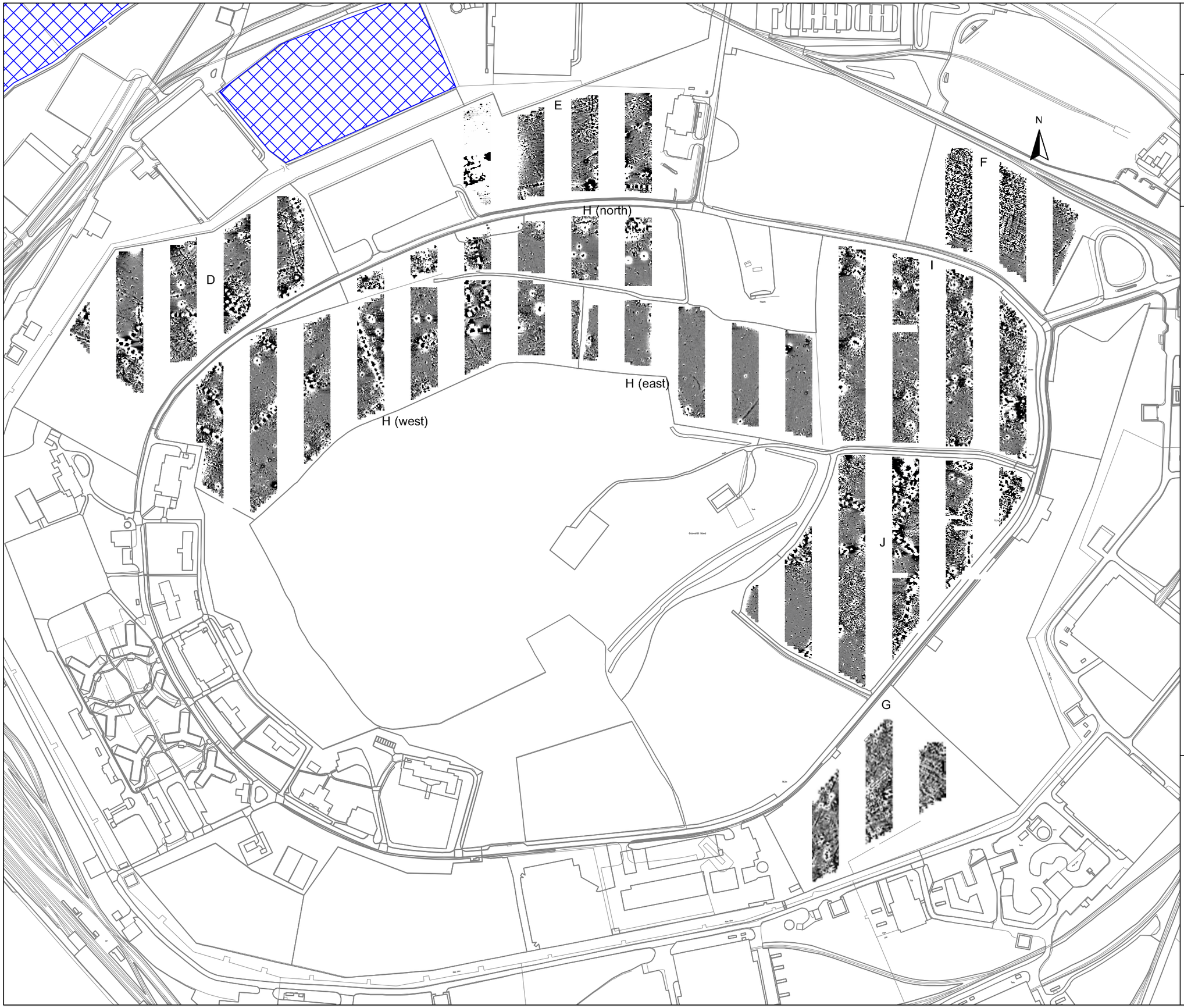
1 Grid reference number and filename

SCALE 1:4000

0m 40 80 120 160 200m

SCALE TRUE AT A3

FIG 02



Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data

+5nT

-5nT

SCALE 1:4000

0m 40 80 120 160 200m

SCALE TRUE AT A3

FIG 03

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies

B

D

E

F

G

H (north)

H (east)

H (west)

I

J

N

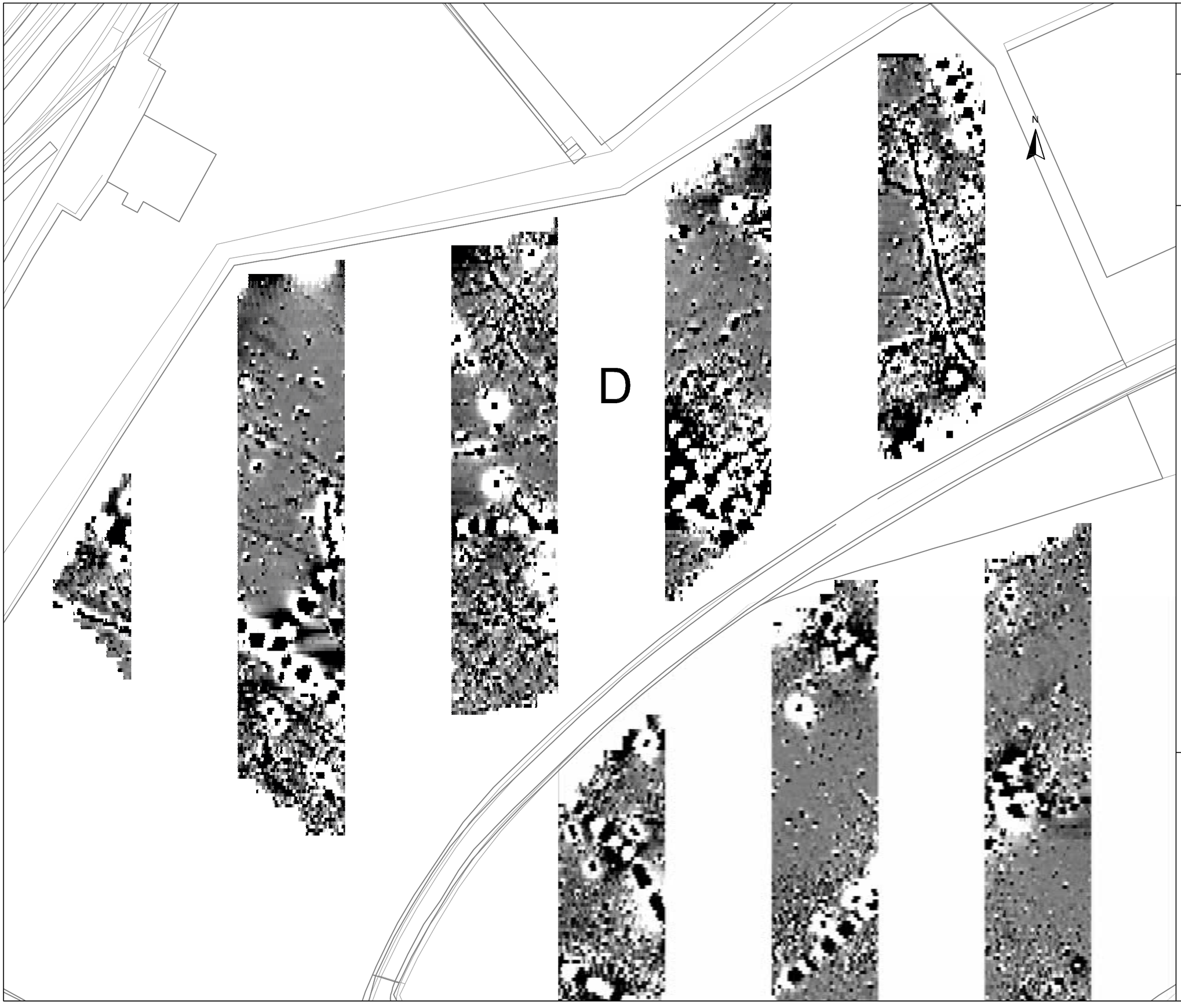
- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:4000

0m 40 80 120 160 200m

SCALE TRUE AT A3

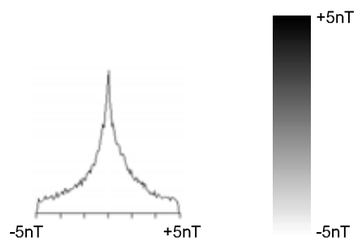
FIG 04



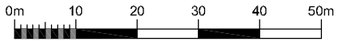
Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area D



SCALE 1:1000



SCALE TRUE AT A3

FIG 05

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area D

- Positive linear anomaly - possible ditch-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

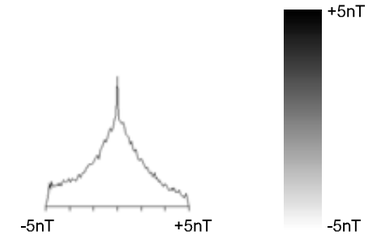
SCALE TRUE AT A3

FIG 06

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area E



E

H (north)

N

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 07

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area E

E

H (north)

5

4

6

13

12

14

N

- Positive linear anomaly - possible ditch-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service

SCALE 1:1000

0m 10 20 30 40 50m

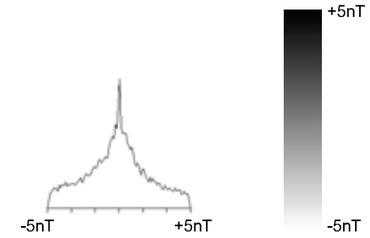
SCALE TRUE AT A3

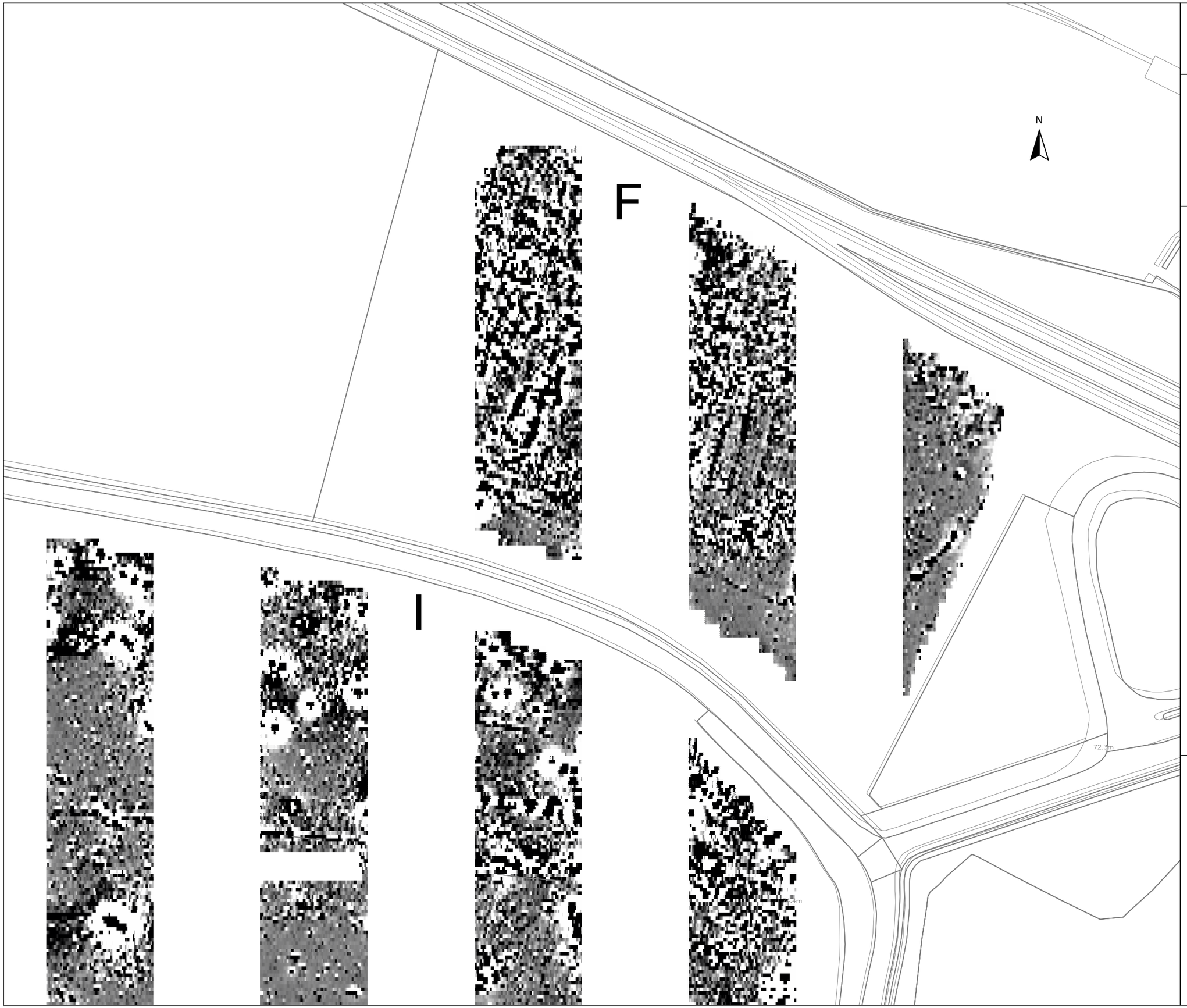
FIG 08

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area F





SCALE 1:1000

0m 10 20 30 40 50m

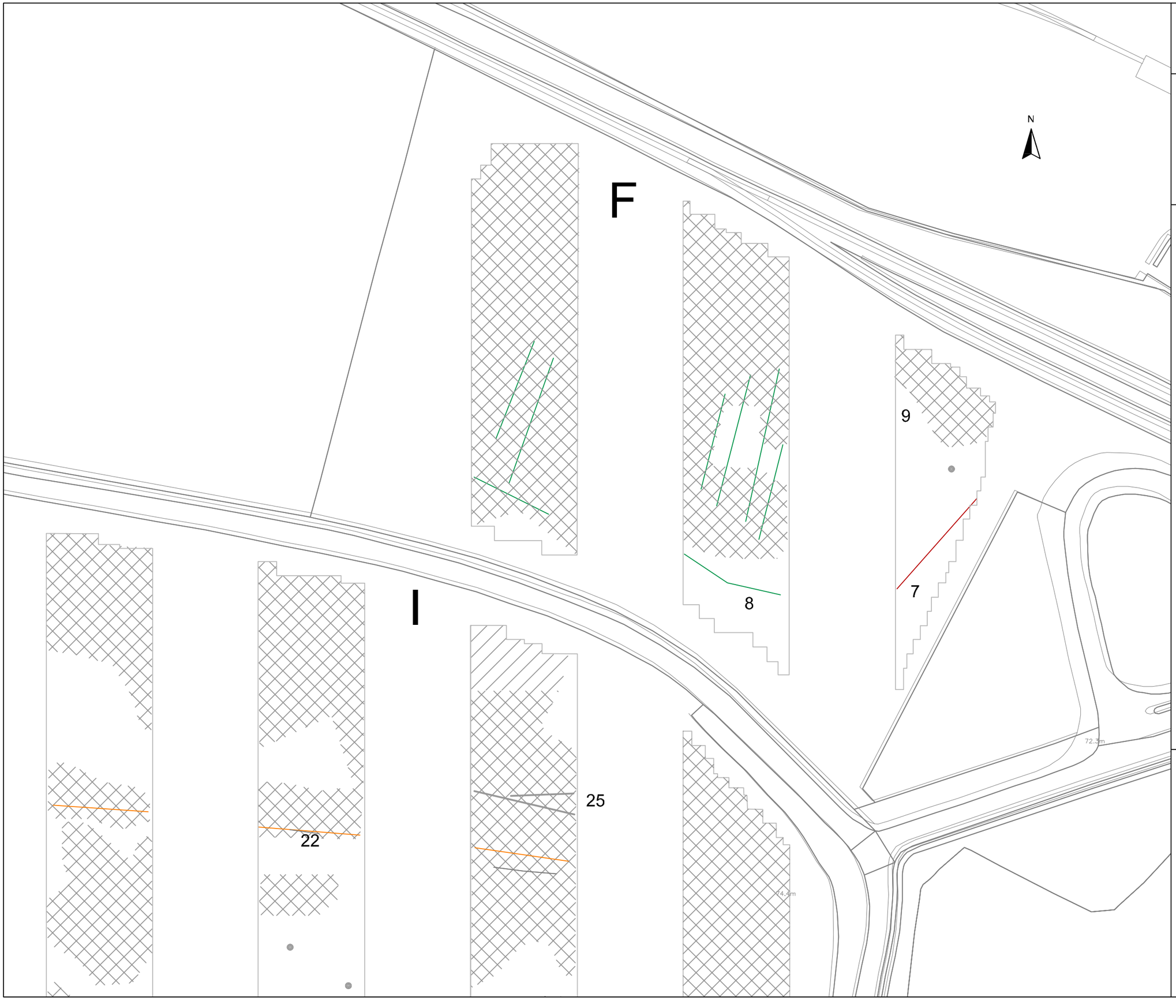
SCALE TRUE AT A3

FIG 09

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area F



- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

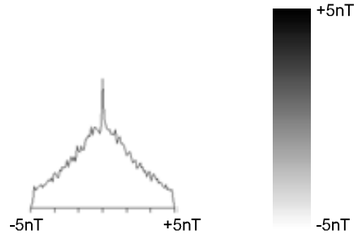
SCALE TRUE AT A3

FIG 10

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area G



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 11

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area G

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

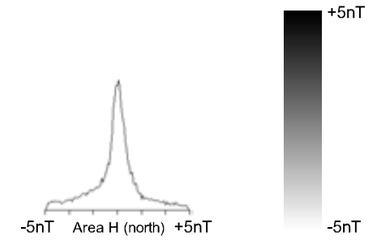
SCALE TRUE AT A3

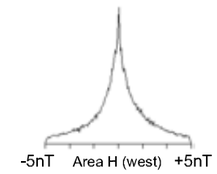
FIG 12

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area H (north and west)





SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 13

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area H (north & west)

- Positive linear anomaly - possible ditch-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 14

N

H (north)

H

H (west)

D

2 4 6 12 13 14 15 16 17 24

H (north)

H (east)

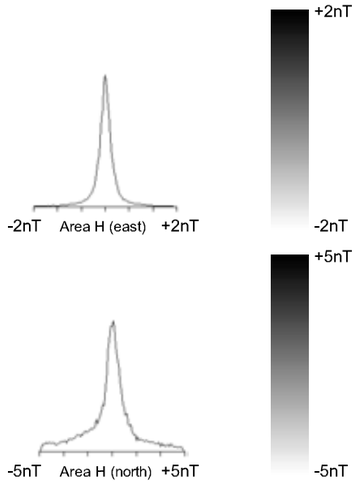
N

Targets

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven HIII

Greyscale plot of processed magnetometer data - Area H (east)



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 15

H (north)

H (east)

13

20

18

21

19

Targets

N

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area H (east)

- Positive linear anomaly - possible ditch-like feature
- Discrete positive response - possible pit-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

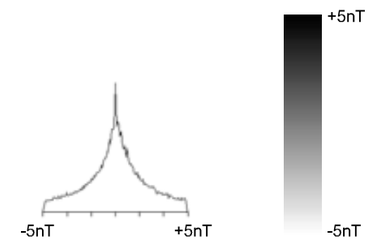
SCALE TRUE AT A3

FIG 16

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area I



N

76.6m

78.1m

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 17

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area I

- Positive linear anomaly - possible ditch-like feature
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

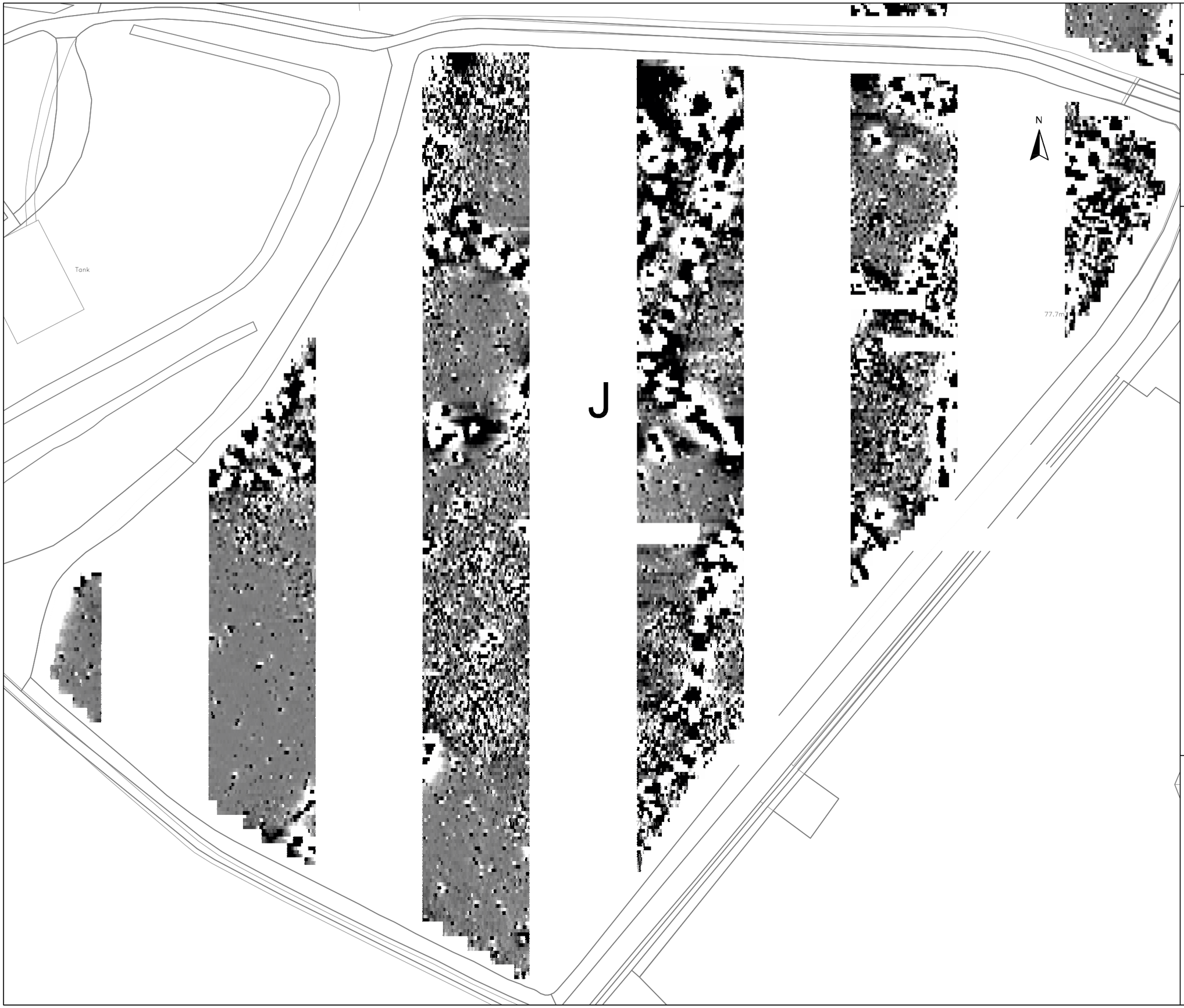
FIG 18

N

I

19 22 23 24 25 7 8

74.4m 76.6m 78.1m



Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Greyscale plot of processed magnetometer data - Area J

+5nT
-5nT
-5nT
+5nT

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 19

Archaeological Surveys Ltd

Geophysical Survey
MOD Bicester
Graven Hill

Abstraction and interpretation of magnetometer anomalies - Area J

- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 20

Appendix I
Landscape and Visual

I.1 Landscape and Visual Assessment Methodology

The methodology used for this Landscape and Visual Assessment is based on the 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) Second Edition, updated by the Landscape Institute, assisted by the Institute of Environmental Management and Assessment. The following sections summarise the approach taken.

Landscape Assessment

Landscape effects are defined as changes to landscape elements, characteristics, character and qualities of the landscape as a result of development and these may be judged adverse, neutral or beneficial.

Predicted landscape effects are considered under the following hierarchy.

- Landscape elements: introduction or removal of trees, vegetation and built elements that combine together to form landscape patterns.
- Landscape patterns: degradation or erosion of groups and arrangements of landscape elements forming patterns characteristic of landscape character types.
- Landscape character: the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, reflecting the combination of geology, landform, soils, vegetation, land use and settlement. Changes to some or all of these may occur due the construction and operation of the (proposed development), the magnitude of whose consequent landscape effects may be sufficient to alter the defined landscape character type(s) of a particular area.
- Cumulative landscape effects: resulting from additional changes to the landscape caused by the proposed development in conjunction with other proposed development (associated or separate from it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

The Landscape Assessment considers:

- The sensitivity of the affected landscape resource (high, medium or low).
- The type of effect (adverse, neutral or beneficial - temporary or permanent - direct or indirect).
- The predicted magnitude of effect (high, medium, low or negligible).

Consideration of the sensitivity of the landscape resource, in combination with the magnitude of change due to development, is fundamental to landscape assessment.

Landscape Sensitivity

Landscape Sensitivity has been determined by reference to the baseline assessment of the existing landscape and is categorised as 'high', 'medium' or 'low'. Table I1.1, below, summarises the criteria used in this categorisation. The definitions used in Table I1.1 are

derived from consideration of the existing (baseline) landscape resource (described in Chapter 11) as follows.

- Landscape condition: the state of repair of the elements and features of a particular landscape, their integrity and intactness and the extent to which its distinctive character is apparent.
- Landscape value: the relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality and condition, special qualities including perceptual aspects such as scenic beauty, tranquillity, or wilderness, cultural associations or other conservation issues including rarity.
- Landscape capacity: the ability of a particular landscape to absorb change without unacceptable adverse effects on its character. Capacity is likely to vary according to the type and nature of change being proposed.

Table I1.1 Landscape Sensitivity

Category	Criteria
High	Landscape of high sensitivity where in terms of landscape character, condition, and value, there is limited capacity to accommodate change and limited scope for mitigation, i.e. having: Valuable elements, features and land uses that combine to form an area of strong, positive and distinctive character. A landscape in a good condition that may also have some rarity and a low potential for replacement or mitigation. Exceptionally high or high value: protected at international or national level (World Heritage Site/National Park/AONB). The management objectives of these areas may be to conserve existing character. (However, some designated landscapes may also include areas of medium or low landscape sensitivity).
Medium	Landscape of medium sensitivity exhibiting positive character though with evidence of degradation/erosion of some elements and features, i.e. having: generally positive character, in reasonable condition, with some valuable elements and features, and/or evidence of degradation/erosion, with opportunities for replacement or mitigation; and medium value: protected at regional level (e.g. an Area of Special Landscape Importance) or at a non-designated local level where there is evidence of local value and use.
Low	Landscape of low sensitivity where in terms of landscape character, condition, and value, there is greatest scope for landscape change in the form of development, mitigation and/or enhancement, i.e. having: Poorly defined character, in poor condition, with a low incidence or absence of valuable elements or features. Change is unlikely to be negative, with scope for scope restoration, enhancement or the creation of a new landscape Low Value: non-designated landscape which may have some redeeming elements or features, where management objectives may be more focused on landscape enhancement.

In the Landscape Assessment, the level of significance attributed to landscape effects is a product of the landscape's sensitivity to change and the predicted magnitude of that change. The application of criteria and thresholds is based upon professional judgement. It is important to apply sensitivity criteria at an appropriate scale for the proposed development. For example, in some cases, where criteria are chosen to reflect nationally sensitive sites, such as designated National Parks or Areas of Outstanding National Beauty, it is possible that issues of local importance are under-emphasised. The opposite is also true. If the highest significance is assigned to nationally designated landscapes and the study area falls within one, the implied assumption would be that all of the land within that study area is of the highest sensitivity to change. This is would be incorrect and the sensitivity criteria should be altered accordingly.

Landscape Effects: Magnitude of change

To establish the magnitude of change the following criteria are considered.

- 'Land Take' to accommodate development, i.e. the extent of land but also its contribution (positive or negative) to the prevailing landscape character (i.e. consider the extent of land take and the how important it is in landscape terms.
- Loss or change in elements and features forming recognisable patterns that contribute to landscape character. The premise is that a 'feature' (for example a wooded hill top) is likely to be more important than an 'element', due to its prominence and hence more notable contribution to prevailing character).
- Predicted change to aesthetic perceptions for example 'tranquillity', e.g. due to vehicle, aircraft etc. noise/movement.
- Duration, for example seasonal variations due to natural changes in vegetation, changes due to land management, or periods of darkness, requiring site lighting.
- Whether change is temporary or permanent.
- Indirect or 'secondary' changes as set out above, which are not a direct result of the development, but are often produced away from it, for example, off site construction parking, a new road or footpath , leading to increased public access and associated problems, e.g. littering).

The magnitude of change is then defined as indicated in Table I1.2, below.

Table I1.2 Magnitude of Landscape Change

Magnitude of Change	
High	Change that may be large in scale and extent, including the loss of key landscape elements and features or the addition of new uncharacteristic elements or features, leading to a change in the overall landscape character.
Medium	Moderate change through the loss of valuable landscape elements or features or the addition of new uncharacteristic elements or features. Change may range from a notable change in landscape character over an extensive area to intensive change, over a more limited area.
Low	A low level of change typically affecting smaller areas of specific landscape character, including the loss of characteristic elements or features or the addition of new features or elements.
Negligible	A negligible level of change affecting small areas of landscape character and quality, including the loss of some landscape elements or the addition of features or elements which are either characteristic of the existing landscape or hardly noticeable.

Visual Assessment

Visual effects are a subset of landscape effects and are concerned wholly with the effect of the development on views, and the general visual amenity of people who will have views of the development. Visual effects may include the following.

- Visual obstruction: physical blocking of a view.
- Visual intrusion: the visual intrusion of the proposed development into an existing view or loss of particular landscape elements or features already present in the view.
- Cumulative visual effects: where more than one development may be viewed simultaneously from a viewpoint, or views occur sequentially where proposed development may be viewed from a number of differing locations, most commonly from a road, rail route or long distance path.

Criteria

Significance of visual effects is dependent on two factors.

- The sensitivity of the receptor to the identified effect.
- The magnitude of the predicted changes.

Visual Sensitivity

Based on the GLVIA, the different receptor categories are ranked according to their sensitivity to visual effects, as set out in Table I1.3, below.

Table I1.3 Sensitivity of Visual Receptors

Visual Receptor Categories	Sensitivity
Resident areas (settlements), isolated residential properties	High
Public Rights of Ways within the Areas of Special Landscape Importance	↓
Other Public Rights of Ways	↓
Schools/Hospitals	Medium
Public and Private Recreational Areas (where landscape appreciation is not prime purpose)	↓
Other Roads/Rail	↓
Offices/Industrial (i.e. places of work)	Low

It should be stressed that this table is indicative only as it would be impossible to rigidly tabulate sensitivity to change. This table has been considered carefully for this assessment and accounts for local conditions and sensibilities.

Visual Effects: Magnitude of Change

To establish the magnitude of visual change, the following factors are considered.

- Distance from receptors to the source(s) of the change.
- Extent of the area(s) over which change would be visible.
- Degree of change to existing views caused by the construction of an intrusive feature or the obstruction of an existing view, taking into account the agreed mitigation measures.
- Degree of contrast or integration of new development with the existing landscape, in terms of mass, scale, colour and texture.
- Frequency and ease with which the development may be viewed from a particular viewpoint taking into account seasonal factors such leaf loss and weather conditions.
- Angle of the main direction of the view and whether the development would be viewed against the skyline or a background landscape.
- Duration (whether temporary or permanent, intermittent or continuous) and seasonal changes, due to periodic management (e.g. hedge cutting or laying) and leaf loss.

To assist in the assessment of the Graven Hill and C Site proposals, and taking account of local receptors, the distance from the boundary of the proposed development has been sub-divided and defined as follows:

- ‘Close’ views - less than 750m.
- ‘Middle’ distance views- 750-1,500m.
- ‘Long’ distance views- over 1,500m.

The above factors are combined in order to judge the magnitude of visual effect for each individual or group of receptors. The magnitude of change is then categorised as ‘high’, ‘medium’, ‘low’ or ‘negligible’ as indicated in Table I1.4, below.

Table I1.4 Visual Effects: Magnitude of Change

Examples of Magnitude	
High	A major change or obstruction of a view that may be directly visible, appearing as a prominent feature and appearing in the foreground or the introduction of elements considered incongruous to the existing view that will become prominent and detracting component.
Medium	A moderate change or partial view of a new element within the view that may be readily noticed, directly or obliquely visible including glimpsed, partly screened or intermittent views, appearing as a noticeable feature in the middle ground. Introduction of incongruous elements within the view or increase in scale of negative elements already found within the view.
Low	A low level of change, affecting a small part of the view that may be obliquely viewed or partly screened and or appearing in the background landscape. May include moving views at speed. May include introduction elements found commonly or are considered in harmony within the view
Negligible	A small or intermittent change to the view that may be obliquely viewed and mostly screened and/or appearing in the distant background or viewed at high speed over short periods and capable of being missed by the casual observer.

Visual Envelope

The ‘Visual Envelope’ surrounding Graven Hill and C Site defines the approximate area from which the proposed development would, in each case, be potentially visible. Visual envelopes for both sites have been estimated by undertaking desk studies (interpretation of contours, mapping and aerial photography). Field studies have also been undertaken, visiting both sites and also publicly accessible areas surrounding the sites to ascertain the extent of potential views.

The approximate visual envelope also provides the study area, enabling initial identification of landscape elements, patterns, character and designations that may be affected by the proposed development, in addition to the identification of potential visual receptors.

Visual Envelopes have been prepared for the Graven Hill Site and C Site assuming the Operation (or ‘Occupation’) Phase, at completion of development (refer to Figure 11.3 and 11.20).

Due to topographical variation, the presence of intervening vegetation and existing development, there are areas within the visual envelope that will not experience views of the proposed development. Beyond the identified Visual Envelope, distances are such that the

development proposals would be barely perceptible and any effects are therefore scoped out of the assessment.

Photomontages and Photography

To produce accurate, high definition photomontages AMEC has adopted the following methodology, based upon the GLVIA, 'Visual Representation of Wind farms Good Practice Guidance' (2006) by Scottish Natural Heritage and latest advice from the Landscape Institute (Advice note 01/11March 2011):

- Photographs are taken using a wide angle lens to capture the view in one shot giving one point of perspective.
- A professional digital SLR camera and tripod are used, to ensure high quality images.
- A three dimensional model of the proposed development is created within AutoCAD and 3D Studio Max and the site photograph inserted as a background. A virtual camera is then accurately positioned in 3D space using OS coordinates in order to locate the model in the virtual landscape as it would be in reality. The accuracy of the position of the model against the background is ensured, by locating existing features within the landscape. The model is then rendered on to the background as either a 'wire frame' or 'solid' model.
- Through use of Adobe Photoshop, a composite digital image is created. During post-production work, the foreground of the image applied to the render to produce a realistic high quality image for the final print.

Assessment of Lighting Effects

The Assessment of nigh time lighting has taken into account the information provided on the assessment of lighting on landscape resources and visual receptors from the following sources:

- The GVLIA (Second Edition);
- Lighting in the Countryside: Towards Good Practice - Main Document, 1997. www.communities.gov.uk; and
- Guidance notes for the Reduction of Obtrusive Light. The Institution of Lighting Engineers. 2005 www.ile.org.uk.

The assessment of the predicted effects from the proposed development has been undertaken by assessing the existing lighting levels in the area of each site, identifying sensitive receptors, identifying the likely effects of the proposed development and assessing the significance of the effects. The baseline assessment included:

- a review of landscape features within or in close proximity to each site, including any relevant designations;
- an overview of 'dark landscapes' and existing lighting in the locality; and

- identification of potential visual receptors and their sensitivity to change in the levels of lighting.

The baseline provides a framework for determining the overall sensitivity of the area around each site and its capacity to accommodate lighting associated with the proposed development. The significance of effects from the night time change in lighting levels as a result of development has been determined using professional judgement, with reference to the sensitivity of the identified receptors and the predicted magnitude of change to existing levels of lighting.

The sensitivity assigned to differing receptors is as indicated previously. The magnitude of change is taken to be a combination of three components: light trespass, glare and sky glow. The Institution of Lighting Engineers offers these definitions:

- 'Sky glow, the brightening of the night sky above our towns, cities and countryside';
- 'Glare, the uncomfortable brightness of a light source when viewed against a dark background'; and
- 'Light Trespass, the spilling of light beyond then property or area being lit'.

In addition to effects on landscape character, when assessing lighting effects, the receptors listed at Table A1.3 have been considered, with the exception of users of countryside footpaths who have been scoped out on the basis that such footpaths will unused or very little used during hours of darkness.

In considering night time lighting, the sensitivity of residential receptors has been assessed as 'medium' as opposed to 'high' for other aspects of the assessment, with the exception of views where the viewpoint distance is sufficiently close to potentially experience light trespass and glare, as defined above.

As permission is sought for the proposed development only in outline, detailed consideration has not been given to the design of a lighting scheme for each site. However, it is recognised that any potential development of this scale has the potential to generate changes to the night time environment and therefore the chapter includes commentary on night time lighting effects.

Assessment of Significance

The approach to evaluating the significance of landscape and visual effects is illustrated by the matrix shown in Table I1.5, below. The table summarises the principle and basis for the application of professional judgement in determining the significance of an effect.

Table I1.5 Evaluation of Effects for Landscape and Visual Assessment

		Sensitivity			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	**High**	Substantial	Moderate / Substantial	Moderate	Slight / Moderate
	Medium	Moderate / Substantial	Moderate	Slight / Moderate	Slight
	Low	Moderate	Slight / Moderate	Slight	Negligible
	Negligible	Slight	Slight / Negligible	Negligible	Negligible
Key:		Significant in terms of the EIA Regulations			
		Not significant			

The 'Magnitude of Change' and 'Sensitivity' of landscape resource (or visual receptor) is combined in order to judge the predicted level of effect. The predicted landscape (or visual) effect is reported using seven descriptions ranging from 'substantial' to 'negligible'. Determining the 'threshold' at which an effect is potentially significant requires the application of systematic, consistent, professional judgement.

In terms of the *Town and Country Planning (Environmental Impact Assessment Regulations 2011 (SI No 1824)*, significant landscape and visual effects resulting from the proposed development are judged to be those effects likely to result in a 'substantial' or a 'moderate/substantial' effect. The remaining effects are considered not to be significant. In determining the threshold for significance the assessment has taken account of the likely sensitivity of visual receptors, the existing baseline landscape resource and inherent landscape capacity within the area to accept the proposed development.

I.2 Graven Hill: Evaluation of Significance, Landscape Effects

Table I2.1 Graven Hill: Evaluation of Significance, Landscape Effects - Construction

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Loss of agricultural land (pastoral fields)	Landscape elements	Adverse	Low	Medium	Slight/ Moderate	Not Significant	Loss of pastoral fields within the northern part of the Site and lower slopes of Graven Hill. The baseline indicates that whilst these elements are typical of the agricultural resource within the locality, they are common and do not contain elements or features considered high in value -and therefore are judged to be of low sensitivity.
	Landscape patterns	Adverse	Low	Low	Slight	Not Significant	The loss of c.33ha. of pastoral land (from the c. 49ha. of existing pastoral land within the 207ha site). Approximately 7.6ha of pastoral land within the north west part of the Site will remain in open use (as allotments and public open space) with hedgerows, trees and ponds incorporated within them. These changes will be too small a scale to change the prevalent landscape patterns in the Otmoor Lowlands. There will be a decrease in pastoral land associated with the wooded brow of Graven Hill (reduced from c. 45ha to c.19ha) although the woodland will remain surrounded by pastoral land. This will represent a small scale change in the Isolated Hills and Mixed Use landscape character type which has been identified as being of low sensitivity.
	Landscape character	Adverse	Medium	Low	Slight/ Moderate	Not Significant	Whilst the magnitude of change will be locally be high within the areas where pastoral fields are lost, the change in landscape character within this part of the Site will occur over a small proportion of the Site (c.33ha out of the c.207ha site and Isolated Hills and Mixed Use landscape character type)

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
							and an even smaller portion of Otmoor Lowlands landscape character area. Magnitude of change will therefore be low.
Loss of Woodland and Trees	Landscape Elements	Adverse	Medium	Low - Medium	Slight/ Moderate - Moderate	Not significant	A tree survey has been undertaken for the Site to BS 5837: 2005 which identifies the majority of woodland as Category 'B' with the Graven Hill woodland identified as Category 'A'(and Ancient semi natural woodland). There are numerous individual trees throughout the Site of varying categories (A, B and C). Whilst there are no trees on site covered by Tree Preservation, category A,B and C trees will be retained where possible. All Category A trees will be retained. Category R trees will be removed. The majority of Category B and C trees will be retained within the network of streets and the principal open spaces and green corridors, except where arboricultural investigation indicates disease or damage that over the course of the construction period necessitates their removal. There are instances where individual trees/groups lie outside of the network of streets and open spaces identified at this stage, typically within the areas identified for residential development on the indicative masterplan. These trees are not detailed on the masterplan but will be retained where possible. c. 57ha. of the existing c. 60ha. of woodland will be retained (including all of the Graven Hill woodland). Only a limited number of trees will potentially be removed and their loss is therefore judged a low to medium magnitude of change. The majority of individual trees located within the identified landscape framework will be retained.
	Landscape patterns	Adverse	Medium	Low	Slight/ Moderate	Not significant	There will be a small loss of woodland (c.6%) and individual as noted above trees and this will be too small-scale to alter prevalent landscape patterns. The characteristic Graven Hill

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
							wooded brow will be retained.
	Landscape Character	Adverse	Medium	Low	Slight/ Moderate	Not significant	The small scale loss of woodland and individual trees across the Site will not undermine the Otmoor Lowlands landscape character area or the Isolated Hills and Mixed Use landscape character type that the Site occupies.
Removal of military development (large and distinctive storage buildings, plus hardstanding areas and security fencing)	Landscape elements	Beneficial	Low	High	Moderate	Not significant	Large military buildings, hardstanding storage areas and security fencing currently extending around and across the Site will be removed. The baseline indicates that these elements are typical of the Isolated Hills and Mixed Uses landscape character type and have been identified as detracting features of the landscape. As such they are judged to be of low value and low sensitivity and effects associated with their removal are considered to be beneficial. Whilst other large scale buildings do exist throughout the Otmoor Lowlands landscape character area, the removal of such built form is considered to generate a high magnitude of change both within the landscape character type and landscape character area.
	Landscape patterns	Beneficial	Low	High	Moderate	Not significant	The loss of large scale military development across approximately 135ha of a 207ha site will generate a large scale change in the prevalent landscape patterns within Otmoor Lowlands landscape character area and Isolated Hills and Mixed Use landscape character type.
	Landscape Character	Beneficial	Medium	High	Moderate/ Substantial	Significant	The removal of military development will fundamentally alter defined Otmoor Lowlands landscape character area and Isolated Hills and Mixed Use landscape character type. The magnitude of change will be high and the effect will be beneficial.

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Introduction of new temporary elements during the construction phases including materials stockpiles, site compounds, security fencing, car parking, plant and vehicles within the Site	Landscape elements	Adverse	Medium	High	Moderate/ Substantial	Significant	Existing elements will be replaced with an increase in movement and the introduction of new, contrasting temporary elements across the Site. These elements are typically redolent of urban or urban fringe areas and as such will not be totally incongruous within the existing developed part of the Site (approximately 135ha). This part of the Site is considered to be of lower sensitivity to this type of activity. However the introduction of such elements within the northern and upper parts of the Site (existing agricultural land approximately 49.21ha in size) will increase complexity, reduce tranquillity and reduce the unity of existing landscape character within these parts of the Site. The magnitude of change is judged to be high, although occurring incrementally over localised areas of the Site as construction proceeds.
	Landscape patterns	Adverse	Medium	High	Moderate/ Substantial	Significant	There will be a reduction of existing landscape patterns through an increase in movement and the introduction of a new temporary and shifting pattern of elements. This will be most readily observed in the more open parts of the Site (upper slopes of Graven Hill). Whilst the majority of the existing site already experiences activity associated with its military use (associated with development, people, vehicles and plant) it is predicted that there will be increase activity that will generate a high magnitude of change in the prevalent landscape patterns across the Site.
	Landscape character	Adverse	Medium	High	Moderate/ Substantial	Significant	During the construction phases a new landscape character type will be introduced across the 207ha site and this will undermine the Otmoor Lowlands landscape character area.
Cumulative effects associated with the removal of elements and introduction of construction	Otmoor Lowlands Landscape Character Area (and Isolated Hills	Adverse	Medium	High	Moderate/ Substantial	Significant	The combined removal of military development (large scale and distinctive buildings and security fencing) and the introduction of construction elements and activities will bring with it a range of effects across the Site. Increases in movement and introduction of construction elements across the Site will have adverse effects; less so in the existing

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
elements and activities	and Mixed Use Landscape Character Type)						developed part of the Site and more so in the undeveloped parts of the Site. Overall the loss of large scale built elements combined with the introduction of construction activities across the 207ha site will fundamentally alter the key characteristics of Otmoor Lowlands landscape character area and Isolated Hills and Mixed Use landscape character type, that is, it will not be a military site as defined and will be replaced with a temporary landscape. The site will however predominantly remain as urban/urban fringe in type.
Cumulative effects associated with the removal of elements and construction activities	Area of High Landscape Value	Adverse	High	Negligible	Slight	Not significant	Effects on the setting and character of Area of High Landscape Value (to the south) will be indirect and associated with visibility. The visual assessment has concluded that there is little inter-visibility between the Site and this area, potential views being restricted to elevated parts of the designation on the north facing slopes of Muswell Hill, from where construction elements and activities will be barely discernable. Due to the very small extent of the designation that may be affected and the limited visual change associated with any views, the magnitude of change is judged negligible.

Table I2.2 Graven Hill: Evaluation of Significance, Landscape Effects - Operation

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Introduction of permanent elements and their operation	Otmoor Lowlands Landscape Character Area (and Isolated Hills and Mixed Use Landscape Character Type)	Beneficial	Medium	High	Moderate/ Substantial	Significant	The Otmoor Lowlands character area is judged to be a landscape of medium sensitivity with existing military development (large scale and distinctive buildings and security fencing) being detracting features of low value and sensitivity. The Isolated Hills and Mixed Uses landscape character type is considered to be of low sensitivity and has been identified by CHDC as a landscape in need of 'restoration'. Whilst there will be a slight increase in developed land, this will result in the implementation of a finer grain of landscape pattern and positive landscape and built elements (housing, trees, woodland, watercourses, waterbodies, etc). Characteristic views of the isolated hills will remain intact with views of the Graven Hill wooded brow retained. New development is characteristic of the nearby urban environment and will be set within a strong landscape framework. The removal of military development (large scale and distinctive buildings and security fencing) will lead to a fundamental change in one of the key characteristics of the Otmoor Lowlands landscape character area and a fundamental change for the Isolated Hills and Mixed Use landscape character type. Due to the location of graven hill on the outskirts of Bicester, lighting associated with buildings and roads within and around Bicester is already visible across the wider countryside. The proposed development will introduce new lighting which will be designed and located to minimise light pollution and avoid significant effects on the character of the landscape at night. There will be no lighting on the upper parts of the hill where this corresponds to the woodland and retained open space. Additional structural planting at the Site will, once mature, help mitigate glare. The adverse effects due to change in night time lighting will be outweighed by the

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
							overall beneficial effects due to redevelopment. In accordance with the CHDC identified strategy for 'restoration' of this site, it is judged that overall these changes will generate beneficial effects on both the character area and character type. The resulting magnitude of change is considered to be high.
Introduction of permanent elements and their operation	Area of High Landscape Value	Beneficial	High	Negligible	Slight	Not Significant	Night time lighting: refer above. Views from the Area of High Landscape Value to the south are confined to the elevated and north facing slopes of Muswell Hill. The removal of existing large storage buildings in the east of the Site and their replacement with predominantly smaller scale development (and finer grain of built elements - interspersed with open spaces and tree cover) that will be barely discernible at these distances will generate beneficial effects. Whilst existing buildings within the southern part of the Site will be replaced with built form that is similar in scale, it is predicted that overall effects will be beneficial and not significant.
Cumulative effects associated with the development of Land to the South and East of the A41	Landscape Character	Beneficial	Medium	Negligible	Slight / Moderate	Not significant	The Graven Hill Development will result in a change in one of the key characteristics of the Otmoor Lowlands landscape character area and a fundamental change in the Isolated Hills and Mixed Uses landscape character type. As noted above, on balance, these effects in isolation will be beneficial as this is already a developed site that has been identified as a landscape in need of restoration. The new business park will result in an increase in developed land around Bicester which is considered to be an adverse effect although it will introduce a land use that is typical of the rural urban fringe landscape associated with Bicester Village, garden centre, sewage works and the main transport corridors (rail and road) located immediately adjacent to both sites.

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
							There will be negligible additional changes to the landscape character area as a result.
Cumulative effects associated with Kingsmere/Bicester South West (Land At Whitelands Farm)	Landscape Character	Beneficial	Medium	Low	Slight / Moderate	Not significant	The new residential development will result in an increase in developed land around Bicester and within the Otmoor Lowlands landscape character area; and loss of an area of low lying arable farmland (to the south of Bicester). This will result in an adverse effect. The Graven Hill Development will result in a change in one of the key characteristics of the Otmoor Lowlands landscape character area and a fundamental change in the Isolated Hills and Mixed Uses landscape character type, although these effects in isolation will be beneficial as Graven Hill is already a developed site that has been identified by CHDC as a landscape in need of restoration. On balance the overall the additional changes to landscape character, resulting from the Kingsmere development, will result in a low magnitude of change.
Cumulative effects associated with the Evergreen 3 Oxford	Landscape Character	Beneficial	Medium	Negligible	Slight / Moderate	Not significant	The Graven Hill Development will result in a change in one of the key characteristics of the Otmoor Lowlands landscape character area and a fundamental change in the Isolated Hills and Mixed Uses landscape character type. These effects in isolation will be beneficial as this is already a developed site that has been identified as a landscape in need of restoration. Cumulative effects associated with diverted Langford Lane will result in a localised change in the landscape that will be similar to roads within the existing area and will be of such a small scale that the cumulative magnitude of change will be negligible.

I.3 Graven Hill: Evaluation of Significance, Visual Effects

Table I3.1 Graven Hill Evaluation of Significance, Visual Effects - Construction and Operation Phases

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Residential Receptors – within 750 metres						
Residents of Langford Park Farm (Refer to Photographic Viewpoint 1)	Adverse	High	High	Substantial	Significant	Construction Construction works associated with the northern part of Phase 1 will be in clear view from the outer farm premises and works associated with construction of the allotments and adjacent Public open space will be in clear view of the farmhouse. Structural planting will have been incorporated along the farm boundaries although it will not have had time to mature and offer any meaningful screening/filtering for Phase 1 works. Construction activities will form a prominent feature within the foreground of views to the south west from the farm house.
	Beneficial	High	Low	Moderate	Not Significant	Operation Views from the farmhouse are only available to the south-west and are dominated by the security fencing with filtered views through of the neighbouring fields and of overgrown/under managed field boundaries. They will be replaced with views across the allotments, SuDS surface water pond and public open space and will be heavily filtered through retained and proposed structural planting (managed hedgerow and trees). This is judged a beneficial change as elements will be introduced that are either found within the existing view or are in harmony with it. Existing security fencing, large scale military buildings and car parks that are dominant within views east from the outer farm premises (away from the farmhouse) will be replaced with views of primarily residential areas set beyond a new perimeter road and an area returned to field with a SuDS surface water pond. Built form will have moved further away from this property and views will

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						be heavily filtered through intervening retained and proposed structural planting (associated with the road and field). Overall this will result in a low magnitude of change that will not be significant for the residents of Langford Park Farm.
Residents within the southern part of Langford Village and within Bicester (Refer to Photographic Viewpoint 3)	Adverse	High	Negligible	Slight	Not significant	Construction The removal of the upper parts of vegetation associated with the A41 junction in Phase 1 may be visible but will be perceived as a small change in the background landscape.
	Adverse	High	Negligible	Slight	Not significant	Operation The upper parts of Graven Hill woodland and tree cover associated with the northern edge of the Site and the A41 are visible through and above intervening residential development within Langford Village. Views of the woodland will be retained and views new built form will not be available. There may be some minimal change evident due to removal of vegetation.
Residents of isolated farms to the south-east of Langford Village (Refer to Photographic and Photomontage Viewpoint 5)	Adverse	High	High	Substantial	Significant	Construction Construction elements and activities associated with Phase 2 will introduce new elements within the middle ground. Whilst the upper parts of the existing container storage area is clearly visible, there will be an increase in construction elements and activities across a wider area within views and these will form prominent features. Whilst structural planting will have been introduced in Phase 1 this will not have matured to offer meaningful screening/filtering.
	Beneficial	High	High	Substantial	Significant	Operation The upper parts of site containers form dominant and colourful elements that are incongruous in the existing view across agricultural fields. These elements are changeable with their heights and locations adding complexity to views. They will be replaced with residential built form interspersed with street tree planting, resulting in an adverse effect prior to maturation of landscape planting. Once planting is mature the effect will become beneficial when compared to the baseline.
Residents of Wretchwick Farm and adjacent	Adverse	High	High	Substantial	Significant	Construction Construction work associated with Phase 2 will form prominent elements with the foreground and middle ground of these views. Whilst structural planting will

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
properties (Refer to Photographic Viewpoint 8)	Beneficial	High	Medium	Moderate / Substantial	Significant	have been introduced in Phase 1 it will not have matured to provide meaningful screening/filtering. <u>Operation</u> Views of an existing large storage building on the outskirts of the Site where boundary vegetation is absent will be replaced with views of residential built form that is smaller in scale. This will introduce a finer grain of built elements that, interspersed with tree planting, will screen and filter views into the Site. These views will be reduced (heavily filtered) with the maturation of structural planting along the eastern boundary of the Site.
Residents within the western part of Ambrosden (Refer to Photographic and Photomontage Viewpoint 9)	Adverse	High	Medium	Moderate / Substantial	Significant	<u>Construction</u> Construction elements and activities within the eastern part of the Site (associated with Phases 1, 2 and 3) will be visible from the western edge of Ambrosden. The most prominent of these will be in Phase 2 (associated with the removal of large storage buildings and their replacement with residential development) where there will be an increase in construction elements and activities across a wider area within views, that will be readily noticeable features. Whilst structural planting will have been introduced in Phase 1 this will not have matured to offer meaningful screening/filtering.
	Beneficial	High	Medium	Moderate / Substantial	Significant	<u>Operation</u> Residents on the western edge of the village have open views across a large agricultural field towards the Site. A wide belt of tree and shrub vegetation screens views of the adjacent poultry farm and restricts open views into the eastern part of the Site. The upper parts of the large storage buildings located along the eastern edge of the Site form dominant and visual intrusive features within this panoramic view. The most prominent of these buildings are located within the right half of the view (with views of the Graven Hill wood and pastoral upper slopes behind). These visually intrusive buildings will be replaced with views of residential built form that is smaller in scale and will introduce a finer grain of built element that, interspersed with tree planting, will screen and filter views into the Site. These views will be reduced (heavily filtered) with the maturation of a new tree and shrub planting along the eastern boundary of the Site. Existing large scale buildings within the left half of the view will be replaced with built form similar in

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						type and scale and it is predicted that there will be little visual change within this part of the view. Whilst the proposed structural planting will heavily filter some views, the uppers parts of new built form located on higher slopes will potentially be visible. Existing views of Graven Hill wood and upper pastoral fields will be retained and overall, following the maturation of structural planting the magnitude of visual change will be medium for the residential properties located on the western part of the village.
Residents of Langford Lane on the western edge of the Site adjacent to the stables (Refer to Photographic Viewpoint 18)	Adverse	High	Medium	Moderate / Substantial	Significant	Construction Construction elements and activities located within the south-western part of the Site (associated with Phase 3 residential development) will form noticeable features in the middle ground, viewed above (and through) boundary vegetation. Structural planting will be introduced in Phase 1 and this will offer additional filtering of views at it matures.
	Beneficial	High	Medium	Moderate / Substantial	Significant	Operation Views into the Site will be limited by woodland (located within the Site) and dense hedgerows along the boundary. Existing views of the upper parts of large scale built form located within the south-west part of the Site and lightly filtered views of St David's Barracks are available to a small number of residential properties within the western part of this group of properties. These views extend across a neighbouring open agricultural field. Existing views of these large scale buildings will be replaced by filtered views of residential built form that is smaller in scale and will introduce a finer grain of built element within the view. New woodland planting, tree planting associated with streets and open spaces and structural planting will mature to further screen and heavily filter views into the Site and of the neighbouring St David's Barracks.
Residents of the Promised Land Farm	Adverse	High	Low	Moderate	Not significant	Construction The upper parts of construction activities associated with Phases 1 and 3 may be visible; forming small elements within the background landscape.
	Adverse	High	Negligible	Slight	Not significant	Operation The presence of intervening vegetation associated with field boundaries, a small stream corridor and woodland located within the western part of the Site predominantly screens views into the lower parts of the Site - with views being restricted to the upper parts of the Graven Hill woodland. Potential views of the

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						upper parts of large storage buildings will be removed and it is predicted that smaller scale residential built form that replaces these buildings will be heavily filtered and screened by intervening vegetation. Views of the wooded hill top will remain.
Residential Receptors – within 750 metres to 1500metres						
Isolated residential properties near Blackthorn Hill (Refer to Photographic Viewpoint 26)	Adverse	High	Medium	Moderate / Substantial	Significant	<u>Construction</u> Construction elements and activities within the eastern part of the Site (associated predominantly with Phase 2) will be visible. There will be an increase in construction elements and activities across a wide area that will be noticeable features within these views. Whilst structural planting will have been introduced in Phase 1 this will not have matured to offer meaningful screening/filtering.
	Adverse	High	Low	Moderate	Not significant	<u>Operation</u> A small number of Isolated residential properties have open views across a large agricultural field towards the Site. The upper parts of large storage buildings located along the eastern edge of the Site form dominant features within this panoramic view; with views of the Graven Hill wood and pastoral upper slopes behind. The majority of buildings will be replaced with views of residential development that is smaller in scale and will introduce a finer grain of built element interspersed with tree planting that will screen and filter views into the Site. These views will be reduced (heavily filtered) with the maturation of new tree and shrub planting along the eastern boundary of the Site. Existing large scale building within the left half of the view will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Whilst the proposed strengthening of structural planting will heavily filter some views, the uppers parts of new built form located on higher slopes will potentially be visible and will represent a slight increase in built form within the view. Existing views of Graven Hill wood and upper pastoral fields will be retained.
Residents of isolated farms to the south (near to Merton Road)	Adverse	High	Low	Moderate	Not significant	<u>Construction</u> The upper parts of construction elements and activities within the southern part of the Site associated with Phases 2 and 3 will potentially be partly visible,

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
(Refer to Photographic Viewpoint 14)	Beneficial	High	Low	Moderate	Not significant	forming small elements within the background landscape. Operation Existing open views are available across large scale agricultural fields towards the wooded top and upper pastoral fields of Graven Hill. The upper parts of large storage buildings located within the southern part of the Site are potentially visible although existing woodland and scrub along the southern part of the Site screens the majority of built form within this area. The replacement of these storage buildings with built form similar in scale, type and location will result in little visual change although the proposed strengthening of existing vegetation with additional tree and woodland cover (structural planting within Phase 1) will reduce views of built form further.
Residents associated with Merton Grounds (Refer to Photographic Viewpoint 17)	Adverse	High	Low	Moderate	Not significant	Construction Construction activities within the southern and western parts of the Site associated with Phases 2 and 3 will be partly visible either above or lightly filtered through existing vegetation and maturing structural planting introduced in Phase 1. These will form small yet noticeable elements within the background landscape and will be viewed in context of the adjacent St David's Barracks.
	Beneficial	High	Low	Moderate	Not significant	Operation A small number of residents experience existing open views are across agricultural fields towards the Site. The upper parts of a small number of large buildings located within the southern and western part of the Site are visible above and lightly filtered through thinning boundary vegetation. Built form associated with St David's Barracks is dominant within the view. The replacement of large scale built form in the western part of the Site with smaller scale residential development will introduce a finer grain of built element within the view. New woodland planting, tree planting associated with streets and open spaces and boundary planting will mature to further screen and heavily filter views into the Site. The replacement of storage buildings within the southern part of the Site with built form similar in scale, type and location will result in little visual change although the proposed strengthening of existing vegetation with additional tree and woodland cover will reduce views of built form further. The views of St David's Barracks and the woodland on Graven Hill

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						will remain.
Residents of isolated farms to the south-west (near Wendlebury)	Adverse	High	Low	Moderate	Not significant	Construction Construction activities within the south-western part of the Site associated with Phase 3 will be partly visible above (or filtered through) a combination of new structural planting and existing boundary planting. The upper parts of these elements and activities will form small elements within the background landscape and will be viewed in context of St David's Barracks.
	Beneficial	High	Low	Moderate	Not significant	Operation Existing open views are available across agricultural fields towards the wooded top of Graven Hill and the upper pastoral fields within St David's Barracks. The upper parts of a small number of large buildings located within the south western part of the Site, as well as the upper parts of St David's Barracks, are visible above and beyond existing woodland, scrub and hedgerows associated with the southern part of the Site and intervening field boundaries. This vegetation heavily filters/screens development within the southern part of the Site. Existing views of these large scale buildings will be replaced by filtered views of residential built form that is smaller in scale and will introduce a finer grain of built element within the view. New woodland planting, tree planting associated with streets and open spaces and boundary planting will mature to further screen and heavily filter views into the Site and to the neighbouring St David's Barracks. Views of Graven Hill wood and upper pastoral fields will remain.
Residential Receptors – over 1,500 metres						
Residents to the north-east near Poundon Hill and on the western edge of Marsh Gibbon (Refer to Photographic Viewpoint 7)	Adverse	High	Negligible	Slight	Not significant	Construction Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
	Adverse	High	Negligible	Slight	Not significant	Operation A number of isolated residential properties associated with the elevated areas near Poundon Hill experience panoramic views across a predominantly low lying agricultural landscape. Within these views the isolated hills of Graven Hill, Arncott Hill and Muswell Hill form focal points (with woodland and pastoral fields occupying the brow and upper slopes) and the large scale storage sheds

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						associated with the eastern edge of Bicester form dominant elements. The upper parts of large storage buildings associated with the eastern and western parts of the Graven Hill site are noticeable due to their light colour and scale; whilst the small scale development both within the Site and associated with Bicester is barely perceptible. Existing large storage buildings within the eastern and western parts of the Site (currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, and represent an increase in built form within the view. However this will be barely discernible at this distance. The wooded hill top and upper pastoral fields will remain visible.
Residents within Upper Arncott (Refer to Photographic Viewpoint 11)	Adverse	High	Negligible	Slight	Not significant	<u>Construction</u> Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
	Beneficial	High	Low	Moderate	Not significant	<u>Operation</u> A number of residential properties located within the upper parts of Upper Arncott experience panoramic views across the predominantly low lying agricultural landscape, the lower parts of Arncott and the neighbouring MOD C Site, towards Graven Hill. Within these views Graven Hill, with its wooded brow and upper pastoral fields forms a focal point. The large storage buildings located within the eastern and southern parts of the Site form noticeable elements due to their light colour and scale. From these elevated areas it will be possible to view the large scale buildings located within the eastern part of Bicester and residential properties associated with Ambrosden. Existing large storage buildings within the eastern part of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, and that will be less visually intrusive than the existing large built form when viewed at these distances. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Due to the elevated location of these receptors, proposed boundary planting will not fully screen views into the Site. The wooded hill top and upper pastoral fields will remain visible.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Residents near Muswell Hill (Refer to Photographic Viewpoint 12)	Adverse	High	Negligible	Slight	Not significant	Construction Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
	Beneficial	High	Negligible	Slight	Not significant	Operation A number of isolated residential properties associated with Muswell Hill experience panoramic views across a predominantly low lying agricultural landscape. From these vantage points the most noticeable features are Arncott Hill and a number of large scale storage buildings that are scattered across the panoramic view. The Graven Hill woodland is discernible as are the large storage buildings associated with the eastern part of the Site (due to their light colour and scale). Existing large storage buildings within the eastern part of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, and will be barely discernible at these distances. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Due to the elevated location of these receptors, proposed boundary planting will not fully screen views into the Site. The wooded hill top and upper pastoral fields will remain visible.
Residents within the northern part of Merton (Refer to Photographic Viewpoint 15)	Adverse	High	Low	Moderate	Not significant	Construction Construction activities within the southern and far western part of the Site will form small yet noticeable elements within the background landscape, viewed above or lightly filtered through existing and new structural landscape (introduced within Phase 1).
	Beneficial	High	Low	Moderate	Not significant	Operation A number of residents on the northern edge of Merton experience views across large scale agricultural fields to the upper parts of large storage buildings (within the southern and far western part of the Site) and to St David's Barracks, above intervening vegetation. The wooded hilltop at Graven Hill is also visible. The replacement of large scale buildings within the western part of the Site with smaller scale residential built form will introduce a finer

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						grain of built form that will be screened and heavily filtered by existing and proposed vegetation (associated with the strengthening of the boundary woodlands and additional tree cover within the Site). Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view.
Residents within northern part of Charlton-on-Otmoor	N/A	High	None	None	Not significant	Construction Construction activities will not be visible.
(Refer to Photographic Viewpoint 16)	N/A	High	None	None	Not significant	Operation The upper parts of Graven Hill woodland are visible above intervening vegetation associated with field boundaries and woodlands within the flat agricultural landscape. Views of the woodland will be retained and views of built form will not be available.
Isolated residents near Bucknell (Refer to Photographic Viewpoint 25)	Adverse	High	Negligible	Slight	Not significant	Construction Construction elements and activities will be visible at long distance and will form small and barely perceptible elements within the view.
	Adverse	High	Negligible	Slight	Not significant	Operation A number of isolated residential properties associated with the elevated areas near Bucknell experience panoramic views across a predominantly low lying agricultural landscape. Within these views Graven Hill forms a noticeable element (with the upper parts of Arncott Hill and Muswell Hill visible beyond Graven Hill). The upper parts of a storage building associated with the northern part of the Site is visible due to its light colour and scale and is viewed in context of other large buildings on the edge of Bicester. The replacement of this building with residential built form that is smaller in scale will introduce a finer grain of built form interspersed with tree cover and new boundary planting. Whilst there will be an increase in built form within the view it will be barely discernible at these distances and the Graven Hill wooded hill top and upper pastoral fields will remain visible.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Users of Public Rights of Way and Public Open Space						
Users of public footpaths near Middle Wretchwick Farm (Refer to Photographic Viewpoint 5).	Adverse	High	High	Substantial	Significant	Construction Construction elements and activities associated with Phase 2 will introduce new elements within the middle ground. Whilst the upper parts of the existing container storage area is clearly visible, there will be an increase in construction elements and activities across a wider area within views from these footpaths and these will form prominent features. Whilst structural planting will have been introduced in Phase 1 this will not have matured to offer meaningful screening/filtering.
	Beneficial	High	High	Substantial	Significant	Operation Users of some sections of public footpath network near Middle Wretchwick Farm experience views into the northern part of the Site where site boundary planting (tree and shrub belts along the A41) are absent. The upper parts of site containers form dominant and colourful elements that incongruous to the existing view across agricultural fields. These elements are changeable with their heights and locations adding complexity to views. They will be replaced with residential built form interspersed with street tree planting (aligned along the contours of the hill) and a new woodland belt along the periphery of the Site. . Once planting is mature the effect will become beneficial when compared to the baseline
Users of public footpaths and bridleways to the south of the Site (near Langford and Merton) (Refer to Photographic Viewpoint 17)	Adverse	High	Low	Moderate	Not significant	Construction Construction elements and activities located within the southern and western parts of the Site (associated with Phases 2 and 3) will be visible for users of footpaths to the south extending from the small settlement of Launton to Merton and Merton Road The nature of these views varies with distance from the Site. From the closest sections of footpath construction elements and activities located within the south-western part of the Site (associated with Phase 3 of the residential development) will form small yet readily noticeable features in the middle ground, viewed above (and through) boundary vegetation. Structural planting will be introduced in Phase 1 and this will offer additional filtering of views. As the footpath moves further from Langford the construction activities within the

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						southern and far western part of the Site (associated with Phases 2 and 3) will form small yet noticeable elements within the background landscape, viewed above or lightly filtered through existing and new structural landscape (introduced within Phase 1). Overall magnitude of change is predicted to be low
	Beneficial	High	Low	Moderate	Not significant	<u>Operation</u> The nature of views again varies with distance from the Site. From the closest sections, views into the Site are limited by woodland (located within the Site) and dense hedgerows along the boundary. There are existing views of the upper parts of large scale buildings located within the south-west part of the Site and lightly filtered views towards St David's Barracks. Existing views of these large scale buildings will be replaced by filtered views of residential built form that is smaller in scale and will introduce a finer grain of built element within the view. New woodland planting, tree planting associated with streets and open spaces and structural planting will mature to further screen and heavily filter views into the Site and those to the neighbouring St David's Barracks. For the majority of the footpath network, as it moves further south, only the upper parts of large storage buildings (within the southern and far western part of the Site) and St David's Barracks are currently visible above intervening vegetation, along with views of the wooded hill. The replacement of large scale buildings within the western part of the Site with smaller scale residential built form will introduce a finer grain of built form that will be screened and heavily filtered by existing and proposed vegetation (associated with the strengthening of the boundary woodlands and additional tree cover within the Site). Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view.
Users of public footpaths to the south of Launton (Refer to Photographic Viewpoint 6)	Adverse	High	Low	Moderate	Not significant	<u>Construction</u> Construction elements and activities associated with Phase 2 will introduce new elements within the background landscape. The upper parts of the existing container storage area are noticeable from a small section of public footpath crossing the railway. This is principally due to elevation and the lack of intervening vegetation. Whilst there will be an increase in construction elements

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						and activities across a wider area of the Site (notably on the slopes of the hill) from this small section of footpath, the presence of intervening vegetation will restrict views from the lower lying section of footpath.
	Adverse	High	Low	Moderate	Not significant	<u>Operation</u> Users of some sections of public footpath network to the south of the village will experience views into the northern part of the Site where site boundary planting (tree and shrub belts along the A41) are absent, along with views to the upper slopes of Graven Hill. Within these views the upper parts of site containers and pastoral slopes of Graven Hill form small yet noticeable elements across the agricultural landscape. The introduction of new residential development will be noticeable below the wooded brow of Graven Hill although this will be interspersed with street tree planting (aligned along the contours of the hill) that will help filter views. These views are restricted to a small section of elevated footpath as it crosses the railway line. Views from lower lying section of footpath are likely to be restricted by intervening vegetation.
Users of public footpaths east of Wendlebury	Adverse	High	Low	Moderate	Not significant	<u>Construction</u> Construction activities within the south-western part of the Site associated with Phase 3 will be partly visible above (or filtered through) a combination of new structural planting and existing boundary planting. The upper parts of these elements and activities will form small elements within the background landscape and will be viewed in context of St David's Barracks. These views occur from short sections of the footpath network where there is an absence of intervening vegetation associated with field boundaries or views are across large fields.
	Beneficial	High	Low	Moderate	Not significant	<u>Operation</u> Existing open views are available across agricultural fields towards the wooded top of Graven Hill and the upper, open spaces within St David's Barracks. The upper parts of a small number of large buildings located within the south western part of the Site, as well as the upper parts of St David's Barracks, are visible above and beyond existing woodland, scrub and hedgerows associated with the southern part of the Site and intervening field boundaries. This vegetation heavily filters/screens development within the southern part of the Site. Existing views of

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						these large scale buildings will be replaced by filtered views of residential built form that is smaller in scale and will introduce a finer grain of built element within the view. New woodland planting, tree planting associated with streets and open spaces and boundary planting will mature to further screen and heavily filter views into the Site and to the neighbouring St David's Barracks. Views of Graven Hill Wood and upper pastoral fields will remain. These views will occur from a short section of the footpath network where there is an absence of intervening vegetation associated with field boundaries.
Users of the public footpath north-east of Chesterton (Refer to Photographic and Photomontage Viewpoint 23)	Adverse	High	Low	Slight/Moderate	Not significant	<u>Construction</u> Users of this public footpath will experience oblique views across open agricultural land towards the Site. Construction activities located within the western and northern parts of the Site (associated with Phase 1 and 3) will be visible.
	Adverse	High	Low	Slight/Moderate	Not significant	<u>Operation</u> There will be an increase in the extent of built form within these oblique views although it will be small in scale and interspersed with tree cover associated with streets and open space. The view to Graven Hill and upper pastoral fields will be retained.
Users of the public bridleway near Blackthorn Hill (Refer to Photographic Viewpoint 26)	Adverse	High	Low	Moderate	Not significant	<u>Construction</u> Construction elements and activities within the eastern part of the Site (associated predominantly with Phase 2) will be visible. There will be an increase in construction elements and activities across a wide area that will introduce readily noticeable features within the view. Whilst structural planting will have been introduced in Phase 1 this will not have matured to offer fully effective screening/filtering. These views will occur from a short section of bridleway.
	Adverse	High	Low	Moderate	Not significant	<u>Operation</u> Open views will occur from short sections of the bridleway across a large agricultural field towards the Site. The upper parts of large storage buildings located along the eastern edge of the Site form dominant features within this

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						panoramic view; with views of the Graven Hill wood and pastoral upper slopes behind. The majority of buildings will be replaced with views of residential built form that is smaller in scale and will introduce a finer grain of built element that, interspersed with tree planting, will screen and filter views into the Site. The views will be reduced (heavily filtered) with the maturation of new tree and shrub planting along the eastern boundary of the Site. Existing large scale buildings within the left half of the view will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Whilst the proposed strengthening of structural planting will heavily filter some views the uppers parts of new built form located on higher slopes will potentially be visible and will represent a slight increase in built form within the view. Existing views of Graven Hill wood and upper pastoral fields will be retained.
Users of public bridleway near Bucknell (Refer to Photographic Viewpoint 25)	Adverse Adverse	High High	Negligible Negligible	Slight Slight	Not significant Not significant	<u>Construction</u> Construction elements and activities will be visible at long distance and will form small and barely perceptible elements within the view. <u>Operation</u> Short sections of the bridleway (associated with the elevated areas near Bucknell) experience panoramic views across a predominantly low lying agricultural landscape. Within these views Graven Hill forms a noticeable element (with the upper parts of Arncott Hill and Muswell Hill visible beyond Graven Hill). The upper parts of a storage building associated with the northern part of the Site is visible due to is light colour and scale and is viewed in context of other large buildings on the edge of Bicester. The replacement of this building with residential built form that is smaller in scale will introduce a finer grain of built form interspersed with tree cover (and new boundary planting. Whilst there will be an increase in built form within the view it will be barely discernible at these distances. The Graven Hill wooded hill top and upper pastoral fields will remain visible.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Users of public footpaths near Poundon Hill and Marsh Gibbon (Refer to Photographic Viewpoint 7)	Adverse	High	Negligible	Slight	Not significant	<u>Construction</u> Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view. <u>Operation</u> There are panoramic views across a predominantly low lying agricultural landscape occur from short sections of public footpath including the Cross Bucks Way (near Poundon Hill). Within these views the isolated hills of Graven Hill, Arncott Hill and Muswell Hill form focal points (with woodland and pastoral fields occupying the brow and upper slopes) and the large scale storage sheds associated with the eastern edge of Bicester form dominant elements. The upper parts of large storage buildings associated with the eastern and western parts of the Graven Hill site are noticeable due to their light colour and scale. The small scale development both within the Site and associated with Bicester is barely perceptible. Existing large storage buildings within the eastern and western parts of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, but resulting in an increase in built form within the view. However this will be barely discernible at this distance and the wooded hill top and upper pastoral fields will remain visible.
Users of public bridleway west of Arncott	Adverse	High	Low	Moderate	Not significant	<u>Construction</u> Construction elements and activities located within the eastern part of the Site will be viewed at long distance and will form small elements within the view.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
(Refer to Photographic Viewpoint 10)	Beneficial	High	Low	Moderate	Not significant	Operation Users of sections of bridleway located to the west of Arncott experience panoramic views across the predominantly towards Graven Hill, viewed above a low cut hedgerow. Within these views Graven Hill forms a focal point, with its wooded brow and upper pastoral fields. The large storage buildings located within the eastern part of the Site form noticeable elements due to their light colour and scale. Existing large storage buildings within the eastern part of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, and that will be less visually intrusive than the existing large built form when viewed at these distances. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. The wooded hill top and upper pastoral fields will remain visible.
Users of public footpaths near Upper Arncott and Arncott Hill	Adverse	High	Negligible	Slight	Not significant	Construction Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
(Refer to Photographic Viewpoint 11)	Beneficial	High	Low	Moderate	Not significant	Operation Users of a short section of public footpath located within the upper parts of Upper Arncott and Arncott Hill experience panoramic views across the predominantly low lying agricultural landscape, and the lower parts of Arncott and the neighbouring MOD C Site, towards Graven Hill. Within these views Graven Hill forms a focal point, with its wooded brow and upper pastoral fields, and the large storage buildings located within the eastern and southern parts of the Site form noticeable elements due to their light colour and scale. From these elevated areas it will be possible to view the large scale buildings located within the eastern part of Bicester and residential properties associated with Ambrosden. Existing large storage buildings within the eastern part of the Site (which are

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, and that will be less visually intrusive than the existing large built form when viewed at these distances. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Due to the elevated location of these receptors, proposed boundary planting will not fully screen views into the Site. The wooded hill top and upper pastoral fields will remain visible.
Public footpaths near Muswell Hill (Refer to Photographic Viewpoint 12)	Adverse	High	Negligible	Slight	Not significant	<u>Construction</u> Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
	Beneficial	High	Negligible	Slight	Not significant	<u>Operation</u> Users of sections of footpath associated with Muswell Hill experience panoramic views across a predominantly low lying agricultural landscape. From these vantage points the most noticeable features are Arncott Hill and a number of large scale storage buildings that are scattered across the panoramic view. The Graven Hill woodland is discernible as are the large storage buildings associated with the eastern part of the Site (due to their light colour and scale). Existing large storage buildings within the eastern part of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover and will be barely discernible at these distances. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. Due to the elevated location of these receptors, proposed boundary planting will not fully screen views into the Site. The wooded hill top and upper pastoral fields will remain visible.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Users of the local road network and M40						
Users of the A41 network to the north (Refer to Viewpoint 2)	Adverse	Low	High	Moderate	Not significant	<u>Construction</u> Assuming the requirement for A41 road improvement that incorporates widening of the existing carriageway and creation of a new verge on the south side, some roadside vegetation will be removed. The removal of vegetation along the southern section of the A41 (between the Esso roundabout and the Site access roundabout will open up views into the Site from users of the A41 eastwards). Sections of this road are elevated resulting in open views into the Site of construction activities in the western and northern parts of the Site (associated with Phases 1, 2 and 3). They will form noticeable elements within the background, middle ground then foreground as drivers near the Site from the Esso roundabout. Overall the magnitude of change will be high.
	Beneficial	Low	Low	Slight	Not significant	<u>Operation</u> Existing glimpsed views (through small gaps in A41 planting) of the Graven Hill woodland and upper slopes and upper parts of large storage buildings will be replaced with open views of new residential built form located within the northern and western parts of the Site. There will be an increase in built form within the view although this will be of a smaller scale, interspersed between new tree planting associated with streets and open spaces; views of the Graven Hill wooded brow and upper pastoral fields will be retained. Structural planting (along with replacement planting on the A41) will mature to screen views of the Site with potential glimpsed views retained at bridge or access points. Overall the magnitude of change will be low.
Users of the Ploughley Road and Merton Road (Refer to Photographic Viewpoint 8 and 14)	Adverse	Low	Low	Slight	Not significant	<u>Construction</u> Users of Ploughley Road will experience only glimpsed views of construction activities within the eastern part of the Site (associated with Phase 2) through gaps in dense hedgerows. Whilst these views are at close distance they are glimpsed at speed and the magnitude of change is predicted to be low. Users of Merton Road will experience glimpsed views (above hedgerows

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						managed to a low height) of construction activities within the southern part of the Site, associated with Phases 2 and 3. The upper parts of construction elements will potentially be partly visible forming small elements within the background landscape.
	Beneficial	Low	Low	Slight	Not significant	Operation Users of Ploughley Road will experience glimpsed views of new residential development located within the eastern part of the Site; heavily filtered/screened behind structural planting once matured. Whilst these views are at close distance they are glimpsed at speed and the magnitude of change is predicted to be low. For users of Merton Road, existing glimpsed views are available across large scale agricultural fields towards the wooded top and upper pastoral fields of Graven Hill. The upper parts of large storage buildings located within the southern part of the Site are intermittently visible although existing woodland and scrub along the southern part of the Site screens the majority of built form within this area. The replacement of these storage buildings with built form similar in scale, type and location will result in little visual change although the proposed strengthening of existing vegetation with additional tree and woodland cover (structural planting within Phase 1) will reduce views of built form further.
Users of local lanes to the west and south-west (including Langdon Lane) (Refer to Photographic Viewpoint 19 and 22)	Adverse	Low	Low	Slight	Not significant	Construction Users of the local road network to the west of the Site will experience glimpsed views of the Site through a small of number of gaps in hedgerows (access points) and along the road where aligned towards the Site. The upper parts of construction elements located within the more elevated areas of the northern, western and southern parts of the Site will be visible (associated with Phases 1 and 3). More localised views will also occur often filtered through intervening vegetation.
	Adverse	Low	Low	Slight	Not significant	Operation Glimpsed views will be available of new residential built form located within the more elevated areas of the Site although these views will be intermittent. The view of Graven Hill Woodland will be retained.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Users of the A4095 (Refer to Photographic and Photomontage Viewpoint 23)	Adverse	Low	Low	Slight	Not significant	Construction Users of the A4095 will experience oblique views across open agricultural land towards the Site. Construction activities located within the western and northern parts of the Site (associated with Phase 1 and 3) will be visible.
	Adverse	Low	Low	Slight	Not significant	Operation There will be an increase in the extent of built form within the oblique views from the A4095 although it will be small in scale and interspersed with tree cover associated with streets and open space. The view to Graven Hill and upper pastoral fields will be retained. These views will be oblique.
Users of the M40 and nearby road network (Refer to Photographic Viewpoints13, 20, 21 and 23)	Adverse	Low	Low	Slight	Not significant	Construction The site will be visible from stretches of the M40 and from the wider local road network. Users on roads closest to the Site (Viewpoints 20 and 21) will experience views of construction activities within the western parts of the Site (associated with Phases 1 and 3). They will form small but noticeable elements within the background landscape. For users of roads further a field (Viewpoints 13 and 21) whilst the Graven Hill woodland forms a focal point within the views, the rest of the Site and associated construction activities will be barely perceptible.
	Adverse	Low	Low	Slight	Not significant	Operation The upper parts of new residential development will be visible although this will be of a scale and finer grain than current development (interspersed with tree cover associated with streets and open spaces). Views of the Graven Hill woodland and upper slopes will be retained.
Employees/places of work						
Bicester Avenue (Refer to Photographic Viewpoint 19 and 22)	Adverse	Low	Low	Slight	Not significant	Construction Employees of Bicester Avenue to the north-west of the Site will experience glimpsed views of the Site through vegetation associated with the Bicester Avenue boundary and car park area. The upper parts of construction activities

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						located within the more elevated areas of the northern, western and southern parts of the Site will be visible (associated with Phases 1 and 3) although visible over small parts of the Site and often filtered through intervening vegetations.
	Adverse	Low	Low	Slight	Not significant	Operation Glimpsed views will be available of new residential built form located within the more elevated areas of the Site although these views will intermittent. The view of Graven Hill Woodland will be retained.
Users of St David's Barracks	Adverse	Low	High	Moderate	Not Significant	Construction Construction works located within the western part of the Site associated with Phase 3 will be in clear view of the barracks with existing tree and shrub groups lightly filtering views. Existing views of buildings, container storage, circular road and car parks will be replaced with views of construction fencing and activities that will form prominent features within the foreground.
	Beneficial	Low	Medium	Slight/Moderate	Not Significant	Operation Existing views of military buildings, container storage and car parks will be replaced by views of built form that is smaller in scale interspersed with tree planting. Existing planting will be strengthened and this will mature, to screen and filter views into the Site. Views to the south-west and south will predominantly remain unchanged although the circular road will be improved and traffic is likely to increase.
Cumulative Visual Effects – Land To The South Of the A41						
Users of the A41 network to the north (Refer to Viewpoint 2)	Adverse	Low	High	Moderate	Not significant	Construction Assuming the requirement for A41 road improvement that incorporates widening of the existing carriageway and creation of a new verge on the south side, some roadside vegetation will be removed. The removal of vegetation along the southern section of the A41 (between the Esso roundabout and the Site access roundabout will open up views into the Site from users of the A41 eastwards). Sections of this road are elevated resulting in open views into the Site of construction activities in the western and northern parts of the Site (associated

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						with Phases 1, 2 and 3). They will form noticeable elements within the background, middle ground then foreground as drivers near the Site from the Esso roundabout.
	Beneficial	Low	Low	Slight	Not significant	Operation Users of the A41 with existing glimpsed views (through small gaps in A41 planting) of the Graven Hill woodland and upper slopes and the upper parts of large storage buildings will be replaced with open views of the new business park and the Graven Hill residential built form located within the northern and western parts of the Site and views across the new business park (Land To The South OF The A41). There will be an increase in built form within the view although views of the Graven Hill wooded brow and upper pastoral fields will be retained as the new business park is located at a lower level that the A41. Structural planting (along with replacement planting on the A41) will mature to screen views of the both sites with potential glimpsed views retained at bridge or access points.
Cumulative Visual Effects – Kingsmere/Bicester South West						
Users of the local road network - A4095 and B4030) (Refer to Photographic Viewpoints 23 and 24)	Adverse	Low	Low	Slight	Not significant	Construction The latter stages of construction activities associated with Kingsmere/Bicester will overlap with Phase 1 of the Graven Hill development. Users of the A4095 will experience oblique views across open agricultural land towards the Site where construction activities (located within the northern parts of the Site and associated with Phase 1) will be discernable in the background. Construction activities associated with Kingsmere will occupy the foreground and middle ground of these views. The cumulative magnitude of change will be low. Users of the B4030 will experience heavily filtered and screened views through retained roadside hedgerows and construction activities associated with the Graven Hill site will predominantly be screened by work on Kingsmere.
	Adverse	Low	Low	Slight	Not significant	Operation For users of the A4095 views of the new Kingsmere development will be visible across open space/fields to the south of the Site. These views will be glimpsed through intervening vegetation (associated with the A4095 and new access road). Oblique views of the upper parts of the Graven Hill woodland will be retained

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						although the majority of the Site will be screened by vegetation associated with the new access road to Kingsmere. Views of the upper parts of the Graven Hill woodland may be retained. For users of the B4030 views of the Graven Hill site will be obscured by the Kingsmere development.
Cumulative Visual Effects – Evergreen 3 Oxford						
Users of the local road network and public footpaths east of Wendlebury	N/A	None	None	None	None	<u>Construction</u> Construction will be completed in 2014.
	Adverse	High	Low	Slight	Not significant	<u>Operation</u> Existing open views are available across agricultural fields towards the wooded top of Graven Hill and the upper open spaces within St David's Barracks. The new road will be predominantly screened by intervening hedgerow cover although the south-eastern corner of the road will potentially be visible due to the lack of intervening hedgerows associated with field boundaries. At this point the road may be visible. However within these views the replacement of large scale buildings within the Graven Hill site with smaller scale residential built form will predominantly be screened by structural planting.
Cumulative Visual Effects with C Site						
Users of public footpaths near Merton Road	Adverse	Medium	Low	Slight/Moderate	Not significant	<u>Construction</u> Users of public footpaths near Merton Road will experience glimpsed views (above hedgerows managed to a low height) of Graven Hill construction elements and activities within the southern part of the Site associated with Phases 2 and 3. The upper parts will potentially be partly visible, forming small elements within the background landscape. From the same vantage points views of construction activities associated with C Site will occur. Cumulative views will be available from short sections of public footpath (when viewing the landscape panoramically) with visibility locally affected by intervening vegetation.
	Adverse	Medium	Low	Slight/Moderate	Not significant	<u>Operation</u> Users of public footpaths near Merton Road experience existing glimpsed views are across large scale agricultural fields towards the wooded top and upper

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						pastoral fields of Graven Hill. The upper parts of large storage buildings located within the southern part of the Site are intermittently visible although existing woodland and scrub along the southern part of the Site screens the majority of built form within this area. The replacement of these storage buildings with built form similar in scale, type and location will result in little visual change although the proposed strengthening of existing vegetation with additional tree and woodland cover (structural planting within Phase 1) will reduce views of built form further. Within the same panoramic views, the roofline of the new warehouse at C Site will be partially visible above perimeter planting once matured. Cumulative views will be restricted to short sections of public footpath (when viewing the landscape panoramically) with visibility affected by intervening vegetation.
Users of public bridleway west of Arncott	Adverse	Medium	Low	Slight/Moderate	Not significant	<u>Construction</u> Construction elements and activities located within the eastern part of the Graven Hill site will be viewed at long distance and will form small elements within the view whilst construction activities within C Site will be evident in the middle ground.
	Adverse	High/ Medium	Low	Slight / Moderate	Not significant	<u>Operation</u> Users of sections of bridleway located to the west of Arncott experience oblique long distance views across agricultural landscape towards Graven Hill, viewed above a low cut hedgerow. Within these views Graven Hill forms a focal point, with its wooded brow and upper pastoral fields, and the large storage buildings located within the eastern part of the Site form noticeable elements due to their light colour and scale. Existing large storage buildings within the eastern part of the Site (which are currently visible) will be replaced with residential built form that is smaller in scale. This will introduce a finer grain of built elements, interspersed with open spaces and tree cover, less visually intrusive than the existing large built form. Existing large scale buildings within the southern part of the Site will be replaced with built form similar in type and scale and it is predicted that there will be little visual change within this part of the view. The wooded hill top and upper pastoral fields will remain visible. Completion of the C Site warehouse will replace several buildings in the north of the Site. The increase in building height and net increase in footprint will not intrude noticeably in the context of the overall vista.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
Visual Effects - Night time lighting						
Residential Receptors to the north	Adverse	Medium	Low	Slight/Moderate	Not significant	Construction and Operation Receptors to the north have glimpsed views of intermittent street lighting within the Site, through existing vegetation, views being experienced within the context of the well-lit A41. The removal of the existing floodlighting within the storage area will have a positive effect on receptors to the north. However, it is likely that the proposed residential area will generally be more visible due to additional street lighting, though this will be a more appropriate height and with appropriate detail design is not in itself anticipated to result in sky glow that is any greater than that existing due to lighting along the A41.
Residential Receptors to the west	Adverse	Medium	Low	Slight/Moderate	Not significant	Construction and Operation Close distance receptors to the west will have glimpses of the residential development located in the western part of the Site. It is anticipated that receptors with long distance views of the Site from the west will experience a change to a more heavily lit landscape around the base of Graven Hill. However, this will be viewed in the panoramic landscape which comprises the heavily lit streets associated with Bicester and the lighting of the proposed Kingsmere development in the foreground.
Residential Receptors to the south and east	Adverse	Medium	Low	Slight/Moderate	Not significant	Construction and Operation The site is barely perceptible to receptors to the east as the Site includes only a small group of lights to the northeast. The silhouette of the hilltop is discernible within a primarily unlit landscape. It is anticipated that the Site will become more prominent at night due to the proposed development, in particular with lighting associated with the main road passing through the east part of the Site. This will have an adverse effect on receptors located to the east of the Site, particularly residents along the west edge of Ambrosden, Properties in the vicinity of Wretchwick Farm will be screened by perimeter landscape treatment although lighting columns associated with the A41 junction may be evident and detailed design will need to consider how to minimise effects in this area.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						Long distance views from south of the Site are dominated by the lighting of the existing barracks on the southern side of Graven Hill. It is not anticipated that the change in views from the south will be low, due to the limited development in the southern part of the Site. Some additional lighting will be visible though this will be not significant in the context of the barracks lighting.

I.4 C Site: Evaluation of Significance, Landscape Effects

Table I4.1 Landscape Effects and Evaluation of Significance for C Site - Construction Stage

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Loss of Trees in the north of the Site	Landscape elements	Adverse	Low	Low	Slight	Not significant	A tree survey has been undertaken for the Site to BS 5837: 2005 which identifies almost all f the trees affected by the development as Category 'C2'. A high percentage of the C2 groups consist of predominantly Horse Chestnut *Aesculus Hippocastanum* .These trees are planted in linear groups along the main access road through the centre of the Site which extends from the north of the Site to the south east corner. The vast majority of these trees are showing visual signs of infection by *Phytophthora* (Bleeding Canker) and *Pseudomonas syringae* pv *aesculi*. This has greatly reduced the life expectancy of these trees, suggesting considerable losses within the next 5 to 10 years.
	Landscape patterns	Adverse	Low	Low	Slight	Not significant	The scale of tree loss will be insufficient to have a material affect on landscape patterns.
	Landscape Character	Adverse	Low	Low	Slight	Not significant	The loss of trees and consequent slight effect on landscape patterns will be insufficient to result in a significant effect on landscape character.

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Introduction of new temporary elements including materials stockpiles, site compounds, security fencing, car park, plant and vehicles within the Site	Landscape elements	Adverse	Low	Medium	Slight / Moderate	Not Significant	Existing elements will be replaced with an increase in movement and the introduction of new, contrasting temporary elements across the Site. However, this change will occur for only a temporary period, the most evident change (the introduction of construction plant including cranes used in the construction of the new Warehouse) will occur for no more than c. 12 months.
	Landscape patterns	Adverse	Low	Medium	Slight / Moderate	Not Significant	There will be a reduction of existing landscape patterns and increase in movement alongside the introduction of a new and shifting pattern of elements. However, the main influence of this change will be local and short term.
	Landscape character	Adverse	Medium	Low	Slight / Moderate	Not Significant	Change will be temporary and short term, and as construction nears completion the Site will return to its current use.
Cumulative effects associated with the removal of elements and introduction of construction elements and activities	Otmoor Lowlands Landscape Character Area (and Isolated Hills and Mixed Use Landscape Character Type)	Adverse	Medium	Low	Slight / Moderate	Not Significant	Cumulative effects over and above those concerned with the introduction of new temporary elements are minimal, i.e. include only the loss of number of mainly poor trees in the north of the Site. Change will be temporary and short term, and as construction nears completion the Site will return to its current use, with the completion of new external works and landscape planting.
Cumulative effects associated with the removal of elements and construction activities	Area of High Landscape Value	Adverse	High	Negligible	Slight	Not significant	Effects on the setting and character of the Area of High Landscape Value (to the south east) will be indirect and associated with visibility. There will be no direct influence on the area's landscape character.

Table I4.2 Landscape Effects and Evaluation of Significance for C Site -Operation

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Introduction of permanent elements and their operation	Otmoor Lowlands Landscape Character Area (and Isolated Hills and Mixed Use Landscape Character Type)	Adverse	Medium	Low	Slight / Moderate	Not Significant	The Otmoor Lowlands character area is considered to be a landscape of medium sensitivity with existing military development (large scale and distinctive buildings and security fencing) viewed as negative and detracting features of low value and sensitivity. The Isolated Hills and Mixed Uses landscape character type is considered to be of low sensitivity and has been identified by Cherwell as a landscape in need of 'restoration'. The proposed development will include a change due to replacement and introduction of new lighting, but night time working will not be routinely undertaken There will be a low adverse effect on night time landscape character, but this is assessed to be not significant in the wider context. Whilst there will be a slight increase in MoD development over and above that existing within the Isolated Hills and Mixed Use Landscape Character Type, and an increase in the scale of development locally, this will also bring some local improvement to the setting of Arncott village around the C Site entrance.
Introduction of permanent elements and their operation	Area of High Landscape Value	Adverse	High	Negligible	Slight	Not Significant	The site will continue in its current use, though with a larger building footprint. Effects on the setting and character of the Area of High Landscape Value (to the south-east) will be indirect and associated with visibility. There will be no direct influence on the area's landscape character.

Cause of Landscape Change	Landscape Resource Affected	Type of Effect	Sensitivity of Resource	Magnitude of Change	Level of Effect	Significance	Rationale
Cumulative effects associated with the Immigration Centre located at A SIte	Landscape Character	Adverse	Medium	Negligible	Slight / Moderate	Not significant	No direct relationship exists between these two sites Any perceived change will be negligible and cumulative effects on Landscape Character will therefore not be significant.

I.5 C Site: Evaluation of Significance, Visual Effects

Table I5.1 Visual Effects and Evaluation of Significance for C Site - Construction and Operation

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Residential Receptors – within 750 metres						
Residents on Green Lane, adjoining the Site	Adverse	High	High	Substantial	Significant	Construction Properties at Green Land will have direct, close views to the construction site, including the demolition of buildings and subsequent warehouse construction, including extensive works to level the area corresponding to the new warehouse footprint and use the surplus spoil to create a new landscape buffer between the properties and the warehouse. Initial demolition to remove buildings C1 and C4 (the two large warehouses on the east side of the Site) plus C7, towards the west, is estimated to have a duration of around 4 months, during which time site levelling and perimeter bunding will also take place. Construction of the building is estimated to take c. 12 months. The level of effect is predicted to reduce markedly when perimeter bunding, the building cladding and roofing is in place, with activities becoming focussed on fit our and on completion of external areas to the building's north and west.
	Beneficial	High	High	Substantial	Significant	Operation Whilst there will be significant change due to the 'enclosing' effect of new planting, this will replace the previous view towards building C4, and the immediate environment will be improved due both to the screen planting and bunding to the rear of properties and to the main gate area improvements.
Residents on the east side of Green Lane.	Adverse	High	High	Substantial	Significant	Construction Residents at this location will experience similar effects to those described above, however views are likely to be confined to the upper levels of properties and will be less evident due to the presence of properties in the foreground of

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Significance Rationale
						views.
	Beneficial	High	High	Moderate	Significant	Operation Change will be less evident compared to that experienced from properties immediately adjacent to the Site. Following the establishment of landscape planting to the Site's periphery, the sense of enclosure provided by the existing building C4 will be replaced by similar visual enclosure, but with an improved foreground aspect.
Residents on Norris Road, adjoining the Site Road (Refer Figure 11.23 Viewpoint 4)	Adverse	High	High	Substantial	Significant	Construction Residents in Norris Road will experience similar effects to those described above, including views towards the main gate area which will be re-configured and the security fence re-aligned. The level of effect will reduce following the completion of roofing and cladding to the eastern side of the new warehouse.
	Beneficial	High	High	Substantial	Significant	Operation Following the establishment of landscape works to the Site's periphery, the immediate surroundings will improve, and on balance the effect is judged to be beneficial.
Residents situated on the east side of Norris Road.	Adverse	High	High	Moderate / Substantial	Significant	Construction Residents on the east side of Norris Road will experience similar effects to those described above, including views towards the main gate area which will be re-configured and the security fence re-aligned. The level of effect will reduce following the completion of roofing and cladding to the eastern side of the new warehouse. Activity associated with demolitions and subsequent construction of the warehouse will be evident between properties in the foreground but this is likely to be mainly the movement of material using cranes rather than the building itself.
	Beneficial	High	low	Moderate / Substantial	Significant	Operation Views will be similar to those experienced by residents of properties adjoining the Site on Norris Road, however in this case confined to glimpses between foreground buildings.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Residents on Murcott Road (Refer Figure 11.26 Viewpoint 8)	Adverse	High	High	Substantial	Significant	Construction Approximately 18 properties on the east side of Murcottt Road will experience views (mainly from upper storeys) towards the demolition of building C4 and the subsequent construction of the new warehouse. The effect will diminish markedly following completion of the cladding and roofing on the east side of the warehouse, the upper levels of which will remain visible above foreground vegetation.
	Adverse	High	Low	Moderate	Not Significant	Operation The more distant and slightly more elevated viewpoints on Murcott Road will result in the upper part of the new warehouse remaining visible above screen planting for a longer period while planting reaches an effective height and filtering views to its roof set against the skyline.
Residents in the vicinity of Hopcroft Close and Teal Close	Adverse	High	Medium	Moderate / Substantial	Significant	Construction It is likely that residents in this location will experience upper storey views towards construction activity, filtered by rear garden vegetation and partially obstructed by other properties in the foreground. The effect will again diminish following completion of the cladding and roofing on the east side of the building.
	Beneficial	High	Medium	Moderate / Substantial	Significant	Operation Where views occur, the existing view across the Site will be replaced by an improved aspect towards screen planting.
Residents situated within Upper Arncott (Refer Figure 11.24 Viewpoint 5)	Adverse	High	Low	Moderate	Not Significant	Construction A proportion of the properties in Upper Arncott, including properties in the vicinity of Mill Lane and Buchanan Road are likely to have partial views towards the Site between foreground vegetation and buildings, within which the construction site may be evident. Views are however generally at least partially obscured by elements in the foreground, reducing the magnitude of change.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
	Adverse	High	Low	Moderate	Not Significant	Operation The introduction of a single large building is likely to have an adverse, but not significant effect on the incidental views towards the Site from Upper Arncott. This is because the slightly elevated nature of views will enable the extensive roof area of the new warehouse to be evident, beyond the screen planting to be introduced at the Site's eastern perimeter.
Residents at Orchard Close, properties to the west and south of Arncott Village Hall	Adverse	High	Low	Moderate	Not Significant	Construction Oblique views to construction activity (principally cranes, during the construction of the new warehouse, may be evident from upper storey windows oriented towards the north/north -west. A small proportion of properties at Orchard Close may be affected.
	Adverse	High	negligible	slight	Not Significant	Operation A small proportion of properties at Orchard Close may allow upper story views north/north -west beyond the new car park to the new warehouse's south east corner.
Residents on Ploughley Road (Refer Figure 11.22 Viewpoints 2 and 3)	Adverse	High	High	Moderate / Substantial	Significant	Construction Residents in the vicinity of the Tally Ho Public House will experience views towards construction activity, these being more evident towards the south east where existing screen planting on site is less effective.
	Beneficial	High	Low	Moderate	Not Significant	Operation The introduction of additional landscape measures to improve screening to the Site will benefit the properties along Ploughley Lane and screen views towards the new development.
Residents within the southern part of Ambrosden in the vicinity of	Adverse	High	Negligible	Slight	Not Significant	Construction Residents may experience temporary views towards construction plant and associated activity during development above foreground vegetation

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Akeman Avenue (Refer Figure 11.20 Viewpoint 1)	Adverse	High	Negligible	Slight	Not Significant	Operation Residents may will experience a small change in their views due to the replacement of existing buildings I the north of C Site with the new warehouse.
Residents of properties on the eastern perimeter of Merton	Adverse	High	Negligible	Slight	Not Significant	Operation Activity may be evident in views from the southern end of the village on its east side however the change to any views will be slight. The remainder of the village (other than possibly it very northern extremity) will not experience views due to intervening foreground vegetation, particularly that at Merton Wood.
	Adverse	High	Negligible	Slight	Not Significant	Construction The completed warehouse may be evident in views from the southern end of the village on its east side however the change to any views will be slight. The remainder of the village (other than possibly it very northern extremity) will not experience views due to intervening foreground vegetation, particularly that at Merton Wood.
Residents at Astley Bridge Farm (Refer Figure 11.31 Viewpoint 13)	Adverse	High	Low	Moderate	Not Significant	Construction The existing view includes building C8 and the roof lines of other buildings on site, set below the skyline formed by Arncott Hill. The water tower in the north of the Site, which is the most prominent feature, will be removed. Some demolition activity and the construction of the new warehouse is likely to be evident above the perimeter screen planting already in place at the Site.
	Adverse	High	Low	Moderate	Not Significant	Operation Following completion, the roofline of the new warehouse will be evident as a single element within the north of the Site, replacing the individual elements (including the water tower) currently visible. The extent of built form on site will increase, but will appear no higher than the existing water tower. Assuming appropriate building finishes/recessive colour the magnitude of change will be low.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Astley Bridge Farm Cottage (Refer Figure 11.31 Viewpoint 13)	Adverse	High	Negligible	Slight	Not Significant	Operation The existing view and predicted views from the property are likely to be similar to Astley Farm, although more distant and any change will be of lower magnitude. Construction The existing view and predicted views from the property are likely to be similar to Astley Farm, although more distant and any change will be of lower magnitude.
Residential Receptors - over 1,500 metres						
Residents of properties on the eastern perimeter of Merton	Adverse	High	Negligible	Slight	Not Significant	Operation Activity may be evident in views from the southern end of the village on its east side however the change to any views will be slight. The remainder of the village (other than possibly it very northern extremity) will not experience views due to intervening foreground vegetation, particularly that at Merton Wood.
	Adverse	High	Negligible	Slight	Not Significant	Construction The completed warehouse may be evident in views from the southern end of the village on its east side however the change to any views will be slight. The remainder of the village (other than possibly it very northern extremity) will not experience views due to intervening foreground vegetation, particularly that at Merton Wood.
Residents near Muswell Hill	Adverse	High	Negligible	Slight	Not significant	Construction Construction elements and activities will be viewed at long distance and will form small and barely perceptible elements within the view.
	Beneficial	High	Negligible	Slight	Not significant	Operation Completion of the warehouse will replace several buildings in the north of the

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance Level	Rationale
						Site. The increase in building height and net increase in footprint will not noticeably intrude in the context of the overall vista.
Users of Public Rights of Way and Recreational Open Space						
Users of public open space in the vicinity of Arncott Village Hall (distance <750m) (Refer Figure 11.26 Viewpoint 8)	Adverse	Medium	High	Moderate / Substantial	Significant	Construction Users of the community open space focussed around Arncott Village Hall will experience views towards the demolition of building C4 and the subsequent construction of the new warehouse. The effect will diminish markedly following completion of the cladding and roofing on the east side of the warehouse, the upper levels of which will remain visible above foreground vegetation.
	Adverse	Medium	Slight	Moderate	Not Significant	Operation The roof line of the new warehouse will ultimately be screened by foreground vegetation although some filtered views will remain
Users of the Village Green, Arncott (distance <750m) (Refer Figure 11.25 Viewpoint 7 and photomontage)	Adverse	Medium	High	Moderate / Substantial	Significant	Construction For a limited period, there will be views towards the demolition of building C4 and towards cranes used during the construction of the warehouse, evident above the rooflines of houses adjacent to the Green.
	Beneficial	Medium	Low	Slight / Moderate	Not Significant	Operation Following completion, the south east corner of the warehouse will be evident although increasingly less so, as foreground vegetation matures and ultimately screens the building.
PRoW north east of Ploughley Road (distance 750m-1,000m)	Adverse	Medium	Medium	Moderate	Not Significant	Construction Users of the PRoW will experience views towards construction activity as building demolition and construction takes place although these will occur over a short period of time.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
	Beneficial	Medium	Low	Slight/ Moderate	Not Significant	Operation The introduction of additional landscape measures to improve screening to the Site will benefit views from the PRoW where glimpses to the Site occur between foreground buildings.
PRoWs south of Brook Farm and leading to Merton Road (distance varies from <750m to .c. 1,500m) (Refer Figure 11.30 Viewpoint 12 and photomontage)	Adverse	Medium	High	Moderate / Substantial	Significant	Construction Direct views to the construction area in the north of the Site will occur from the PRoW in this location, filtered through the existing hedgerow on the Site's west boundary. The effect will however diminish further south on the footpath, as the view becomes oblique and as a consequence the screening effect of the Site's perimeter vegetation is more effective. As the PR0W turns towards the Merton Road the increasing distance will further reduce the effect due to the increasing viewpoint distance.
	Beneficial	Medium	Medium	Moderate	Not Significant	Operation The views described under 'construction' will initially be adverse prior to the maturing of additional perimeter planting on the Site's west boundary. Appropriate planting along the boundary will ultimately screen development and improve the setting.
Users of the Bridleway at Muswell Hill (distance c. 4km) (Refer Figure 11.24 Viewpoint 6)	Adverse	Medium	Low	Slight	Not Significant	Construction Construction activity will be evident as a small element of the wide vista from this elevated but distant location.
	Adverse	Medium	Negligible	Slight	Not Significant	Operation Completion of the warehouse will replace several buildings in the north of the Site. The increase in building height and net increase in footprint will not noticeably intrude in the context of the overall vista.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Users of Merton Community Wood	Adverse	Medium	Low	Slight / Moderate	Not Significant	Construction There are limited views towards the Site (mainly its southern part) from the north-east and east perimeter of Merton Wood. Construction plant on Site will be evident via glimpses between the wood's perimeter hedgerows.
Users of public footpaths near Upper Arncott and Arncott Hill	Adverse	High	Low	Moderate	Not significant	Construction Construction activity and elements will be partially evident, filtered by existing development at Upper Arncott and associated foreground vegetation.
	Beneficial	High	Low	Moderate	Not significant	Operation The introduction of a single large building is likely to have an adverse, but not significant effect on the glimpsed views from parts of this PRoW which will be the filtered by foreground buildings and vegetation.
	Beneficial	Medium	Slight	Slight / Moderate	Not Significant	Operation Merton wood is a recently planting community facility and it is likely that its perimeter will grow on to prevent view out to the Site. However, should glimpses out from its perimeter occur, the introduction of additional screen planting along the Site's western boundary will screen the warehouse and while the change will be barley perceptible this will have a very marginal beneficial effect on the setting
Users of the local road system						
Ploughley Road	Adverse	Low	Low	Slight	Not Significant	Construction Users of Ploughley Road may experience views of construction activity either above or between properties on Ploughley Road. However any views will be transient and not significant.
	Beneficial	Low	Negligible	Negligible	Not Significant	Operation Users of Ploughley Road may experience views of new screen planting

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
						(whereas previously there were views into the Site) between properties on Ploughley Road. However any views will be transient and not significant.
Norris Road	Adverse	Low	High	Moderate	Not Significant	Construction Users of Norris Road will experience views similar to those from properties on its east side. However any views will be transient and not significant.
	Beneficial	Low	High	Moderate	Not Significant	Operation Users of Norris Road will experience views similar to those from properties on its east side, including landscape improvements to the Site's main gate area. However, any views will be transient and not significant.
Buchanan Road	Adverse	Low	Medium	Slight / Moderate	Not Significant	Construction Users travelling west on Buchanan Road will experience views of construction activity. However, any views will be transient and not significant
	Adverse	Low	Medium	Slight / Moderate	Not Significant	Operation Following completion of the warehouse, building C1 and the water tower in the north of the Site, which is a prominent feature in the view west along Buchanan Road, will be replaced by a view to the rooftop of the warehouse. However any views will be transient and not significant
Murcott Road	Adverse	Low	Negligible	Negligible	Not Significant	Construction Evidence of construction activity may be visible from Murcott Road as it crosses the M40 however the extent of foreground vegetation and distance involved are such that any change will be negligible.
	Adverse	Low	Negligible	Negligible	Not Significant	Operation Any change will be confined to the roofline of the buildings on site and barely perceptible.

Visual Receptors	Type of Effect	Sensitivity	Magnitude of Visual Change	Level of Effect	Significance	
					Level	Rationale
Merton Road	Adverse	Low	Low	Slight	Not Significant	Construction The existing view includes the roof lines of buildings on site, set below the skyline formed by Arncott Hill. The water tower in the north of the Site, which is the most prominent feature, will be removed. Some demolition activity and the construction of the new warehouse is likely to be evident although these will be transient and the viewing direction is at an oblique angle to the road.
	Adverse	Low	Negligible	Slight	Not Significant	Operation Following completion, the roofline of the new warehouse will be evident as a single element within the north of the Site, replacing the individual elements (including the water tower) currently visible. The extent of built form on site will increase, but will appear no higher than the existing water tower. Assuming appropriate building finishes/recessive colour the magnitude of change will be negligible.
Employees/places of work (None identified)						
Cumulative Visual Effects- Graven Hill: Refer to Graven Hill Visual Effects Table I3.1						