Gavray Drive West
BICESTER

ENVIRONMENTAL STATEMENT FIGURES & APPENDICES

April 2015

Coordinated by
David Lock Associates Ltd
on behalf of **Gallagher Estates Ltd**
Charles Brown
and **Simon Digby**

GALLAGHER
ESTATES

Environmental Statement Figures and Appendices
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FIGURES

02 SITE AND PROPOSED DEVELOPMENT

Site Boundary

Other land under the Applicant's control

Gavray Drive

Chadbridge Lane

0 100 200 Meters

NOTE
This drawing is for information purposes only and not for use in construction.
Do NOT scale from this drawing.
All dimensions are to be checked on site and any discrepancies should be immediately reported to the originator of the drawing.
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Title

Gavray Drive West, Bicester
Site Location Plan

Date	Scale
11-02-15	1:2,500@A1 / 1:5,000@A3

Drawn	Designed	Approved	Drawing Number	
DG	---	PJC	JJG050 - 015	A

David Lock Associates
Town Planning and Urban Design

DAVID LOCK ASSOCIATES LIMITED
50 NORTH THIRTEENTH STREET, CENTRAL MILTON KEYNES, MK9 3BP
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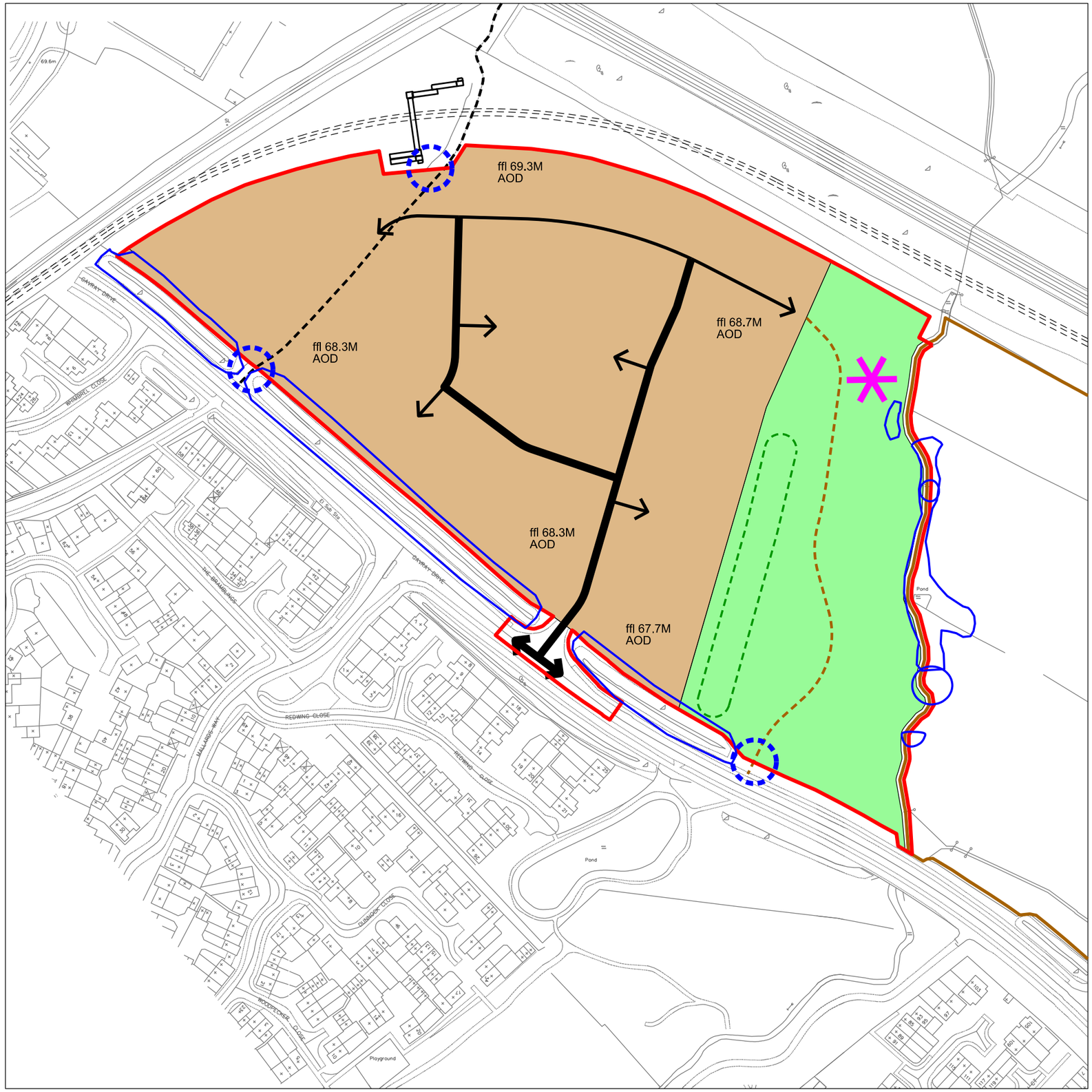

- Application boundary - area - 6.92Ha including access
- Use - Residential - area - 4.62Ha
- Use - Public open space - area - 2.0Ha
- Area of surface water run-off within public open space
- Play Area
- Main residential street - made up of 5.5m wide carriageway and two footways of 2m width
- Access to minor lanes and mews streets
- Retained footpath
- Proposed footpath
- Footpath connections at application boundary
- Hedgerow canopy (Catagory B)
- Local Wildlife Site

Scale and massing of buildings by types: in meters and are additional to approximate finished ground level (AOD) indicated on plan.

Building Type		Length (m)	Width (m)	Ridge Heights (m)	Storeys
		Distance across frontage	Depth from front to back	Highest point above AOD	
Typical terraces	Minimum	13.5	5.5	8.5	1
	Maximum	48	10	11	2.5
Semi-detached	Minimum	10	5.5	8.5	1
	Maximum	20	10	11	2.5
Detached	Minimum	8	8	6	1
	Maximum	12	11	11	2.5
Dwelling over Garage	Minimum	10	6	5.5	2
	Maximum	13	8	12	2.5
Garage	Minimum	3	6	1.5	1
	Maximum	12	6	6	1
Bin Stores / Ancillary	Minimum	2	3	3	1
	Maximum	5	5	3.5	1

Client
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LONDON EC1V 0DN
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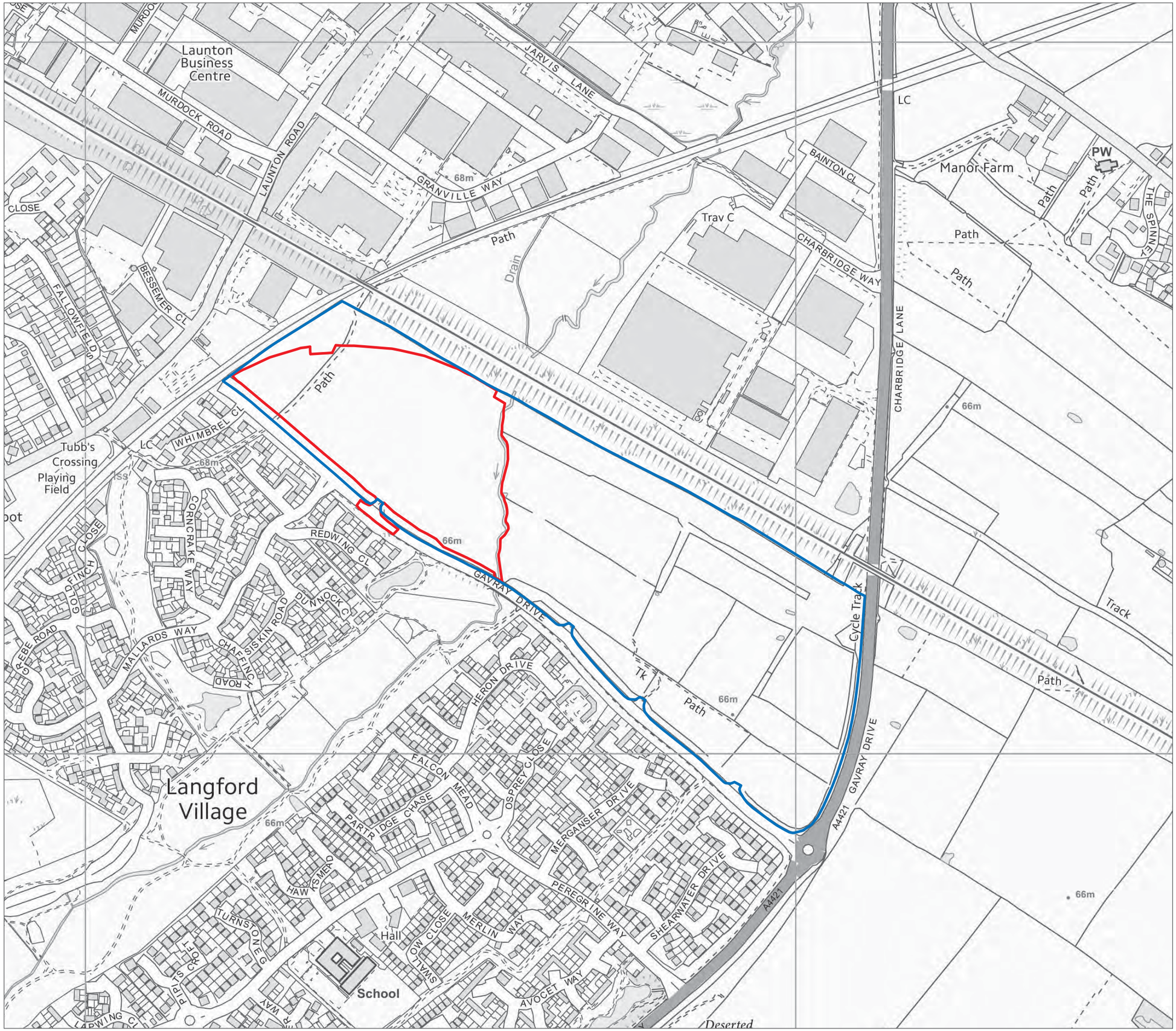
Project
Gavray Drive West

PAUL DREW DESIGN

Drawing Title
Parameters Plan

Job Ref. Ge.GD.W
Drawn Pd
Scale 1:2,000 @ A3
Date 22.10.2014
Drawing no. 001
Rev. D 13.02.2015

09 ECOLOGY AND BIODIVERSITY



Site Boundary

Study Area

N

0 250m

THE ENVIRONMENTAL DIMENSION PARTNERSHIP

Tithe Barn, Barnsley Park Estate, Barnsley, Cirencester, Gloucestershire, GL7 5EG **t** 01285 740427 **f** 01285 740848
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client

Gallagher Estates Ltd

project title

Gavray Drive West, Bicester, Oxfordshire

drawing title

Figure 9.1: Study Area and Development Site

date	27 OCTOBER 2014	drawn by	TS
drawing number	EDP124/105	checked	JB
scale	NTS		

- Study Area
- Broadleaved Tree
- Broadleaved woodland
- Continuous scrub
- Scattered scrub
- SI — Semi-improved grassland
- SI — Poor Semi-improved grassland
- Tall ruderal
- Marshy Grassland
- H8 — Hedgerow ID
- F1 — Field ID
- Species poor hedgerow
- Species rich hedgerow with trees
- P1 — Ponds
- Swamp
- Dry ditch
- Fence
- Wet ditch

Note:
Habitat mapping should be treated as indicative only. For detailed mapping of grassland NVC communities refer to EDP 124/94

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client

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project title

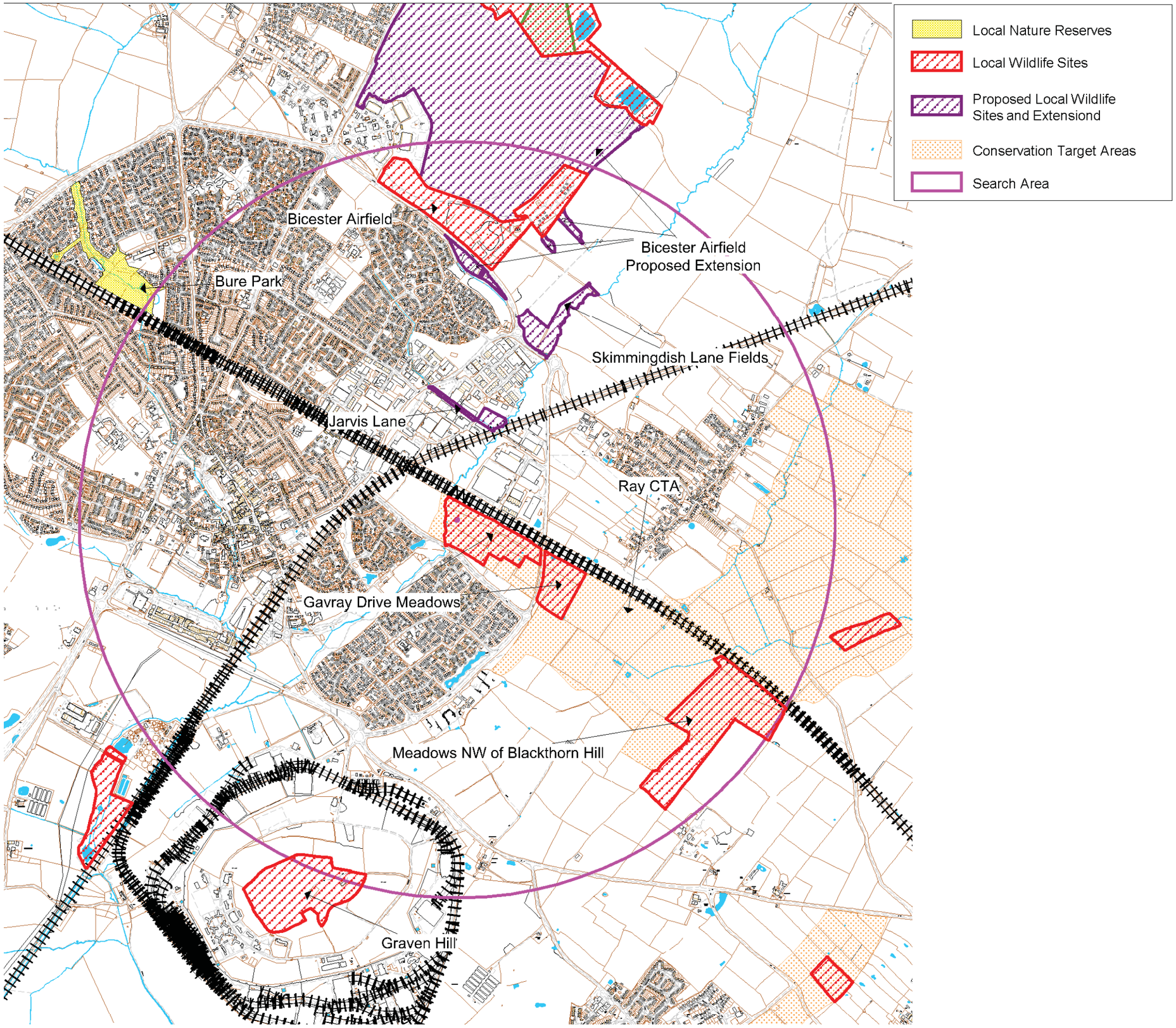
Land North of Gavray Drive, Bicester, Oxfordshire

drawing title

Figure 9.2: Extended Phase 1 Survey

date	27 OCTOBER 2014	drawn by	TB
drawing number	edp124/56c	checked	JB
scale	NTS		

9.3



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client

Gallagher Estates Ltd

project title

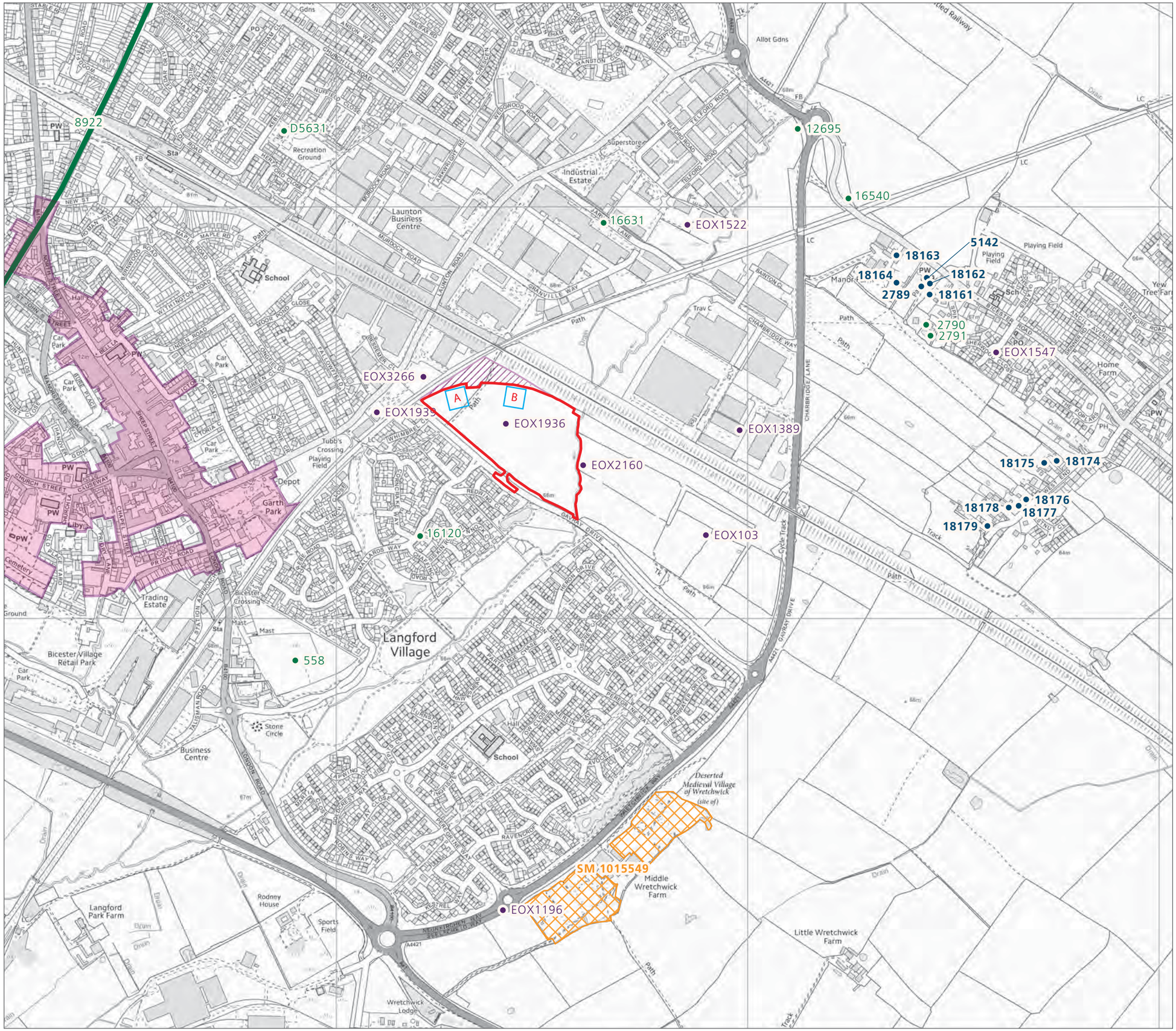
Land North of Gavray Drive, Bicester, Oxfordshire

drawing title

Figure 9.3: TVERC Designated Sites Map

date	17 NOVEMBER 2014	drawn by	JTF
drawing number	edp124/109	checked	JB
scale	NTS		

11 HISTORIC ENVIRONMENT



Application Site Boundary

SM XXX — Scheduled Monument

5142 — Listed Building

Bicester Conservation Area

A — Area of Known Archaelogical Deposit

16540 — HER Monument

EOX1547 — HER Event

Location of Oxford Archeology Trial Trench Evaluation (2013)

N

0 500m

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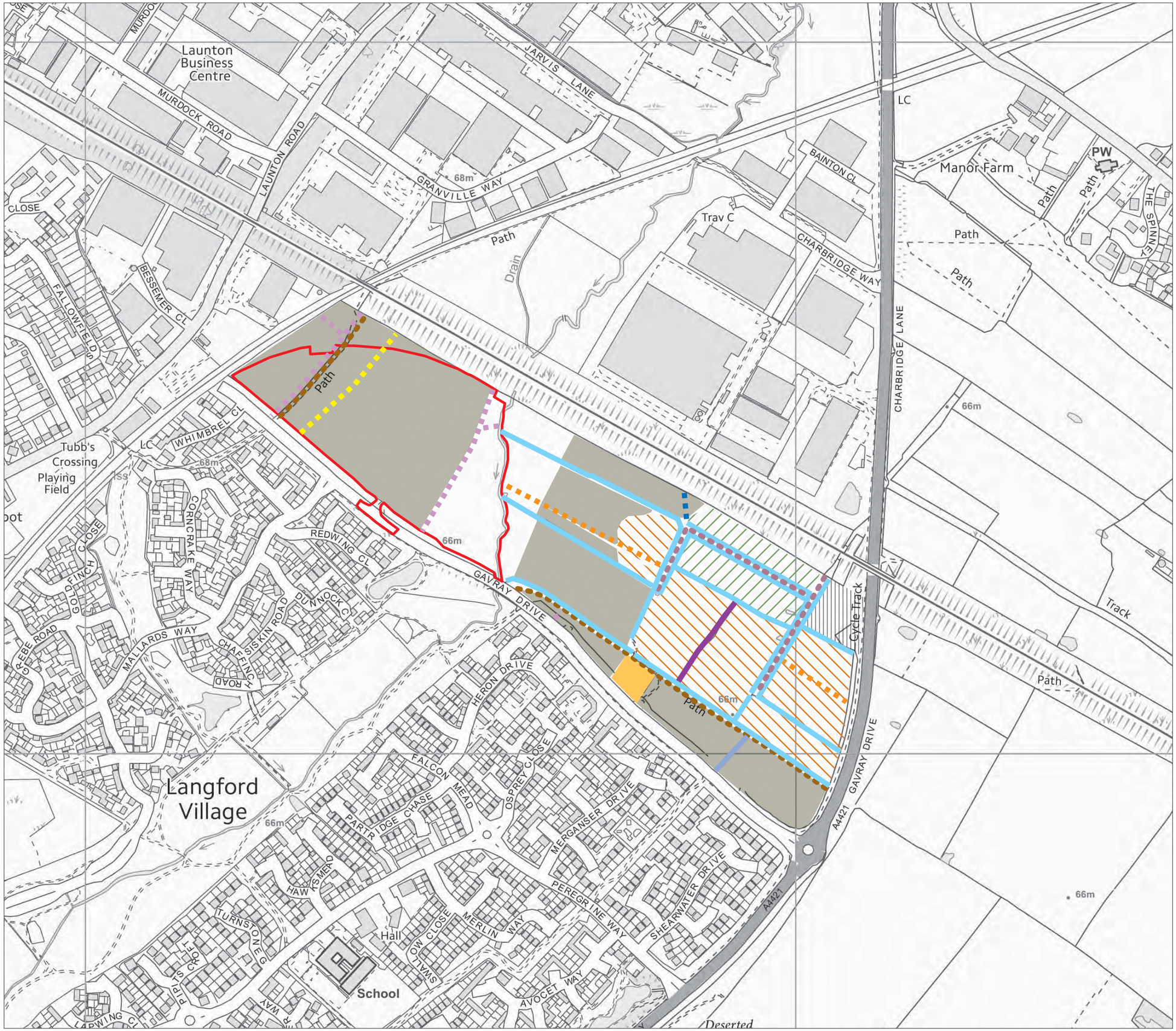
project title

Gavray Drive West, Bicester, Oxfordshire

drawing title

Figure 11.1: Known Heritage Assets

date	21 OCTOBER 2014	drawn by	TS
drawing number	EDP124/101	checked	MM
scale	NTS		



Site Boundary

Extant Ridge and Furrow Noted on Walkover (September 2013)

Extant Ridge and Furrow Noted on Previous Survey (OAU 1997) but not Confirmed by Site Walkover

Extant Hedges Depicted on the Launton Parish Map of 1607

Extant Hedges Noted on Plan of the Parish of Launton c.1814

Extant Hedge Noted on First Edition Ordnance Survey Map of 1881

Extant Trackway Noted on Launton Parish Map of 1607

Path Noted on First Edition Ordnance Survey Map of 1881

Non-extant Ridge and Furrow Noted on Aerial Photographs

Non-extant Hedges Depicted on the Launton Parish Map of 1607

Non-extant Hedge Depicted on the Map of Bicester 1753

Non-extant Hedge Noted on First Edition Ordnance Survey Map of 1881

Non-extant Trackway Noted on Launton Parish Map of 1607

Approximate Location of Non-extant Victorian Farmstead

Area Inaccessible for Survey

N

0 250m

edp

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client

Gallagher Estates

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Gavray Drive West, Bicester, Oxfordshire

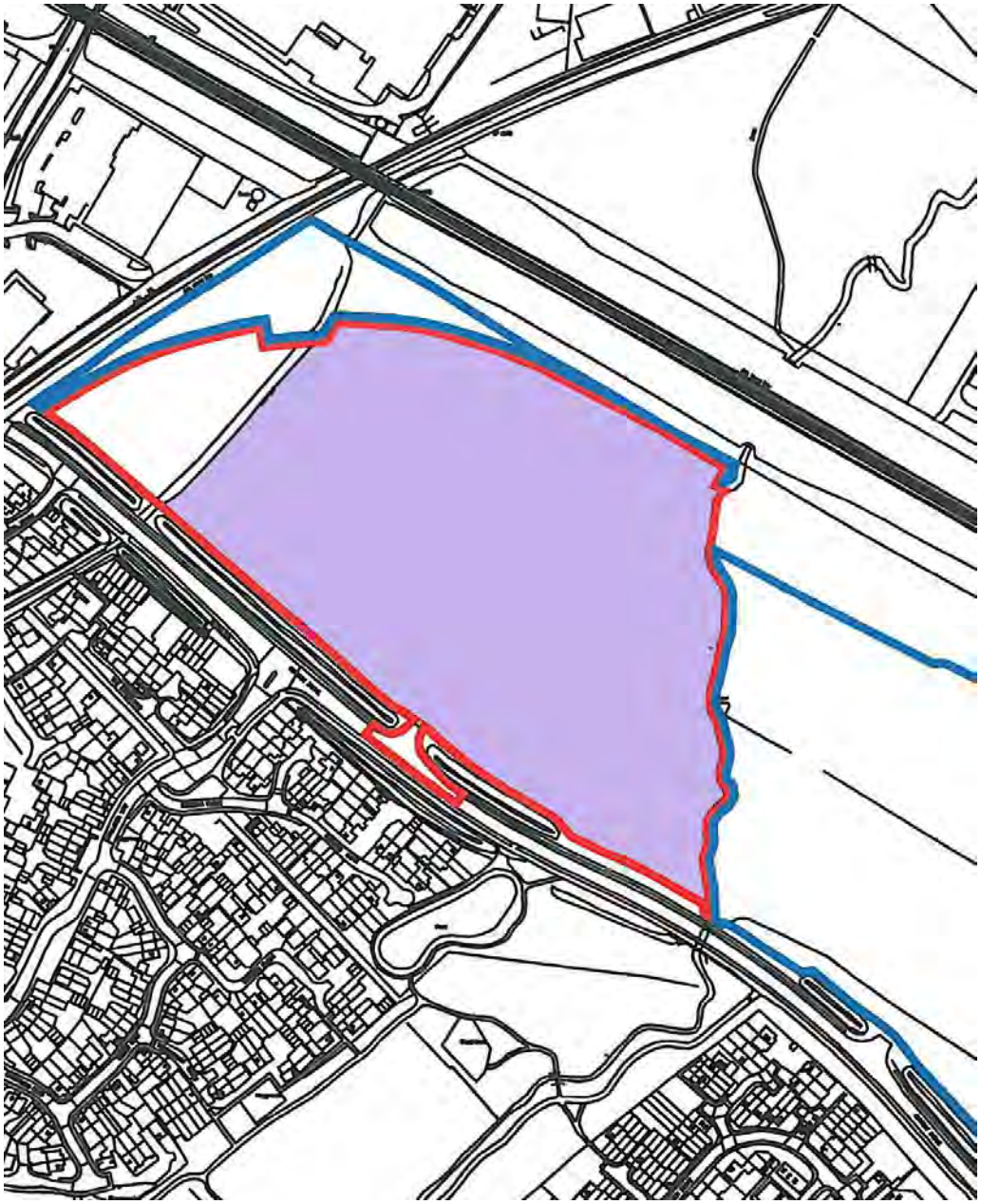
drawing title

Figure 11.2: Historic Landscape Character

date	21 OCTOBER 2014	drawn by	TS
drawing number	EDP124/102	checked	MM
scale	NTS		

12 AGRICULTURAL AND SOIL RESOURCES

KEY		Ha	%	PLAN	KCC1		
	Grade 1			TITLE	**Agricultural Land Classification**		
	Grade 2			SITE	Gavray Drive West		
	Grade 3a			CLIENT	Gallagher Estates		
	Grade 3b	6.7	100	NUMBER	KCC1674/01 10/14sc		
	Grade 4			DATE	October 2014	Scale	NTS
	Grade 5			**KERNON COUNTRYSIDE CONSULTANTS LTD** **GREENACRES BARN, PURTON STOKE, SWINDON,** **WILTSHIRE, SN5 4LL** Tel 01793 771 333 Email: info@kernon.co.uk		
	Non-agricultural						
	Urban						
	Not surveyed						



Key

Purple: Current Farm Business Occupation (land in arable use)

NORTH

PLAN	**Figure 12.2**		
TITLE	**Farm Busines Occupation**		
SITE	Gavray Drive West		
CLIENT	Gallagher Estates		
NUMBER	KCC1674/02 10/14sc		
DATE	October 2014	**SCALE**	NTS

KERNON COUNTRYSIDE CONSULTANTS LIMITED
GREENACRES BARN, PURTON STOKE, SWINDON, WILTSHIRE, SN5 4LL
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APPENDICES

06 AIR QUALITY

APPENIDX 6.1 CONSTRUCTION ASSESSMENT METHODOLOGY

Table A6.1 Categorisation of dust emission magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• total building volume <20,000m^3 • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months	• total building volume 20,000 - 50,000m^3 • potentially dusty construction material • demolition activities 10 - 20m above ground level	• total building volume >50,000m^3 • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level
Earthworks		
• total site area <2,500m^2 • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <10,000 tonnes • earthworks during wetter months	• total site area 2,500m^2 - 10,000m^2 • moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • formation of bunds 4 - 8m in height • total material moved 20,000 - 100,000 tonnes	• total site area >10,000m^2 • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8m in height • total material moved >100,000 tonnes
Construction		
• total building volume <25,000 m^3 • construction material with low potential for dust release (e.g. metal cladding or timber)	• total building volume 25,000 - 100,000m^3 • potentially dusty construction material (e.g. concrete) • on-site concrete batching	• total building volume >100,000m^3 • on-site concrete batching • sandblasting
Trackout		
• <10 HDV (>3.5t) outward movements in any one day • surface material with low potential for dust release • unpaved road length <50m	• 10 – 50 HDV (>3.5t) outward movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 – 100m;	• >50 HDV (>3.5t) outward movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

Table A6.2 Sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		< 20	**< 50**	**< 100**	**< 350**
High	> 100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

Table A6.3 Sensitivity of the area to human health impacts

Background PM_{10} concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
High receptor sensitivity						
> 32µg/m^3	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	< 10		Medium	Low		
28 – 32µg/m^3	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	< 10					
24 – 28µg/m^3	> 100	High	Medium	Low	Low	Low
	10 – 100					
	< 10	Medium	Low			
< 24µg/m^3	> 100	Medium	Low	Low	Low	Low
	10 – 100	Low				
	< 10					
Medium receptor sensitivity						
–	> 10	High	Medium	Low	Low	Low
	< 10	Medium	Low			
Low receptor sensitivity						
–	> 1	Low	Low	Low	Low	Low

Table A6.4 Sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	< 20	< 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A6.5 Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible

Sensitivity of area	Dust emission magnitude		
	Large	**Medium**	**Small**
Trackout			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Low risk site	Negligible
Low	Low risk site	Low risk site	Negligible

APPENDIX 6.2 TRAFFIC DATA

Table A6.6 Baseline 2014 traffic data

Road		AADT	HGV	Speed (kph)
ATC 1	Chabridge Lane	11,392	9.9	67
ATC 2	Gavray Drive	1,647	5.3	49
ATC 3	Wretchwrack Way	10,341	11.3	78
ATC 4&5	Neunkirchen Way	13,626	8.0	60
ATC 6	A41 (South)	19,693	6.4	62
ATC 7	A41 (North)	21,576	8.3	69
ATC 8	London Road	9,794	5.3	63

Table A6.7 Future year traffic data for main assessment

Road		DM (2020)		DS (2020)	
		AADT	HGV	AADT	HGV
ATC 1	Chabridge Lane	14,025	9.2	14,485	8.9
ATC 2	Gavray Drive	1,857	5.1	3,545	2.7
ATC 3	Wretchwrack Way	13,035	10.2	14,263	9.3
ATC 4&5	Neunkirchen Way	16,929	7.3	18,157	6.9
ATC 6	A41 (South)	25,333	6.8	25,493	6.7
ATC 7	A41 (North)	29,837	6.8	30,857	6.6
ATC 8	London Road	11,366	5.3	11,413	5.3

Table A6.8 Future year traffic data for cumulative assessment

Road		DM (2020)		DS (2020)	
		AADT	HGV	AADT	HGV
ATC 1	Chabridge Lane	15,694	9.1	16,155	8.8
ATC 2	Gavray Drive	1,876	5.0	3,564	2.6
ATC 3	Wretchwrack Way	12,436	9.1	13,503	8.4
ATC 4&5	Neunkirchen Way	15,342	6.8	16,409	6.3
ATC 6	A41 (South)	23,352	6.4	23,352	6.4
ATC 7	A41 (North)	34,177	6.5	35,197	6.3
ATC 8	London Road	11,832	5.4	11,880	5.4

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07 NOISE AND VIBRATION

APPENDIX 7.1 – Construction Noise Assumptions

This section provides the construction activity assumptions which form the basis for the prediction of construction noise in accordance with BS 8228.

Activity 1 - Site enabling works - tracked excavators, continuous movements of tipper trucks removing material and a compacting roller.

Activity 2 - Piling - rotary bored piling, cast in situ.

Activity 3 - Concrete pours - foundation and basement works for buildings, including any piling activities. Concrete pouring using truck mixers and lorry mounted concrete pumps.

Activity 4 - Construction to roof level - fabrication of steel structures, potentially some concrete pours, craning of materials and wall sections to buildings, bricklaying.

Table 7.1 Construction Noise Assumptions

Activity name	Source	Sound power (dBLwA)	Number	On-time (%)
Activity 1 – Enabling works				
Dozer	BS5228 Table C 2-1	103	2	20
Tracked Excavator	BS5228 Table C 2-3	106	8	20
Dozer	BS5228 Table C 2-1	103	2	40
Tracked Excavator	BS5228 Table C 2-3	106	2	100
Wheeled Loader	BS5228 Table C 2-28	104	2	60
Vibratory Roller	BS5228 Table C 2-40	101	2	60
Vibratory Plate (Petrol)	BS5228 Table C 2-41	108	1	60
Activity 2 – Piling and concrete works				
Large Rotary Bored Piling Rig	BS5228 Table C 3-14	111	1	85
Mini Tracked Excavator	BS5228 Table C 3-20	96	1	10
Concrete Pump	BS5228 Table C 3-25	106	1	15
Activity 3 – Foundations & concrete pours				
Tower Crane	BS5228 Table C 4-49	105	1	50
Tracked Excavator	BS5228 Table C 4-63	105	1	10
Compressor for Hand-held Pneumatic Breaker	BS5228 Table C 5-5	93	2	50
Diesel Generator	BS5228 Table C 6-39	93	1	60
Pump Boom + Vibrating Poker	BS5228 Table C 4-36	99	4	20
Concrete Pump	BS5228 Table C 3-25	106	2	20
Concrete Mixer Truck	BS5228 Table C 4-20	108	10	10
Telescopic Handler	BS5228 Table C 4-54	107	2	40
Dumper	BS5228 Table C 4-3	104	4	40
Activity 4 – Construction to roof level				
Lorry	BS5228 Table C 11-4	111	2	50
Tower Crane	BS5228 Table C 4-49	105	1	25

Pump Boom + Vibrating Poker	BS5228 Table C 4-36	99	4	25
Concrete Pump	BS5228 Table C 3-25	106	1	25
Concrete Mixer Truck	BS5228 Table C 4-20	108	4	25

APPENDIX 7.2 – Road Traffic Noise Flows

This section provides the road traffic flow data and assumptions which form the basis for rad traffic noise predictions in accordance with the calculation of road traffic noise (CRTN).

Figure 1 indicates the road links for which changes in traffic were assessed in terms of noise levels. For full details refer to the Transport Assessment.

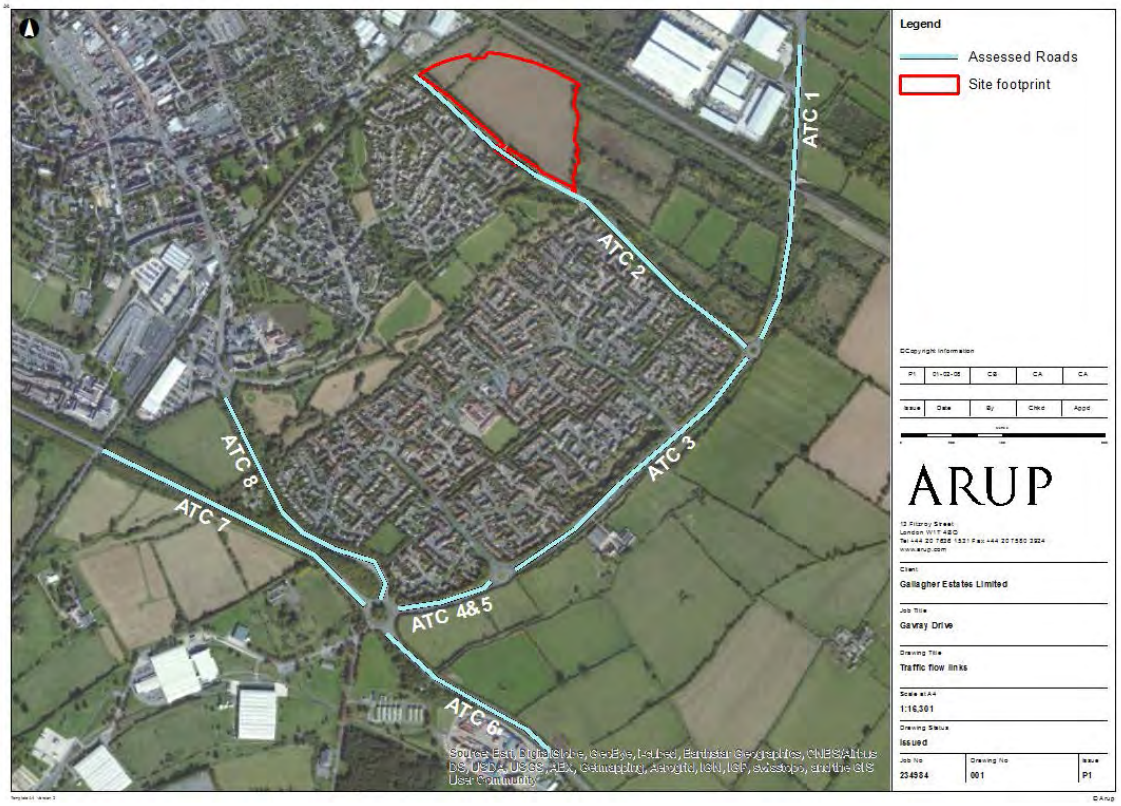

Figure 1 Summary of assessed roads for road traffic noise (BNL) predictions

Table 1 - Table 4 provide details of predicted road traffic flows of the nearest road network to the proposed site, relating to the 'Baseline 2014' (B) conditions as well as predicted 'do minimum 2020' (DM) and 'do something' (DS).

Table 1 Road Traffic AAWT flows without South East Bicester

Code	Link	18hr AAWT flows				
		B	DM	DS+CD	DS+CD+ GDD	DS+CD+ SD
ATC 1	Chabridge Ln	12244	13234	14481	14757	14942
ATC 2	Gavray Drive	1771	1914	1989	3002	3677
ATC 3	Wretchwrack Way	11027	11918	13317	14053	14544
ATC 4&5	Neunkirchen Way	14257	15409	17150	17886	18377
ATC 6	A41 (South)	20778	22456	24464	24560	24624

ATC 7	A41 (North)	22514	24333	29126	29738	30146
ATC 8	London Road	10187	11010	11196	11225	11244

Table 2 Road Traffic %HGV without South East Bicester

Code	Link	%HGV				
		B	DM	DS+CD	DS+CD+ GDD	DS+CD+ SD
ATC 1	**Chabridge Ln**	9.8	9.8	9.1	9	8.9
ATC 2	**Gavray Drive**	5.6	5.6	5.4	3.6	2.9
ATC 3	**Wretchwrack Way**	11.6	11.6	10.6	10	9.7
ATC 4&5	**Neunkirchen Way**	8.6	8.6	7.8	7.5	7.3
ATC 6	**A41 (South)**	6.8	6.8	6.3	6.3	6.3
ATC 7	**A41 (North)**	8.6	8.6	6.7	6.5	6.4
ATC 8	**London Road**	5.7	5.7	5.7	5.7	5.7

Table 3 Road Traffic AAWT flows with South East Bicester

Code	Link	18hr AAWT flows				
		B	DM	DS+CD	DS+CD+ GDD	DS+CD+ SD
ATC 1	**Chabridge Ln**	12244	13234	14953	15230	11392
ATC 2	**Gavray Drive**	1771	1914	1986	2999	1646
ATC 3	**Wretchwrack Way**	11027	11918	14155	14795	10340
ATC 4&5	**Neunkirchen Way**	14257	15409	17989	18630	13626
ATC 6	**A41 (South)**	20778	22456	25304	25304	19693
ATC 7	**A41 (North)**	22514	24333	31150	31762	21576
ATC 8	**London Road**	10187	11010	11519	11548	9794

Table 4 Road Traffic %HGV with South East Bicester

Code	Link	18hr %HGV flows				
		B	DM	DS+CD	DS+CD+ GDD	DS+CD+ SD
ATC 1	**Chabridge Ln**	9.8	9.9	9.1	8.9	9.9
ATC 2	**Gavray Drive**	5.6	5.3	5.1	3.4	5.3
ATC 3	**Wretchwrack Way**	11.6	11.2	9.7	9.3	11.2
ATC 4&5	**Neunkirchen Way**	8.6	8	7.1	6.9	8
ATC 6	**A41 (South)**	6.8	6.4	5.9	5.9	6.4
ATC 7	**A41 (North)**	8.6	8.3	6.2	6.1	8.3
ATC 8	**London Road**	5.7	5.3	5.3	5.3	5.3

Where:

- *B is baseline (2014)*
- *DM is 'Do minimum' (2020),*
- *With Committed Development (CD),*

- *With the Gavray Drive Development - west parcel (GDD), and*
- *With Sensitivity Development - both west and east parcels (SD).*

7.3

APPENDIX 7.3 – Site Suitability Assessment

Introduction

7.1 This appendix provides an assessment in noise terms, of the suitability of the site for residential development. It considers the effects of transportation and other anonymous noise by reference to absolute noise criteria developed by reference to BS8233:2014: Sound Insulation and noise reduction for buildings – Code of practice and World Health Organization (WHO) Guidelines for Community Noise (1999).

Suitability of the site for residential development

7.2 Noise effects upon proposed new residential uses have been considered by reference to criteria from BS8233 and WHO Guidelines as presented in Table 1.

Table 1 Residential ambient noise criteria for proposed new residential buildings

Source of criteria and space	Target level
BS8233 – Living rooms (07:00 to 23:00)	35dBL_{Aeq}*
WHO – Living rooms (07:00 to 23:00)	35dBL_{Aeq}
BS8233 – Bedrooms (23:00 to 07:00)	30dBL_{Aeq}*
WHO – Bedrooms (23:00 to 07:00)	30dBL_{Aeq}
WHO – Bedrooms (23:00 to 07:00)	45dBL_{Amax}
WHO – Outdoor living areas (07:00 to 23:00)	50 – 55dBL_{Aeq}
* BS8233:2014 allows 5dB internal target level relaxation, where the development is considered necessary or desirable	

Baseline Noise Survey

7.3 Currently there are construction works ongoing on the Bicester Chord which have prevented survey measurements being taken on site in the last three months. Given the difficulties in carrying out noise surveys, a baseline noise map model has been prepared instead ,using rail noise source data and road traffic source data, calibrated to noise survey measurements taken by Environmental Resources Management (ERM) at the site to accompany the Chiltern Railways application for the Bicester Chord development works. The data is found in “Scheme of Assessment for Route Section A”, reference 0221083/11/04 as issued in January 2014. This data has been used to calibrate the model and predictions of ambient noise on the site. The model outputs are used here to determine the baseline noise climate on the site.

7.4 The baseline noise survey was conducted by ERM from 4 to 9 of August 2010 to establish the existing noise climate in the area. Measurements have been taken to enable the assessment of proposed new sources forming part of the development affecting existing sensitive receptors and noise from existing sources affecting the

proposed development. The measurement locations are represented by green circles and proposed development in shaded orange.

Figure 1 Development footprint and measurement locations

Baseline Noise Results

7.5 The baseline noise levels at measurement locations are summarised Table 2 and Table 3:

Table 2 Measurements during daytime

Measurement Location	Measured Noise level, dB			
	$L_{A90,T}$	L_{Aeq}	L_{A10}	$L_{Amax,F}$
NML (ES) 1 – Gavray Drive	39 - 40	47 - 48	50 - 51	66 - 72
NML (P1) – Whimbrel Close	32 – 45	40 – 52	43 – 57	51 - 74

Table 3 Measurements during night time

Measurement Location	Measured Noise level, dB			
	$L_{A90,T}$	L_{Aeq}	L_{A10}	$L_{Amax,F}$
NML (ES) 1 – Gavray Drive	37 - 38	41 - 42	41 - 42	57 – 64
NML (P1) – Whimbrel Close	27 - 44	33 - 48	35 - 50	48 - 69

Transportation noise assessment

7.6 The most significant transportation noise source affecting the proposed development site is railway noise from the Bicester Chord to the north and road traffic from Gavray Drive road to the west.

7.7 In order to fully understand the noise impact of rail and road traffic the measured noise data has been used to calibrate a noise map as explained below.

7.8 The measurements taken at location NML-ES1 are assumed to be robust and representative of the daytime $L_{Aeq,16h}$. The resultant daytime noise level at location NML-ES1 is therefore 48dB$L_{Aeq,16h}$.

7.9 Taking the diurnal variation in noise levels from NML-ES1 would suggest that night time level at Location R5 is 41$L_{Aeq,8h}$, i.e. 7dB quieter than the day time.

7.10 In addition to the noise levels measured on-site, road traffic flow data has been provided to carry out a CRTN calculation. Details can be found in Appendix 5.2.

7.11 Likewise, $L_{Aeq,16h}$ and $L_{Aeq,8h}$ resulting from railway noise of the Bicester Chord have been provided in the Scheme of Assessment for Route Section A – Appendix D, Table D4.1 and Table D4.2 carried out by Environmental Resources Management (ERM). A summary is shown in Table 4:

Table 4 Results of noise modelling with and without mitigation (free-field)

Measurement Location	Predicted Train Noise level without mitigation*, dB		Predicted Train Noise level with mitigation*, dB	
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	$L_{Aeq,16h}$	$L_{Aeq,8h}$
NML (ES) 1 – Gavray Drive (First floor)	60	58	49	48
NML (P1) – Whimbrel Close (First floor)	67	66	65	64

**Mitigation of ERM discussed below*

7.12 The noise levels shown in Table 4 are used to calibrate the railway noise map. It is important to point out that noise from existing train movements was removed from the measured baseline noise levels as these will be replaced by the Bicester Chord Railway Order Scheme.

Daytime

Outdoor sound levels

7.13 Physical mitigation will be driven by noise levels in outdoor amenity areas during the day, because indoor noise levels can be more readily controlled.

7.14 Noise mapping has been conducted (Figure 2) to show the predicted daytime sound levels across the site at a height of 4m above ground to represent worst case scenario at an elevated window. The noise map is calibrated to the measurements obtained at NML-ES1 for road noise and to levels given by ERM summarised in Table 4.

7.15 The Scheme of Assessment for Route Section A advises on an acoustic barrier of 2.5m. However, the acoustic barrier would only protect existing noise sensitive receptors and

proposed development would be exposed to high levels during both daytime and night time as it is shown in the figure below.

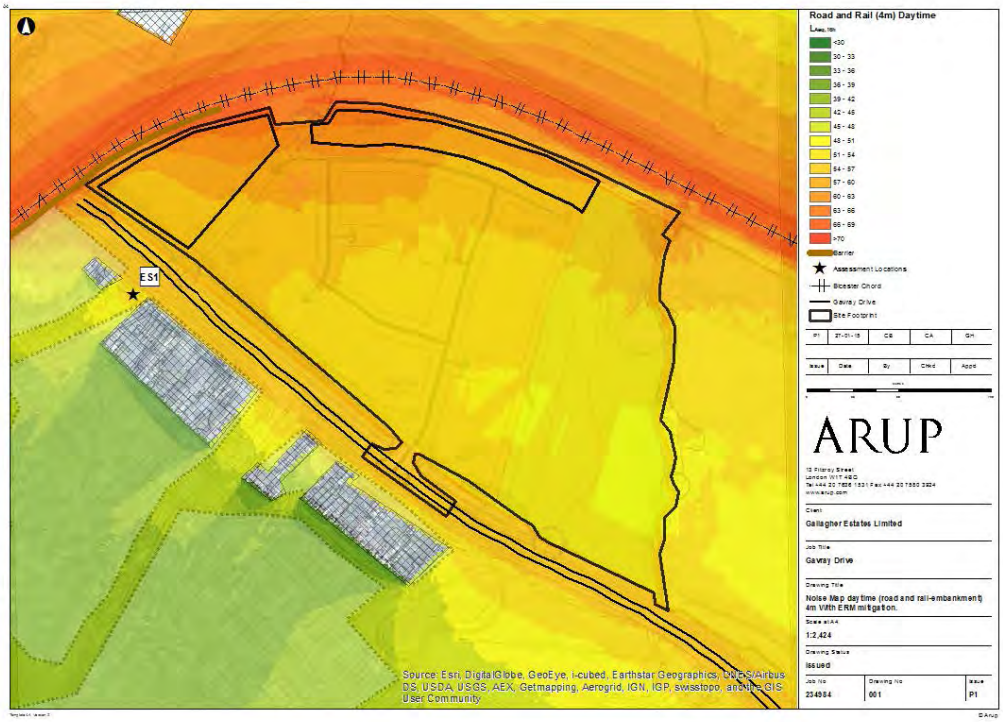

Figure 2 Noise map of current situation during daytime

7.16 By reference to WHO noise criteria, a value of 55dBL$_{Aeq,16h}$ at 1.5m above ground has been adopted as a design target for residential gardens. It can be seen from the noise maps that, without mitigation and when assessed as an empty site, areas to the north boundary reside in the 60-63dB contour, and therefore exceed the adopted design target.

Mitigation Options

7.17 Possible mitigation options are discussed below:

7.18 Erect a noise barrier / bund combination to deliver 55dBL$_{Aeq,16h}$ at 1.5m above the ground at the perimeter of the red line boundary.

7.19 Use residential properties to the north to provide a noise barrier to properties further away. This requires a contiguous row of terraces / apartment block (or similar) or for properties to be tightly packed with fences between them. The gardens would need to be located to the south so that the property provides a noise barrier to the rear garden, and if the gardens were to the north they would need a large timber fence, potentially prohibitively tall.

7.20 Use a row of commercial properties to provide a noise barrier to residential properties further away. Same as above but using less sensitive buildings to provide a barrier effect and increased buffer distance.

7.21 The following Figure 3 shows a noise map with an indicative 2.5m high noise barrier to the northern boundary. This barrier is based on the design of the proposed ERM mitigation, so instead of having an incomplete barrier that only protects existing noise sensitive receptors, it would extend to the perimeter of the proposed site, achieving 55dB$L_{Aeq,T}$ (at 1.5m above the ground) at the edge of the red line boundary.

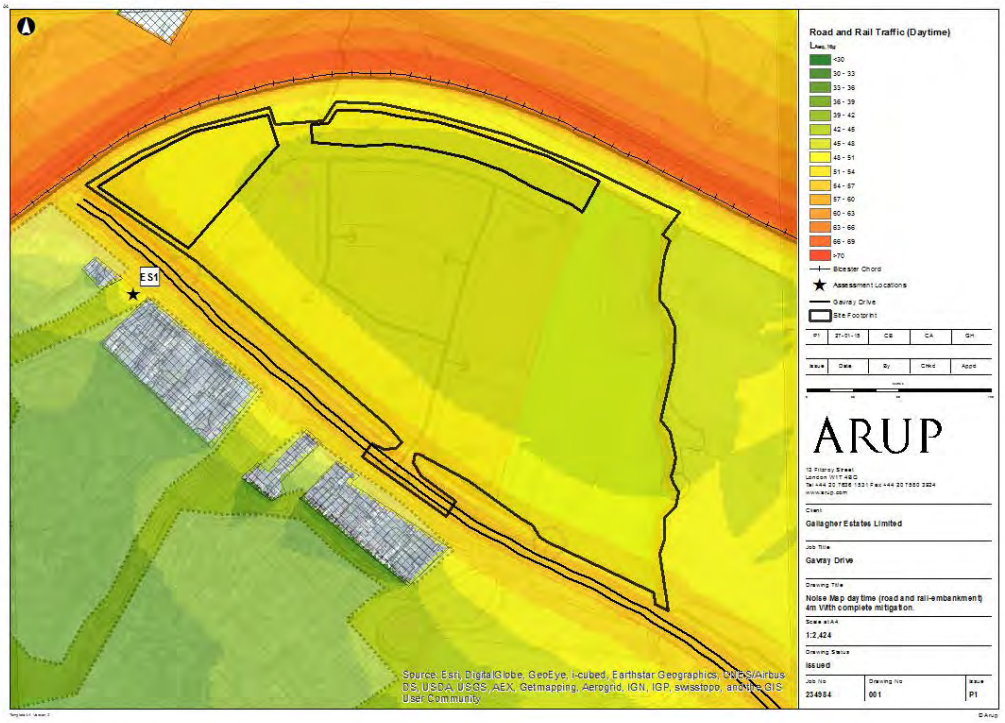

Figure 3 Noise map of proposed development with extended mitigation of railway along perimeter

Internal Sound Levels

7.22 A value of 55dB$L_{Aeq,16h}$ at 1.5m above ground has been adopted as a design target for residential gardens. This is equivalent to 58dB$L_{Aeq,16h}$ as a façade level.

7.23 Assuming 10-15 dB(A) attenuation (from a facade level) for an open window, the resulting equivalent internal noise level would be 43-48dB(A).

7.24 A standard thermal double glazed unit with a ventilation opening not exceeding 8000mm^2 would provide at least 26dB sound insulation (from a façade level) when closed. The resulting equivalent internal noise level would be 32dB(A); well within the 35dB(A) criterion quoted in WHO and BS8233.

7.25 It is recommended that the full details be developed during detail design, because it relies upon a fuller understanding of the building design. This approach can be secured by a suitably worded planning condition.

7.26 Therefore it can be seen that the adopted design criteria is consistent with acceptable internal sound levels, for ground floor rooms, on the basis of enhanced closed windows and acoustically treated ventilation solutions.

Night-time

Internal Sound Levels

7.27 Taking the diurnal variation in noise levels from logger NML-P1 suggests that night time noise levels from Gavray Drive road would be 7dB(A) quieter than the day time. Night-time levels for rail are only 1dB lower than daytime based on the ERM Scheme of Assessment.

7.28 A noise map across the site at 4m above ground (to represent 1st floor bedroom) with both rail and road noise is shown in Figure 4.

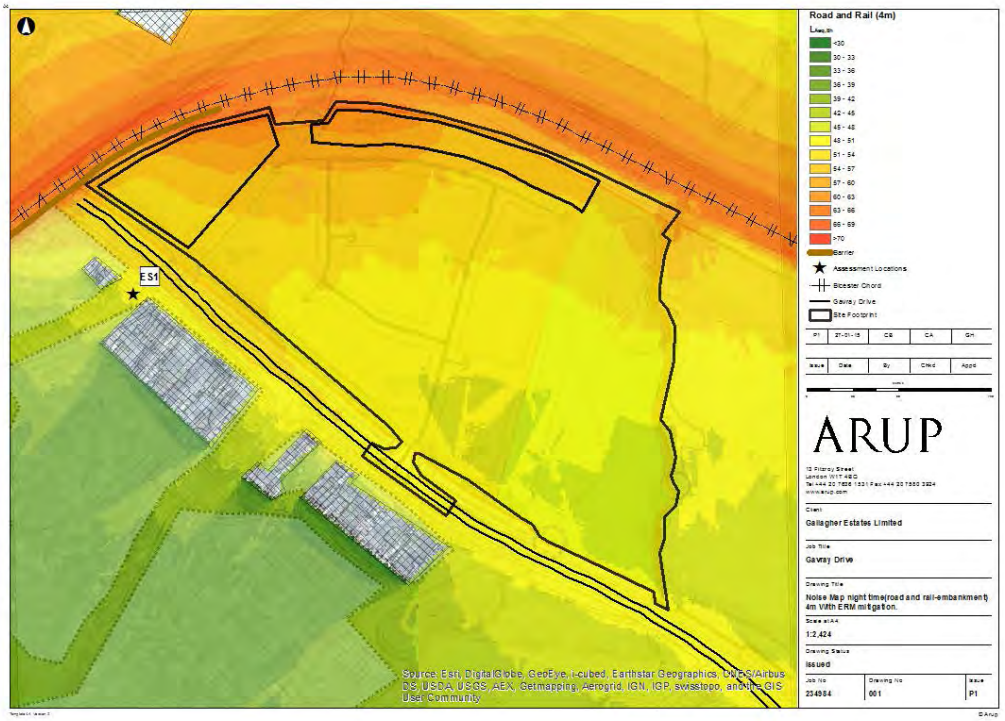

Figure 4 Noise map of current conditions during night time

7.29 Noise levels to the north of the development reside on the 63-66dB line contour. These levels would not be within proposed criteria even with a 26dB attenuation of single glazing being considered.

7.30 However, if a noise barrier is assumed along the perimeter of the site or other mitigation towards the northern boundary, then the effects could be potentially reduced.

7.31 Noise mapping has therefore been conducted (Figure 5) to show the predicted night-time sound levels across the site at height of 4m metres above ground.

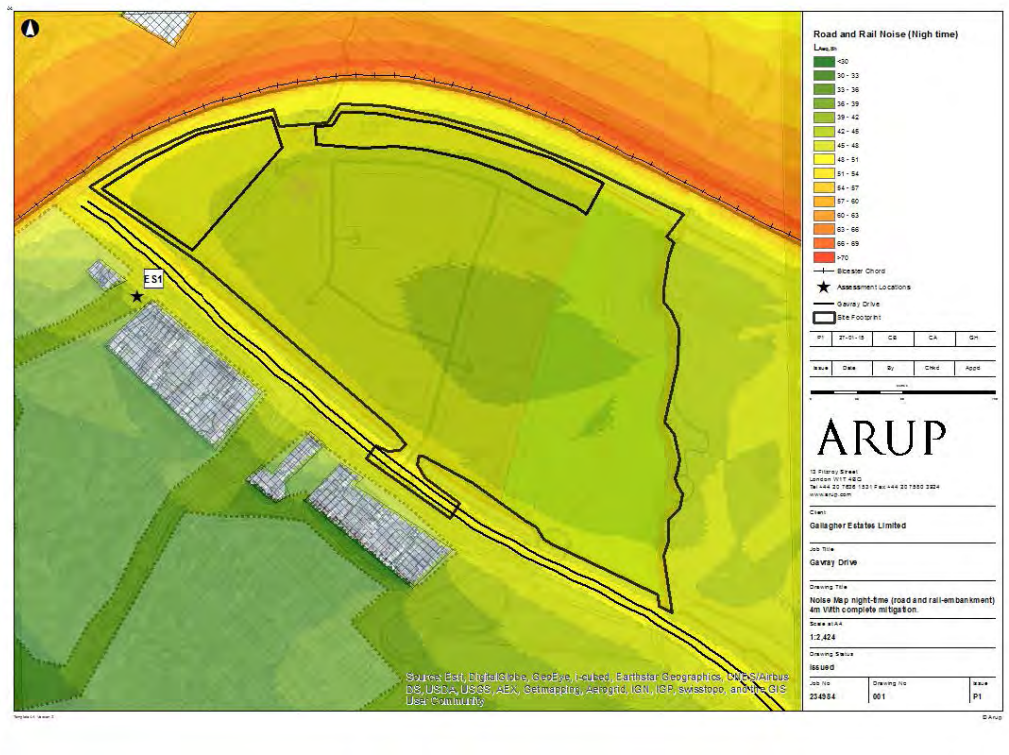

Figure 5 Noise map during night time with extended mitigation

7.32 A resultant worst case noise level of 54dB$L_{Aeq,8h}$ at 4m above ground has been adopted for this assessment. This is equivalent to 58dB$L_{Aeq,8h}$ as a façade level.

7.33 Assuming 10-15dB(A) attenuation (from a facade level) for an open window, the resulting equivalent internal noise level would be 39-44dB(A).

7.34 To achieve the more onerous requirements of 35dB$L_{Aeq,16h}$ criterion, the residences would require enhanced glazing and acoustically treated ventilation provision.

7.35 It is recommended that the full details be developed during detail design, because it relies upon a fuller understanding of the building design. This approach can be secured by a suitably worded planning condition.

7.36 The adopted design criteria for residences during the day is consistent with acceptable internal sound levels, for first floor bedrooms at night, on the basis of enhanced glazing and acoustically treated ventilation solutions.

7.37 Once the development is fully built out, the properties towards the centre of the site will be afforded a degree of barrier attenuation from those properties located around the site perimeter. Consequently for the majority of the site suitable internal maybe be achieved on a windows open basis.

7.38 If necessary, the requirement for a more detailed noise study on a plot by plot basis could be secured by a suitably worded planning condition, once detailed layouts for the development are brought forward.

Summary

7.39 In summary, the proposed development may be considered to be suitable for residential uses, with the provision of enhanced glazing and acoustically treated ventilation such that windows may remain closed. This also considers the railway mitigation outlined by ERM.

7.40 For this assessment the proposed approach is considered to result in noise levels inside buildings below a LOAEL. At these levels "*Noise can be heard, but does not cause any changes in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life*". No specific additional actions would be required.