MVV Environment Services Ltd

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Environmental Statement Appendix
Volume Two

27 October 2016

MVV Environment

ARUP

Contents

Introduction

This Environmental Statement (ES) Appendix is part of a suite of documents submitted to Dundee City Council (DCC) in support of an application for planning permission by MVV Environment Services Limited (MVV) (the Applicant) for the construction and operation of an Energy from Waste Combined Heat and Power Facility (EfW CHP facility) (The Proposed Scheme) on land situated on Forties Road, in the north-east of Dundee (the Application Site).

The proposed EfW CHP facility would replace the existing DERL EfW facility on the neighbouring site on Forties Road.

The ES has been prepared pursuant to The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 (EIA Regulations). It comprises two volumes with supporting appendices, and a non-technical summary (NTS), namely:

a) **Volume One**: this provides a description of the existing Application Site and surroundings (Section 2), a description of the Proposed Scheme (Section 3), a description of alternatives (Section 4), a description of the EIA approach and methodology (Section 5) and a summary of the environmental assessment results (Section 6);

b) **Volume Two:** this provides assessments for the following topics:

- Acoustics (Volume 2, Section 2);
- Air Quality (Volume 2, Section 3);
- Ecology (Volume 2, Section 4);
- Ground Conditions and Contamination (Volume 2, Section 5);
- Landscape and Visual Amenity (Volume 2, Section 6)
- Socio-economics (Volume 2, Section 7);
- Traffic and Transport (Volume 2, Section 8);
- Water Resources (Volume 2, Section 9); and
- Interactive Effects[1] (Volume 2, Section 10).

c) **Volume Three**: this provides the supporting A3 figures to Volume Two;

d) **Appendix Volume One**: this provides supporting figures, reports and documents to Volume One;

e) **Appendix Volume Two (this Appendix)**: this provides supporting reports and documents to Volume Two;

f) **Non-Technical Summary**: This provides a summary description of the Proposed Scheme and environmental assessment results presented in non-technical language.

[1] It is noted that cumulative effects are assessed in the topic section (Volumes 2) of the ES.

Appendix A

Acoustics

Contents

A1 Acoustics terminology

Decibel (dB)

The ratio of sound pressures which we can hear is a ratio of 10^6:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as L_{A10}, L_{A90}, and L_{Aeq} for the 'A' weighted equivalent continuous noise level.

Equivalent continuous sound level

An index for assessment for overall noise exposure is the equivalent continuous sound level, L_{eq}. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

Frequency

Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1kHz, e.g. 2kHz = 2000Hz. Human hearing ranges approximately from 20Hz to 20kHz. For design purposes the octave bands between 63Hz to 8kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or in some cases, narrow frequency bands.

Maximum noise level

The maximum noise level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response. Slow time weighting (S) has an exponential time constant of 1s and is used to allow more accurate estimation of the average sound level on a visual display.

The maximum level measured with fast time weighting is denoted as $L_{Amax, F}$. The maximum level measured with slow time weighting is denoted $L_{Amax, S}$.

Noise rating (NR) curves

Noise rating (NR) curves are a set of internationally-agreed octave band sound pressure level curves, based on the concept of equal loudness. The curves are mathematically derived and defined in BS 8233 and commonly used to define building services noise limits. The NR value of a noise is obtained by plotting the octave band spectrum on the set of standard curves. The highest value curve which is reached by the spectrum is the NR value. Shown below is a plant noise spectrum that is equivalent to NR70.

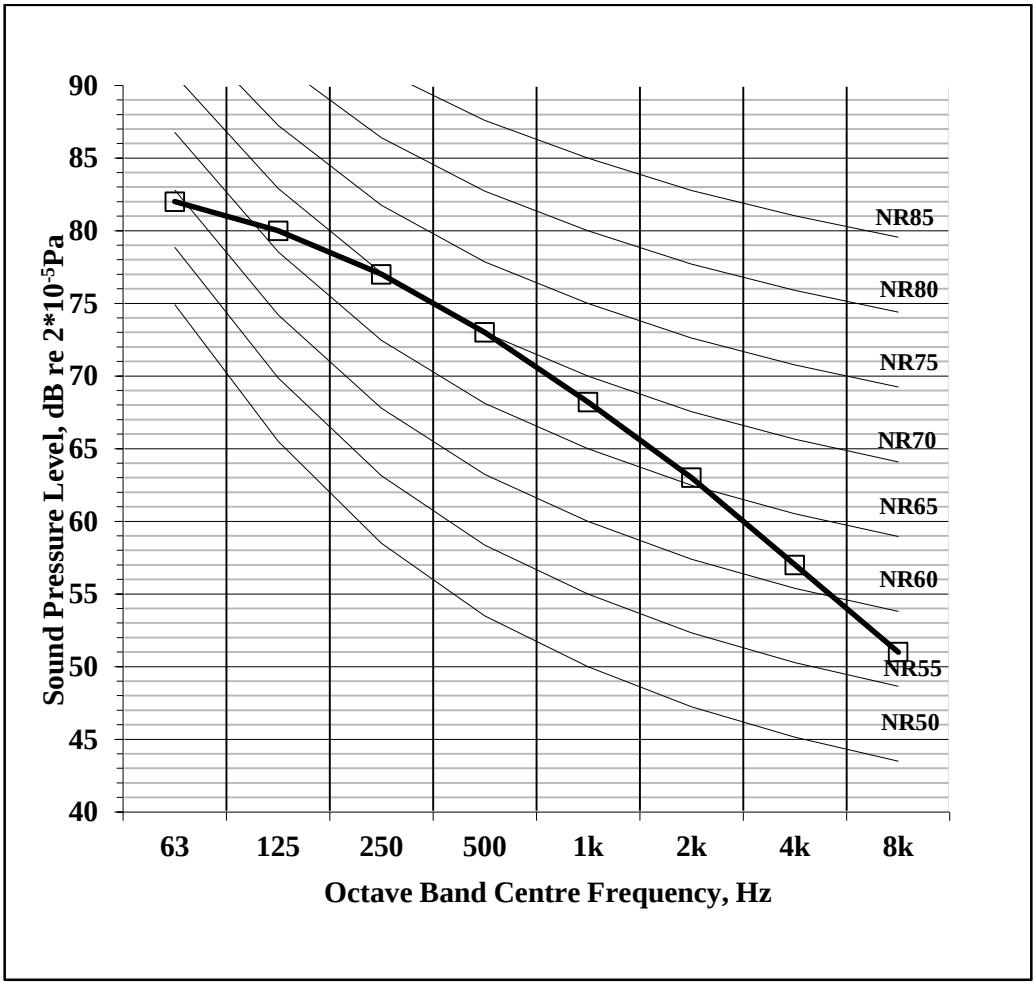

Figure A.1 Noise Rating curves

Noise criteria (NC) curves

Noise criteria (NC) curves were originally developed in the USA. The curves are commonly used to define building services noise limits. The NC value of a noise is obtained by plotting the octave band spectrum on the set of standard curves. The highest value curve which is reached by the spectrum is the NC value, in a similar way to that described for NR.

Sound pressure level

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level (L_p) is ten times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of 2 x 10^{-5}Pa (the threshold of hearing).

Thus L_p (dB) = 10 log $(P1/P_{ref})^2$ where P_{ref}, the lowest pressure detectable by the ear, is 0.00002 pascals (i.e. $2x10^{-5}$ Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dBL_A and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

Sound reduction index (R)

The sound reduction index (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. The weighted sound reduction index, R_w, is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'_w ratings.

Statistical noise levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{10}, the level exceeded for 10% of the time period under consideration, and can be used for the assessment of road traffic noise (note that L_{Aeq} is used in BS 8233 for assessing traffic noise). The L_{90}, the level exceeded for 90% of the time, has been adopted to represent the background noise level. The L_1, the level exceeded for 1% of the time, is representative of the maximum levels recorded during the sample period.

A weighted statistical noise levels are denoted L_{A10}, dBL_{A90} etc. The reference time period (T) is normally included, e.g. dB$L_{A10,\ 5min}$ or dB$L_{A90,\ 8hr}$.

Typical levels

Some typical dB(A) noise levels are given in Table A.1:

Table A.1 Typical noise levels (dBA)

Noise Level, dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-off at 100m
110	Chain saw at 1m

100	Inside disco
90	Heavy lorries at 5m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heater at 1m
40	Living room
30	Theatre
20	Remote countryside on still night
10	Sound insulated test chamber

A2 Policy and Guidance

A2.1 Legislative and Policy Background

This noise and vibration assessment takes account of the following national legislation:

- Scottish Planning Policy (SPP, 2014)[1]
- Scotland's third National Planning Framework (NPF3)[2]
- The Environmental Noise (Scotland) Regulations 2006[3]
- The Control of Pollution Act 1974 (CoPA)[4]
- The Environmental Protection Act 1990[5]

In addition, The Dundee Local Development Plan 2014[6] was reviewed as part of this assessment. The Local Development Plan sets out the land use strategy that will guide development across Dundee up to 2024 and beyond.

Policy 47: Environmental Protection – states *'All new development or an extension to an existing development that would generate noise, vibration or light pollution will be required to demonstrate that it can be accommodated without an unsatisfactory level of disturbance on the surrounding area.*

New development or an extension to an existing development in close proximity to existing sources of noise, vibration or light pollution will need to demonstrate that it can achieve a satisfactory level of amenity without impacting on viability of existing businesses or uses.'

[1] Scottish Planning Policy; The Scottish Government; Accessed via: http://www.gov.scot/Resource/0045/00453827.pdf; last accessed: 17 May 2016.
[2] National Planning Framework 3 (NPF3); Scottish Government; http://www.gov.scot/Topics/Built-Environment/planning/NPF3-SPP-Review/NPF3 ; Accessed 17 May 2016
[3] The Environmental Noise (Scotland) Regulations 2006 http://www.legislation.gov.uk/ssi/2006/465/pdfs/ssi_20060465_en.pdf last accessed: 17 May 2016.
[4] Control of Pollution Act 1974 (1974 Chapter 40); http://www.legislation.gov.uk/ukpga/1974/40; Accessed: 17 May 2016
[5] The Environmental Protection Act 1990; Access via http://www.legislation.gov.uk/ukpga/1990/43/contents; last accessed 18 May 2016
[6] Dundee Local Development Plan 2014, Dundee City Council; last accessed 05 October 2016; https://www.dundeecity.gov.uk/sites/default/files/publications/CD_LDP_written_statement_Dec13.pdf

A2.2 Guidance and Standards

The noise (and vibration) assessment has taken account of the following relevant guidance and standards:

- Guidelines for Community Noise (World Health Organization,1999) [7]
- Night Noise Guidelines (NNG) for Europe (World Health Organisation Europe,1999)[8]
- Planning Advice Note (PAN) 1/2011 (Scottish Government,2011)[9]
- BS8233 Guidance on sound insulation and noise reduction for buildings (British Standards Institution, 2014)[10]
- BS4142 2014 Methods for rating and assessing industrial and commercial sound (British Standards Institution, 2014)[11]
- BS 5228-1 Code of practice for noise and vibration control on construction and open sites – Noise (British Standards Institution, 2014) [12]
- Calculation of Road Traffic Noise (CRTN) (Welsh Office, 1988) (CRTN)[13]
- The Design Manual for Roads and Bridges (DMRB) HD213/11 (Highways Agency and Welsh Office, 2011)[14]
- Horizontal Guidance Note IPPC H3 (part 1) Regulation and Permitting[15]
- Horizontal Guidance Note IPPC H3 (part 2) Noise assessment and Control[16]

[7] World Health Organization (1999); Guidelines for Community Noise; http://www.who.int/docstore/peh/noise/guidelines2.html; Accessed: 17 May 2016
[8] World Health Organisation Europe; Night Noise Guidelines for Europe (2009); http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf; Accessed 17 May 2016.
[9] Planning and noise 1/2011; The Scottish Government; http://www.gov.scot/resource/doc/343210/0114180.pdf; Accessed 17 May 2016
[10] British Standards Institute (2014). BS8233 Guidance on sound insulation and noise reduction for buildings.
[11] British Standards Institute (2014). BS4142:2014 Methods for rating and assessing industrial and commercial sound.
[12] British Standards Institute (2014). BS5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites - Noise.
[13] Department of Transport and Welsh Office (1988). Calculation of Road Traffic Noise
[14] Highways Agency and Welsh Office (2011). Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, HD213/11 Revision 1, Noise and Vibration
[15] Horizontal Guidance Note IPPC H3 (part 1) Regulation and Permitting (2002); Environment Agency; https://www.sepa.org.uk/media/61299/ippc-h3-1-noise-part-1-published-september-2002.pdf ; Accessed 17 May 2016
[16] Horizontal Guidance Note IPPC H3 (part 2) Noise assessment and Control (2002); https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/298126/LIT_8291_337647.pdf ; Accessed 17 May 2016

- Control of Pollution Act, 1974[17]
- Environmental Protection Act, 1990[18]

[17] Control of Pollution Act 1974 (1974 Chapter 40); http://www.legislation.gov.uk/ukpga/1974/40; *Accessed: 17 May 2016*
[18] Environmental Protection Act 1990 (Chapter 43); http://www.legislation.gov.uk/ukpga/1990/43/pdfs/ukpga_19900043_en.pdf; Accessed: 5 May 2016.

A3 Engagement

Table A.2 Engagement summary

No.	Organisation and date	Comment	Response
1	Arup 11 October 2016	*Email to EHO, Dundee City Council (DCC):* *Thank you for your recent advice on the above application.* *With regard to the environmental statement, would you (or the DCC Planning Team) confirm that the following approach for the ES chapter would be acceptable based on the programme current constraints on producing a full operation noise model.* • *The noise emission from the proposed waste to energy facility and its associated operations within the redline boundary would not be quantified in the ES. Instead, noise will be assessed on the basis that noise emission will meet SEPA's permit requirements, which DCC will be consulted on. This will provide assurance that noise emission will be controlled appropriately, and would be therefore 'not significant', in EIA terms.* *Clearly, to obtain the SEPA permit before the facility can operate, the applicant will produce a full noise model to provide evidence that SEPA's requirements are met.* *I hope this would meet your requirements for the application, I'd be grateful if you could let me have you comments, or those of the planning officer if required to proceed on this.*	*No response received at date of publication.*
2	SEPA, 14 June 2016	*Email from SEPA:* *"…we are in agreement that the proposed locations and use of attended and unattended surveys would be appropriate. The only comment that we*	*Email from Arup:* *"We shall proceed on this basis and we note your comment regarding tonal analysis. Our attended monitoring will be undertaken using 1/3 octave*

No.	Organisation and date	Comment	Response
		would add is that tonal analysis would also be useful to fully characterise the noise environment."	*band sound level meters. Unattended meters may also have 1/3 octave band capability depending on equipment availability.* *I would also reiterate that we would have to resort to attended surveys if deployment of loggers is not possible, eg due to security of equipment or no resident uptake."*
3	Arup, 28 January 2016	*Email to EHO, Dundee City Council (DCC):* *Further to our previous telephone conversation/communications I write to summarise the current position.* *Following discussions and feedback from David Fisher at SEPA, he has suggested that as noise is a planning issue, Dundee City Council should agree baseline monitoring requirements and acceptable levels of noise emission.* *For clarity, do you require us to scope for a baseline survey and assessment:* *a) appropriate for a standard EIA (suitable for a planning application); OR also* *b) compliant with the 'IPPC H1 Horizontal Guidance Note'.* *Your guidance would be welcome.*	*Email from EHO, DCC:* *I refer to your email dated the 28/1/16.* *All aspects of noise, whether at the construction or operational stages, must be assessed to determine the potential impact on the residents of the area. I am unable to define the specific noise sources given the limited information available regarding the proposed site - this will need to be determined by you from your client's brief.* *I spoke with [SEPA contact] yesterday and the simple answer to your question is that baseline survey and assessment will be required for (a) and (b), as per your email.* *I trust this clarifies this matter. Please contact me should you require further information.*

A4 Baseline Noise Survey

A4.1 Introduction

Arup has been commissioned by MVV Environment Services Limited to provide consultancy services in support of the proposed 'Energy from Waste' (EfW) facility at Baldovie, Dundee.

As part of the Environmental Statement, an assessment of the existing noise climate in and around the site has been necessary. This report details the attended and unattended baseline noise surveys which have been conducted.

Acoustic terminology used in this report is explained in Appendix A1.

A4.2 Site description

As shown in Figure A4.2, the proposed site is located immediately adjacent to the existing DERL facility on Forties Road. The surrounding area consists predominantly of industrial estates and residences, in addition to a number of open spaces[IL2]. The proposed development site lies on Forties Road. Other road links in the vicinity include Drumgeith Road to the north, Baldovie Road to the east and Balunie Drive to the south. A tyre production facility (operated by Michelin) is located to the east of the proposed site and a car dismantling yard is located to the south.

Figure A4.2 Proposed development site and surrounding area

A4.3 Methodology

A4.3.1 Dates, personnel and conditions

The noise survey was conducted by Iain Laird and Nastassia Somikava of Arup between 20 June and 26 June 2016. Attended measurements were conducted on 20 and 26 June in addition to unattended measurements conducted in the intervening time. Meteorological conditions were mainly clear and dry and windspeeds did not exceed 5m/s.

A4.3.2 Noise measurement equipment

The sound level meters and microphones are type 1 conforming to BS EN 61672-1:2013. The calibration of the sound level meters and microphones was checked before and after use to confirm that there was no significant drift in meter response. This verification indicated that there was less than 0.5dB variation between checks. The monitoring equipment is calibrated annually, according to international standards together with traceable records. The monitoring equipment used is described in Table A4.3 and Table A4.4.

Table A4.3 Instrumentation used for the attended noise measurements

Equipment	Manufacturer	Model Number	Serial Number
Precision integrating sound level meter	RION	NA28	30921859
Sound level meter microphone	RION	UC-59	04158
Sound level meter preamp	RION	NH-23	11914
Type I sound pressure level calibrator	RION	NC-74	34235940
Sound level meter windshield	RION	-	-

Table A4.4 Instrumentation used for the unattended noise measurements

Equipment	Manufacturer	Model Number	Serial Number
Logging sound level meter deployed north of Michelin tyre production facility			
Precision integrating sound level meter	RION	RION NL-32	00493035
Sound level meter microphone	RION	UC-53A	315940
Sound level meter preamp	RION	NH-21	29977
Type I sound pressure level calibrator	RION	NC-74	34104514
Logging sound level meter deployed south of Michelin tyre production facility			
Precision integrating sound level meter	RION	RION NL-32	00451285
Sound level meter microphone	RION	UC-53A	308532
Sound level meter preamp	RION	NH-21	15278

Equipment	Manufacturer	Model Number	Serial Number
Type I sound pressure level calibrator	RION	NC-74	34773051

A4.3.3 Noise measurement methodology

Attended and unattended noise measurements were captured at locations considered to be representative of the nearest existing noise sensitive receptors (dwellings) as shown in Figure A4.3. At each location, $L_{Aeq,T}$, L_{A10}, L_{A90} and L_{Amax} metric values were measured. Octave and third octave band spectra were also recorded at all attended survey locations. All broadband measurements were A-weighted and used a fast time constant (0.125s).

The sound level meter was mounted on a tripod with the microphone set approximately at 1.2m-1.5m above local ground level under acoustically free-field conditions (i.e. at least 3.5m from any reflective surface other than the ground). A windshield was fitted to the microphone in order to minimise the effects of wind-induced noise across the microphone diagram.

Attended noise measurements were carried out at the following times on 20 and 26 June:

- Day-time inter-peak measurements between the hours of 10:00 and 17:00hrs;
- Evening measurements 20:00-22:00;
- Night time measurements 01:00-04:00.

Attended measurements were 10 minutes in duration during day time and night time periods.

Unattended logging sound level meters were deployed on the north and south boundaries of the Michelin tyre production facility which captured relevant noise metrics in 15 minute intervals between 20 and 26 June 2016. These locations were chosen in lieu of deployment at residential receptors, which would have been the preferred option. On attending the site no suitable position was identified at any surrounding residential receptors. The unattended positions were chosen as being reasonable proxy locations and the noise climate least likely to be unduly influenced by activities at the Michelin tyre production facility.

Figure A4.3 Attended and unattended noise monitoring locations

A4.4 Measurement locations

A4.4.1 Location A

The attended sound level meter was located approximately 30m north of Drumgeith Road. This location is considered to be representative of ambient noise conditions at the closest residential receptors on Summerfield Avenue. During day and night times, ambient noise at this location was dominated by road traffic [MB3]on Drumgeith Road. Distant road traffic noise was also audible to the south and west during quiet periods.

Figure A4.4 Location A – view to the south east (left) and south west (right)

A4.4.2 Location B

Location B was considered representative of the ambient noise conditions at the closest residences on Britannia Drive. The attended sound level meter was located approximately 15m south of residences on Britannia drive. Ambient noise at this location consisted mainly of road traffic noise from Drumgeith Road with a contribution from distant road traffic noise to the west. In addition, during the night time, plant noise was audible to the south and south east. The plant noise consisted of both broadband and tonal noise. The tonal noise source was observed to activate during night time hours.

Figure A4.5 Location B – view to the north (left) and south (right)

A4.4.3 Location C

The attended sound level meter was located approximately 5m from Drumgeith Road adjacent to the entrance of Montpelier Gardens. This location was considered representative of the closest residential receivers on Montpelier Gardens. During day time and night time periods, ambient noise at this location was dominated by local road traffic on Drumgeith Road. Distant road traffic noise was audible to the west. Plant noise was audible to the south of this location in addition to seagulls gathering adjacent to the DERL facility.

Figure A4.6 Location C – View to the south west (left) and south east (right)

A4.4.4 Location D

This location was considered representative of the closest residential receivers on Drumgeith Road. The attended sound level meter was positioned approximately 17m from Drumgeith Road, adjacent to the corner of Hawick Drive. Ambient noise at this location, during day and night time periods, was dominated by road traffic on Drumgeith Road and Hawick Drive. Traffic on Hawick Drive was affected by a loose gravel surface, causing traffic to reduce speed. During quiet periods broadband plant noise was audible to the west. Activity from the Michelin Athletic club to the south created occasional noise (i.e. bottles being transferred to bins) during the evening.

Figure A4.7 Location D – View to the south (left) and south west (right)

A4.4.5 Location E

This location was considered representative of residential receptors on Balunie Drive. The attended sound level meter was located approximately 7m from Balunie Drive and approximately 60m west of Baldovie Road. During daytime and night times, ambient noise at this location was dominated by local road traffic on Balunie Drive and Baldovie Road. Tonal plant was audible to the north west during the night time. Pedestrian and residential activity was also audible at this location.

Figure A4.8 Location E – view to the north west (left) and south (right)

A4.4.6 Location F

The attended sound level meter was located approximately 8m from Balunie Drive. This location was considered representative of residential receptors on Balunie Drive. Ambient noise at this location was dominated by local road traffic during the day and night times. In addition, during the night time, distant tonal plant noise and HGV movements were audible to the north. During the daytime activity from Buildbase (to the north) was audible which comprised forklifts moving stock around the service yard.

Figure A4.9 Location F – View to the north west (left) and north east (right)

A4.4.7 Location G

The attended sound level meter was located approximately 4m from Balunie Drive. This location was considered representative of residences adjacent to Balunie Drive. Ambient noise at this location was dominated by local road traffic noise and occasional pedestrian/residential noise during the daytime and night time. During quiet periods distant road traffic was audible to the west. In addition, during the night time, distant plant noise was faintly audible to the north.

Figure A4.10 Location G – views to the east (left) and west (right)

A4.4.8 Logger location 1

An unattended sound level meter was located approximately 75m north of the Michelin tyre production facility and 200m south of Drumgeith Road. This location was approximately 150m east of the existing DERL facility and was considered representative of the prevailing noise climate to the north of the Michelin tyre production facility. Ambient noise at this location was dominated by distant road traffic to the north and west. At this location industrial noise was faintly audible from the existing DERL facility and the Michelin tyre production facility.

A4.4.9 Logger location 2

An unattended sound level meter was located adjacent to the south boundary of the Michelin tyre production facility, approximately 100m west of Baldovie Drive. This location was considered representative of the prevailing noise climate to the south of the Michelin tyre production facility. Ambient noise at this location was dominated by distant road traffic to the east in addition to occasional low-speed HGV movements in the service yard to the south.

A4.5 Measurement results

A4.5.1 Attended measurement results

The results of the attended noise measurements in terms of L_{A90}, L_{A10}, $L_{Amax,F}$ and $L_{Aeq,T}$ are shown in Table A4.5 to Table A4.11 below.

Table A4.5 Noise survey results at Location A

Date	Time		Wind		Noise Level, dB (A)				Comments[MB4]
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	19:55	20:05	2	NW	51	63	73	59	Road traffic on Drumgeith Road dominant, Distant Road Traffic to SW audible during quiet periods.
	00:00	00:10	0	-	39	53	72	39	
21/06/2016	02:05	02:16	0	-	37	49	66	49	
	11:54	12:10	0	-	56	64	74	62	
	14:45	14:55	1.5	NW	55	64	80	62	
22/06/2016	10:06	10:16	0.5	NW	54	65	72	62	
26/06/2016	10:17	10:27	0	-	51	64	69	60	
	12:30	12:40	1	SW	53	64	71	61	
	14:59	15:09	2-3	W	55	65	74	62	
	20:06	20:16	0	-	49	63	68	59	
27/06/2016	00:00	00:12	1-2	W	39	56	71	53	

Table A4.6 Noise survey results at Location B

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	20:15	20:25	3	SW	48	52	60	50	Road traffic noise on Drumgeith Road dominant, Broadband industrial noise audible to the south/ south east during quiet periods, local residential/pedestrian noise, tonal industrial noise observed to activate during night time hours to the south of this location.
21/06/2016	00:17	00:28	2-3	SW	40	42	46	41	
	02:28	02:39	2-3	SW	40	43	55	42	
	12:19	12:34	2	SW	49	52	62	50	
	15:01	15:11	2	SW	50	54	63	52	
22/06/2016	10:21	10:31	0.5	SW	47	51	61	49	
26/06/2016	10:34	10:44	1	W	45	48	56	47	
	12:46	12:56	2	SW	48	51	64	50	
	15:15	15:25	2-3	W	51	54	62	53	
	20:32	20:42	1	W	43	48	59	46	
27/06/2016	00:20	00:30	1	W	40	43	52	42	
	02:13	02:23	0	-	37	42	60	40	

Table A4.7 Noise survey results at Location C

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	20:34	20:44	2	W	51	73	82	68	Road traffic noise from Drumgeith Road dominant at this location, Noise from seagulls on top of existing DERL site throughout, Tonal plant to SW clearly audible, residential/pedestrian noise
21/06/2016	00:36	00:46	2	W	45	55	77	57	
	02:47	02:48	0	W	44	51	85	58	
	12:52	13:07	1	W	58	75	83	71	
	15:19	15:29	1	W	61	75	84	72	
22/06/2016	10:39	10:57	1	W	58	75	83	71	
26/06/2016	10:53	11:03	1	SW	57	75	84	71	
	13:04	13:14	2	S	55	75	82	70	
	15:32	15:42	2-4	S	61	74	81	71	
	20:51	21:01	0	-	52	73	83	69	
27/06/2016	00:39	00:49	0	-	44	51	78	58	

Table A4.8 Noise survey results at Location D

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	20:50	21:00	1	W	51	65	76	61	Road traffic on Drumgeith Road dominant, occasional traffic on Hawick Drive influenced by temporary gravel surfacing, Occasional activity from Michelin Athletic club, plant noise faintly audible to the west
21/06/2016	00:52	01:02	0.5	W	45	51	72	52	
	03:05	03:15	0.5	W	44	49	69	50	
	13:14	13:29	1	W	55	65	77	61	
	15:37	15:47	1	W	57	65	72	62	
22/06/2016	11:03	11:16	1	SW	54	64	87	64	
26/06/2016	11:13	11:23	1	SW	52	64	72	60	
	13:28	13:38	1	SW	55	65	76	62	
	15:49	15:59	1	SW	55	64	68	61	
	21:08	21:18	0	-	50	63	71	59	
27/06/2016	00:54	01:04	0	-	45	54	73	53	

Table A4.9 Noise survey results at Location E

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	21:09	21:19	1	NW	46	65	74	60	Road traffic noise on Balunie Drive dominant at this location, distant tonal plant audible to north west during quiet periods, distant road traffic to west audible during quiet periods, local residential/pedestrian noise
21/06/2016	01:10	01:20	1	NW	39	60	76	58	
	03:21	03:31	1	NW	41	54	72	54	
	13:36	13:51	1	NW	51	67	75	63	
	15:54	16:04	1	NW	52	67	76	63	
22/06/2016	11:27	11:37	1	NW	53	68	80	64	
26/06/2016	11:31	11:41	0-1	S	48	64	72	59	
	13:46	13:56	0-1	S	50	67	78	63	
	21:30	21:40	0	-	41	60	75	57	
27/06/2016	01:14	01:24	0	-	39	43	60	42	

Table A4.10 Noise survey results at Location F

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	21:26	21:36	0-0.5	W	42	65	77	60	Road traffic noise from Balunie Drive dominant noise source, during quiet periods and night time tonal plant noise audible to north, HGV movements faintly audible to north, local residential/pedestrian noise, noise from activity in BuildBase service yard
21/06/2016	01:27	01:37	0-0.5	W	40	43	59	42	
	03:36	03:46	0-0.5	W	38	47	72	49	
	13:56	14:15	0-0.5	W	46	71	78	65	
	16:09	16:19	0-0.5	W	46	71	78	66	
22/06/2016	11:42	11:52	0-0.5	W	47	68	76	63	
26/06/2016	11:48	11:58	1	S	43	69	76	63	
	14:01	14:11	1	S	42	69	76	63	
	21:47	21:57	1	S	39	59	75	59	
27/06/2016	01:30	01:40	0	-	40	48	78	55	

Table A4.11 Noise survey results at Location G

Date	Time		Wind		Noise Level, dB (A)				Comments
	Start	Finish	Speed ms^{-1}	Dir	L_{90}	L_{10}	L_{max}	L_{eq}	
20/06/2016	21:55	22:05	0.5	W	44	65	82	62	Road traffic noise on Balunie Drive dominant noise source at this location, distant road traffic to the west audible during quiet periods, general residential/pedestrian activity noise, distant plant noise faintly audible to the north during quiet periods
21/06/2016	01:45	01:55	0.5	W	36	56	74	56	
	03:52	04:02	0.5	W	40	59	79	58	
	14:21	14:36	0.5	W	51	68	79	65	
	16:24	16:34	0.5	W	55	69	78	66	
22/06/2016	11:59	12:09	0.5	W	52	69	83	66	
26/06/2016	12:08	12:18	0-1	S	48	68	77	63	
	14:18	14:28	2-2.5	SW	50	68	86	65	
	22:04	22:14	1	W	43	65	77	61	
27/06/2016	01:48	01:58	1	W	34	39	74	49	

A4.5.2 Unattended measurement results

The results of the unattended noise measurements are shown below in Table A4.12 and Table A4.13 with time traces shown in Figure A4.11 and Figure A4.12. Measurements are summarised in terms of $L_{Aeq,T}$, $L_{A90,T}$, $L_{A10,T}$ and $L_{Amax,F}$ for the day time and night time.

Table A4.12 Summary of noise levels measured with logging sound level meter (Logger 1)

Measurement period	Measured noise level dB (re 20µPa)			
	$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$	$L_{Amax,F}$
Day time (07:00 - 23:00)	48	50	51	62
Night time (23:00 - 07:00)	46	48	48	57

Table A4.13 Summary of noise levels measured with logging sound level meter (Logger 2)

Measurement period	Measured noise level dB (re 20µPa)			
	$L_{A90,T}$	$L_{Aeq,T}$	$L_{A10,T}$	$L_{Amax,F}$
Day time (07:00 - 23:00)	46	58	53	66
Night time (23:00 - 07:00)	41	46	48	60

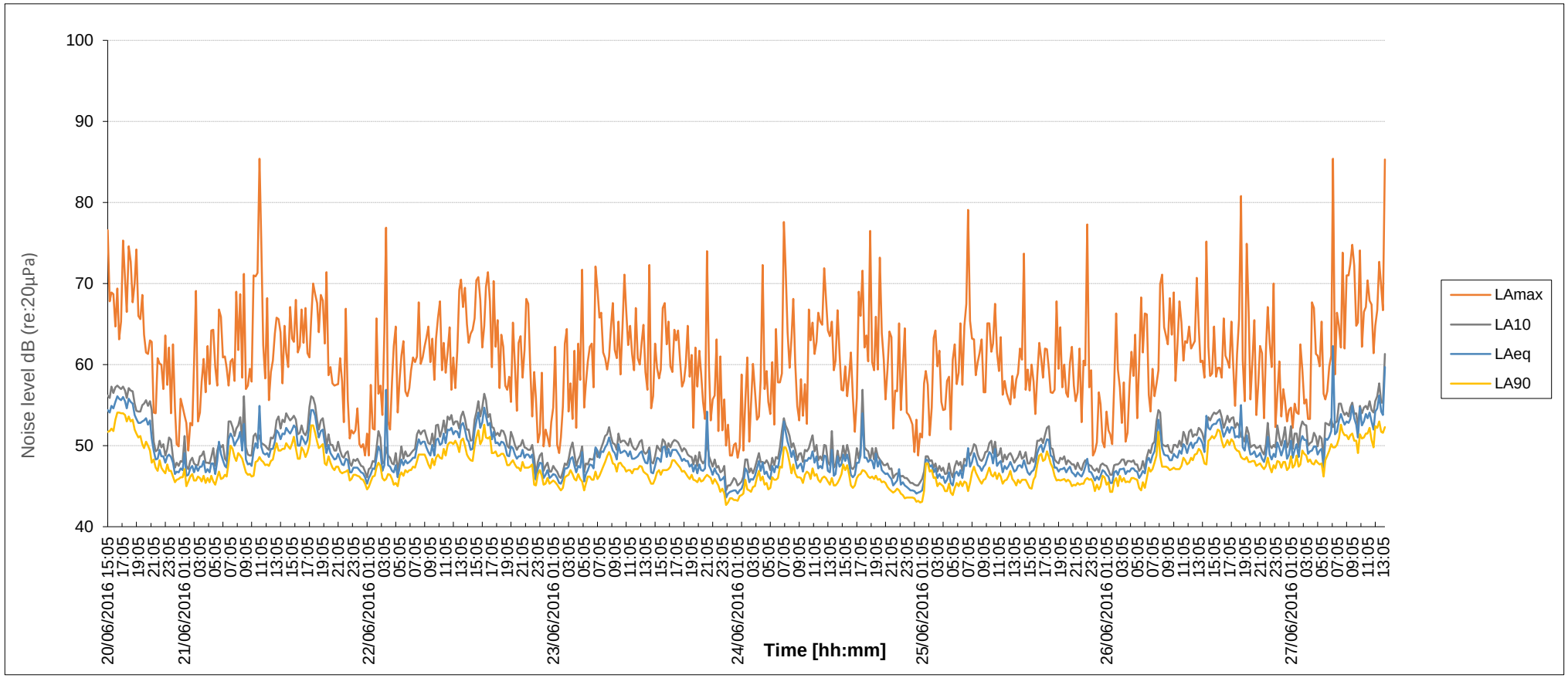

Figure A4.11 Broadband noise level data captured at Logger position 1 (North of Michelin tyre production facility)

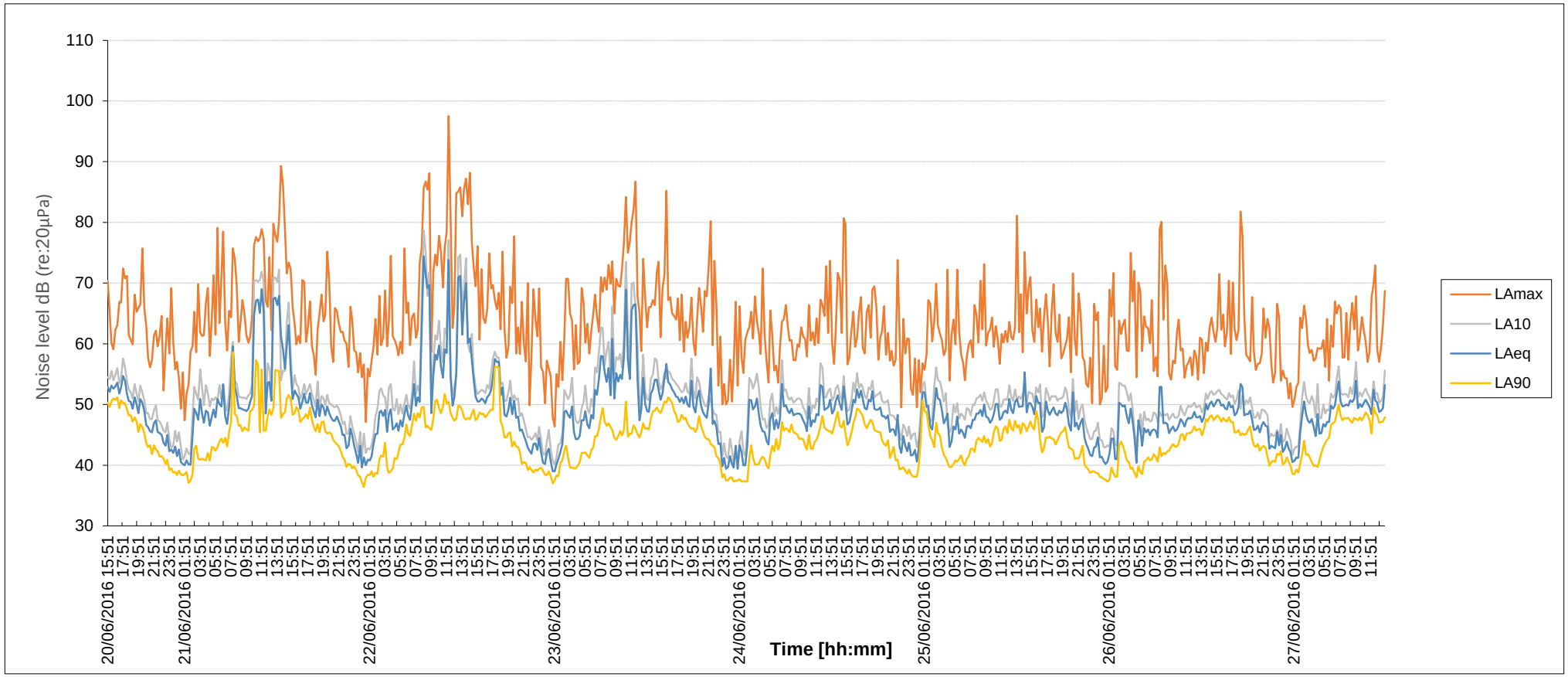

Figure A4.12 Broadband noise level data captured at Logger position 2 (South of Michelin tyre production facility)

A5 Construction Noise Assumptions

Table A5.14 Assumed noise source details for construction activities

Construction phase	Activity	BS 5228 reference[19]	Equipment	No. sources	% on time	Lw (dBA)
Mobilisation and early works	Site clearance	Table D2-14	Chainsaw	1	10	114
		Table C2-10	Bulldozer	1	50	108
		Table C2-30	Dumper (tipping fill)	1	50	107
		Table D9-14	Scraper	1	50	123
		Table C2-26	Wheeled Loader	1	50	107
	Temporary road construction	Table C2-10	Bulldozer	1	50	108
		Table C5-20	Vibratory roller	1	50	103
		Table C5-30	Asphalt paver (+tipper lorry)	1	50	103
Main works and process installation	Earthworks	Table D3-37	Excavator (tracked)	2	50	111
		Table C2-30	Dumper (tipping fill)	1	50	107
		Table C2-10	Bulldozer	1	50	108
	Excavations and foundations	Table D3-37	Excavator (tracked)	2	50	111
		Table D23-17	Tracked Loader	2	50	113
		Table C4-18	Cement Mixer truck	1	50	103
		Table D6-34	Lorry mounted concrete pump	1	50	107
		Table D7-20	Compressor	3	50	104
		Table D6-40	Poker vibrator (2 pokers)	3	50	101
	Piling	Table D4-36	Crane mounted Auger	1	83	118
		Table D7-72	Water pump	2	50	102
		Table C3-29	Tracked mobile crane	1	50	98
	Slab construction	Table C4-18	Cement Mixer truck	1	50	103
		Table D6-34	Lorry mounted concrete pump	1	50	107
		Table D7-20	Compressor	1	50	104

[19] BS 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise, British Standards Institution

		Table D6-40	Poker vibrator (2 pokers)	1	50	101
		Table C4-38	Wheeled mobile telescopic crane	1	50	106
		Table C4-85	Generator (for welder)	1	50	94
		Table D6-54	Electric percussion drill	2	33	117
		Table C1-18	Gas cutter	1	33	107
		Table D7-121	Lorries (pulling up)	3	50	98
	Finishing and fitting	Table C4-85	Generator (for welder)	1	50	94
		Table C3-31	Hand-held welder	1	50	101
		Table D6-54	Electric percussion drill	2	50	117
		Table D7-121	Lorries (pulling up)	3	50	98

Appendix B

Air Quality

Contents

B1 Air Quality Assessment Methodology

B1.1 Introduction

This appendix sets out the methodology for assessing the likely significant effects of the proposed EfW CHP on air quality and odour during the construction and operation.

Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This air quality assessment looks at potential emissions of dust, gases, particulates, heavy metals and odour, during construction of the proposed EfW CHP, and due to emissions from traffic associated with the project during construction and operation. Operational air quality from the proposed EfW CHP facility and traffic emission during construction, have not been assessed as part of the ES but will be assessed as part of the permit submitted to SEPA.

B1.2 Legislation and Policy

This section identifies national and local legislation, policy and guidance of relevance to air quality that have informed the methodology for the assessment of air quality and odour effects of the proposed EfW CHP.

B1.2.1 National Planning Framework

The third National Planning Framework[1] was published by the Scottish Government in June 2014. This framework sets out a strategy for long term development in Scotland for the next 20-30 years. The main focus of the framework is supporting economic growth and the transition to a low carbon economy and needs to be considered at all strategic and local development plans.

In relation to air quality, the framework states:

> *"Reducing the impact of the car on city and town centres will make a significant contribution to realising their potential as sustainable places to live and invest by addressing congestion, air pollution and noise and improving the public realm."*

B1.2.2 Scottish Planning Policy

The Scottish Planning Policy[2] (SPP) is a statement of the Scottish Government policy on land-use planning and provides the Scottish Government's vision on the purpose of land-use planning and desired outcomes. The SPP provides core principles on the operation of the planning system with objectives, statutory guidance on sustainable development, and categorised planning policies for development planning and development management.

[1] The Scottish Government (2014); National Planning Framework for Scotland 3
[2] The Scottish Government (2014); Scottish Planning Policy

B1.2.3 Industrial Emissions Directive

The Industrial Emissions Directive (IED) (2010/75 /EU)[3], brought seven separate directives including the waste incineration direction (WID) into a single directive. The IED was transposed into national legislation by The Pollution Prevention & Control (Scotland) Regulations 2012. The legislation contains the ELVs applicable to the proposed EfW CHP as set out in Table 1. The ELVs are the maximum concentrations the development can emit. In reality the emissions would be below the ELVs. SEPA is responsible for permitting operations that fall under the IED.

Operational air quality from the proposed EfW CHP based on emissions at IED ELVs will be assessed as part of the permit submitted to SEPA.

Table 1: Industrial Emission Directive ELVs (mg/ Nm^3) [(a)]

Substance	**Daily mean**	**30 minute mean**	
		100th percentile	**97th percentile**
Particles	10	30	10
Nitrogen dioxide (NO_2)	200	400	200
Sulphur dioxide (SO_2)	50	200	50
Carbon monoxide (CO)	50	100 [(b)]	150 [(c)]
Hydrogen fluoride (HF)	1	4	2
Hydrogen chloride (HCl)	10	60	10
Total Organic Carbon (TOC)	10	20	10
Group I metals - Cd and Ti [(d)]	0.05		
Group II metals - Hg [(d)]	0.05		
Group III metals - Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V [(d)]	0.5		
Dioxins and Furans [(e)]	0.1 ng I-TEQ m^3		

(a) Units are in Nm^3 (273K, dry and 11 per cent O_2) unless otherwise stated
(b) 100th percentile of half hourly average concentrations in any 24 hour period
(c) 95th percentile of tem minute average CO concentration
(d) Average over a sample period between 30 minutes and 8 hours
(e) Average over a sampling period of 6 to 8 hours

B1.2.4 European Air Quality Management

In 1996 the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC)[4]. This Directive defined the policy framework for 12 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant were set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive)[5] which sets limit values for

[3] Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control).
4 Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management
5 Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air

sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and NOx, particulate matter (PM_{10}) and lead (Pb) in ambient air.

In May 2008 the Directive 2008/50/EC[6] on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the above (apart from the 4th Daughter Directive) and makes provision for extended compliance deadlines for NO_2 and PM_{10}. The Directives were transposed into legislation in Scotland by the Air Quality Standards (Scotland) Regulations 2010[7]. The Scottish Ministers have the duty of ensuring compliance with the air quality limit values. The limit values will be taken into consideration in the assessment of the EfW CHP.

B1.2.5 Environment (Scotland) Act 1995

Part IV of the Environment (Scotland) Act 1995[8] places a duty on the Scottish Ministers to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality. The Air Quality Strategy[9] for England, Scotland, Wales and Northern Ireland provides the national air quality objectives and a framework for ensuring compliance with these values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMAs) where pollutant concentrations exceed the national air quality objectives. Where an AQMA is declared, the local authority needs to produce an Air Quality Action Plan (AQAP) which outlines the strategy for improving air quality in these areas.

B1.2.6 Cleaner Air for Scotland

Cleaner Air for Scotland[10] is a national strategy which links up the various contributing factors and responsible bodies, to encourage them to work together towards the common aim of achieving the best possible air quality for Scotland. Future updates and revisions to Scottish Planning Policy and the National Planning Framework, the Local Development Plans of local authorities and their air quality action plans should take “Cleaner Air for Scotland” into account.

B1.2.7 Air Quality Objectives and Limit Values

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur (long-term) after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, 1-hour or 15-minute average concentrations (short-term) due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term

6 Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[7] Scottish Statutory Instrument 2010 No.204, Environmental Protection, The Air Quality Standards (Scotland) Regulations 2010, 11 June 2010

8 Environment Act 1995, Chapter 25, Part IV Air Quality

9 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Volume 1, July 2007

10 The Scottish Government (2015) Cleaner Air For Scotland The Road To A Healthier Future, November 2015. Accessed at http://www.gov.scot/Resource/0048/00488493.pdf

concentrations. Table 1 out the air quality objectives for Scotland and the UK, for the pollutants relevant to this study.

The standards apply at human and ecological receptor locations. The standards which apply at human receptor locations apply where people will be exposed to a pollutant for a period relevant to the standard such as at residential locations, hospitals and schools for annual mean values. Standards which apply to ecological receptors apply at sensitive ecological sites.

The limit values and objectives will be used to assess the impact of the proposed EfW CHP. It is assumed that 100% of the VOCs emitted by the EfW CHP will be benzene (C_6H_6), which represents an extreme worst case assessment.

Table 2: Air quality standards and guidelines for Scotland

Pollutant	**Averaging period**	**Limit value/objective**	**Date to be achieved by**
Nitrogen dioxide (NO_2)	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year	31 December 2005
	Annual mean	40µg/m^3	31 December 2005
Oxides of nitrogen (NOx)	Annual mean	30µg/m^3 (for protection of vegetation & ecosystems)	31 December 2000
Carbon Monoxide (CO)	Running 8-hour mean	10mg/m^3	31 December 2003
Volatile Organic Compounds (VOCs): Benzene (C_6H_6)	Annual mean	3.25µg/m^3	31 December 2010
Sulphur dioxide (SO_2)	15-minute mean	266µg/m^3 not to be exceeded more than 35 times a year	31 December 2005
	1-hour mean	350µg/m^3 not to be exceeded more than 24 times a year	31 December 2004
	24-hour mean	125µg/m^3 not to be exceeded more than 3 times a year	31 December 2004
	Annual mean	20µg/m^3 (for protection of vegetation & ecosystems)	31 December 2000
Fine particulates (PM_{10})	24-hour mean	50µg/m^3 not to be exceeded more than 7 times a year	31 December 2010
	Annual mean	18µg/m^3	31 December 2010

Pollutant	Averaging period	Limit value/objective	Date to be achieved by
Very fine particulates ($PM_{2.5}$)	Annual mean	10µg/m^3	2020
PAH (benzo[a]pyrene)	Annual mean	0.25ng/m^3	31 December 2010
Lead (Pb)	Annual mean	0.25µg/m^3	31 December 2008
Arsenic (As)	Annual mean	6ng/m^3	31 December 2012
Cadmium (Cd)	Annual mean	5ng/m^3	31 December 2012
Nickel (Ni)	Annual mean	20ng/m^3	31 December 2012

For other pollutants which will be emitted under IED ELVs, there are no air quality objectives. For these pollutants assessment criteria in the form of Environmental Assessment Levels (EALs) provided by the by SEPA,[13] the EA[14], and the Health and Safety Executive[11], will be used as the latest guidance in the UK. Of the trace metals emitted, there are European limit values for Pb, As, Cd and Ni and for other trace metals EALs are provided. A summary of the appropriate EALs considered for short-term (hourly mean) and long-term (annual mean) averaging periods, for all pollutants not included in Table 2, are presented in Table 3.

The air quality objectives and limit values as set out in Table 2 and Table 3 are the air quality standards used within this assessment for human health.

Table 3: Environmental assessment levels (EALs)

Pollutant	Averaging period	Value (µg/m^3)	Source
Ammonia (NH_3)	Annual mean	180	EA
	1-hour mean	2,500	EA
Antimony (Sb)	Annual mean	5	EA
	1-hour mean	150	EA
Arsenic (As)	Annual mean	0.003	EA
	Annual mean	0.006	UK/EU target
Benzene (C_6H_6)	1-hour mean	195	EA
Carbon monoxide (CO)	1-hour mean	30,000	EA
Chromium, Chromium (II) and Chromium (II) compounds (as Cr)	Annual mean	5	EA
	1-hour mean	150	EA

[11] Health and Safety Executive (2011) EH40/2005 Workplace exposure limits (Second edition, published 2011)

Pollutant	Averaging period	Value (µg/m^3)	Source
Chromium (VI) oxidation state in the PM_{10} fraction	Annual mean	0.0002	EA
Cobalt (Co)	Annual mean	1	Derived from HSE EH40
Copper (Cu)	Annual mean	10	EA
	1-hour mean	200	EA
Hydrogen chloride (HCl)	1-hour mean	750	EA
Hydrogen fluoride (HF)	Monthly mean	16	EA
	1-hour mean	160	EA
Manganese (Mn)	Annual mean	0.15	EA
	1-hour mean	1,500	EA
Mercury (Hg)	Annual mean	0.25	EA
	1-hour mean	7.5	EA
Polychlorinated biphenyls (PCBs)	Annual mean	0.2	EA
	1-hour mean	6	EA
Thallium (Tl)	Annual mean	1	Derived from HSE EH40
Vanadium (V)	Annual mean	5	EA
	1-hour mean	1	EA

There are no air quality strategy objectives, European limit values or EALs for dioxins (polychlorinated dibenzo-p-dioxins) and furans (polychlorinated dibenzofurans). Dioxins and furans will be assessed further in a human health risk assessment (HHRA), which will be carried out on the overall human exposure to the substances by the local population and then the risk that this exposure causes.

B1.2.8 Dust Nuisance

Dust is the generic term used in the British Standard document BS 6069 (Part Two) to describe particulate matter in the size range 1–75µm in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990[12], dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and

[12]Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air

mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

B1.3 Guidance

B1.3.1 Integrated Pollution Prevention and Control (IPPC) Horizontal Guidance Note H1

The IPPC H1 guidance[13] was produced by the Environment Agency (EA) for England and Wales in collaboration with the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). The IPPC is a regulatory system that employs an integrated approach to control the environmental impacts of certain industrial activities. The purpose of H1 guidance note is to provide supplementary information relevant to all sectors, for the appraisal of Best Available Techniques (BAT) and to carry out an appropriate environmental assessment of the overall impact of the emissions resulting from a proposed installation.

More recently the EA has revised the H1 guidance and has development a web based version[14], with the latest revision date being August 2016. The SEPA H1 has been followed in the assessment, and where applicable, reference is also made to the EA air emissions risk assessment guidance.

B1.3.2 Scotland's Local Air Quality Management Policy and Technical Guidance

Scotland's Local Air Quality Management Policy Guidance[15] provides guidance on the links between air quality and the land-use planning system. The guidance advises that air quality considerations should be integrated within the planning process at the earliest stage, and is intended to aid local authorities in developing action plans to deal with specific air quality problems and create strategies to improve air quality generally. It summarises the main ways in which land-use planning system can help deliver air quality objectives.

Scotland's Local Air Quality Management Technical guidance[16] is designed to support local authorities in carrying out their duties under the Environment Act (1995). This includes various methodologies including model verification, which are appropriate for use in air quality assessments. Where technical guidance is relevant to the assessment, this will be included and used.

B1.3.3 Non-Road Mobile Machinery Regulations and Guidance

The Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) (Amended) Regulations 2014 (SI 2014/1309)[17], which implement EU Directive 2012/46/EU[18], require that NRMM engines meet certain emissions standards for

[13] IPPC H1 (2003) Environmental Assessment and Appraisal of BAT
[14] EA (2016) Air emissions risk assessment for your environmental permit
Available at: [https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit]
[15] The Scottish Government (2016); Local Air Quality Management Policy Guidance PG(S)(16)
[16] The Scottish Government (2016); Local Air Quality Management Technical Guidance TG(S)(16)
[17] Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) (Amendment) Regulations 2014, SI 2014/1309
[18] COMMISSION DIRECTIVE 2012/46/EU of 6 December 2012
amending Directive 97/68/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal

different engine types. The regulations aim to reduce emissions from NRMM through the fitting of devices to engines, to help meet the Stage IV emissions standard, where applicable. All NRMM to be used during the demolition and construction phase should adhere to the emission standards provided in the regulations.

B1.3.4 IAQM Guidance on Construction Dust

The Institute of Air Quality Management (IAQM) guidance on construction dust[19] was produced in consultation with industry specialists and gives guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effects from construction activities based on 'dust magnitude' (high, medium or low) and the sensitivity of the area based on the sensitivity of receptors and PM_{10} concentrations in the area. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented.

B1.3.5 EPUK/IAQM Planning Guidance

The 2015 Land-Use Planning & Development Control guidance document[20] produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for consideration of air quality within the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals. The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.

B1.4 Ecological Legislation

European Council Directive 92/43/EEC[21] (Habitats Directive) requires member states to introduce a range of measures for the protection of habitats and species. The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland)[22] transposes the Directive into law in Scotland.

The Habitats Directive requires the competent authority to firstly evaluate whether the proposed development is likely to give rise to a significant effect on the European site (Habitats Regulation Assessment screening). Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the Project would adversely affect the integrity of the European site.

There are specific objective pollutant concentrations for vegetation called 'critical levels', which are shown in Table 4. These are concentrations below which harmful effects are unlikely to occur. The limit value applies to locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways. However, the H1 guidance states that "the critical levels should be applied at all locations as a

combustion engines to be installed in non-road mobile machinery
[19] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (V1.1)
[20] IAQM and EPUK (2015). Land-use planning and development control: Planning for air quality
[21] European Council Directive (92/43/EEC) of 21 May 1992, on the conservation of natural habitats and of wild fauna and flora
[22] The Conservation (Natural Habitats, &c.) Regulations (as amended in Scotland) 1994 No. 2716

matter of policy, as they represent a standard against which to judge ecological harm".

The objectives within the legislation are used to assess the potential impacts upon any sensitive ecosystems.

Table 4: Critical levels for the protection of ecosystems

Pollutant	Averaging period	Standard
Nitrogen oxides (expressed as NO_2)	Annual mean	30µg/m^3
	Daily mean	75µg/m^3
SO_2 for ecosystems where lichens and bryophytes are present	Annual mean	10µg/m^3
SO_2 for all other ecosystems	Annual mean	20µg/m^3
NH_3 for ecosystems where lichens and bryophytes are present	Annual mean	1µg/m^3
NH_3 for all other ecosystems	Annual mean	3µg/m^3
HF	Weekly mean	0.5µg/m^3
	Daily mean	5µg/m^3

B1.5 Odour

Odour is perceived due to a single substance or a mixture of volatile chemical compounds triggering a reaction in the olfactory organ at very low concentrations. Any odour, whether pleasant or unpleasant, can result in a loss of amenity for nearby residents. If the odour is perceived for a sufficiently frequent time above a threshold level, then it can give rise to statutory nuisance. Odour can therefore be an important issue in planning, when proposals are submitted for potentially odorous developments located near sensitive receptors and vice versa.

There is no statutory limit in Scotland for ambient odour concentrations, for either single or a mix of compounds.

B1.5.1.1 SEPA H4 Guidance

The Horizontal Guidance for Odour (H4) guidance was produced by the EA in collaboration with SEPA. The guidance aims to bring consistency to the overall approach to the regulation of odorous emissions, and outlines the main considerations relating to the permitting and regulation of odour-generating activities. The second part of the guidance relates to odour assessment and control and describes a range of odour impact assessment methodologies, gives guidance on the collection of odour samples using analytical and sensory techniques, the control of odour by design, operational and management techniques and outlines the range of "end-of-pipe" odour abatement technologies available.

B1.5.1.2 IAQM Odour Guidance

The Institute of Air Quality Management (IAQM) produced guidance in 2014[23] with the specific intention to provide advice for "assessing odour impacts for planning purposes". It recommends various assessment techniques including the use of a Source-Pathway-Receptor model in which the risk of an adverse odour impact is determined by examining the source characteristics, how effectively the odours can travel from the Source to a receptor (i.e. the Pathway) and examining the sensitivity of the Receptor.

B1.6 Baseline Methodology

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, and natural sources.

The entire area of Dundee City was declared an Air Quality Management Area (AQMA) in 2013. The AQMA was declared due to exceedences of the 1-hour and annual mean nitrogen dioxide (NO_2) air quality objectives, and the annual mean particulate matter (PM_{10}) air quality objective, included in the Air Quality Standards (Scotland) Regulations 2010.

A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:

- Local authority review and assessment reports and local air quality monitoring data[24];
- Project-specific air quality monitoring carried out by Arup;
- Defra UK Air Information Resource website[25] for details of air quality monitoring and AQMAs;
- Ammonia, Acid Gases and Aerosols, and Heavy Metals Monitoring Networks for the UK[26]; and
- Air Quality Scotland website[27] for local authority background data, and predicted background pollutant concentrations.

B1.7 Baseline Assessment

The overall approach to the baseline air quality assessment comprises a review of the existing air quality conditions in the vicinity of the proposed development.

This section reviews the background monitoring data and assumptions made to determine the likely background concentrations at the proposed development site for the following pollutants:

- Nitrogen oxides (NOx) and Nitrogen Dioxide (NO_2);

[23] IAQM, Guidance on the assessment of odour for planning, May 2014.
24 Dundee City Council (2016) https://www.dundeecity.gov.uk/air-quality
25 Defra (2016) https://uk-air.defra.gov.uk/data/
26 Defra (2016) https://uk-air.defra.gov.uk/networks/network-info?view=metals
27 Air quality in Scotland (2016) http://www.scottishairquality.co.uk/

- Carbon monoxide (CO);
- Total organic carbon (TOC) as benzene;
- Sulphur dioxide (SO_2);
- Fine particulate matter (PM_{10} and $PM_{2.5}$);
- Hydrogen fluoride (HF) and Hydrogen chloride (HCl);
- Ammonia (NH_3);
- Dioxins and furans;
- Polychlorinated biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs) as benzo(a)pyrene; and
- Trace metals: lead (Pb), arsenic (As), cadmium (Cd), nickel (Ni), thallium (Ti), mercury (Hg), antimony (Sb), chromium (Cr and CrVI), cobalt (Co), copper (Cu), manganese (Mn) and vanadium (V).

Background data has been obtained from a variety of sources, and these are outlined in the following sections.

B1.7.1.1 Nitrogen Oxides (NOx) and Nitrogen Dioxide (NO_2)

The city of Dundee carries out automatic monitoring of NOx and NO_2 at seven monitoring sites in the city. Automatic monitoring involves the use of instruments which continuously draw air through the instrument, and provide data on short averaging periods such as 15 minutes.

One of the monitoring sites, Mains Loan, is in an urban background monitoring location, and this is therefore considered to best represent background concentrations in the local area. Details of the monitoring site are outlined in Table 5.

Average concentrations for NOx and NO_2 in 2013, 2014 and 2015 at the Mains Loan monitoring site are shown in Table 6. Data capture in 2013 was below the recommended 75% rate in 2013, and therefore these concentration have not been used in the averaging of the years.

Concentrations at the Mains Loan background monitoring site have met the applicable air quality objectives for NOx and NO_2 in 2014 and 2015.

Table 5: Mains Loan automatic monitoring site details

Site ID	Site name	Site type	OS grid reference	
			x	y
DUN1	Mains Loan	Urban background	340970	731892

Table 6: Mains Loan NOx and NO_2 monitoring data

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)			
			2013	2014	2015	Average
NOx	Annual mean	30	*	16.5	14.9	15.7
NO_2	Max 1-hour mean	200	*	103.0	82.0	92.5

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)			
			2013	2014	2015	Average
	Annual mean	40	*	12.6	10.5	11.6
	Max 24-hour mean	75	*	45.0	38.0	41.5

Notes: '*' indicates data capture less than 75% at the monitoring site in this year.

B1.7.1.2 Carbon Monoxide (CO)

Monitoring for CO is not carried out in Dundee. The closest monitoring site to the proposed development which carries out automatic monitoring for CO is Edinburgh St Leonards which is located in an urban background location in the south of Edinburgh. Site details are shown in Table 7. Monitoring data for 2013, 2014 and 2015 has been reviewed and is presented in Table 8. Concentrations of CO are shown to be well below the relevant standards for all years.

Table 7: Edinburgh St Leonards automatic monitoring site details

Site ID	Site name	Site type	OS grid reference	
			x	y
UKA00454	Edinburgh St Leonards	Urban background	326264	673136

Table 8: Edinburgh CO monitoring data

Pollutant	Averaging period	Standard (mg/m^3)	Concentration (mg/m^3)			
			2013	2014	2015	Average
CO	Max 1-hour mean	30	0.96	1.53	1.12	1.20
	Max 8-hour mean	10	0.73	1.00	0.79	0.84

B1.7.1.3 Total Organic Carbon (TOC) as Benzene

Monitoring for benzene is not carried out in Dundee. The closest monitoring site to the proposed development which carries out automatic monitoring for benzene is Auchencorth Moss which is located in a rural background location, 18km south of Edinburgh city centre. Site details are shown in Table 9. Monitoring data for benzene been reviewed and is presented in Table 10. Data capture in 2014 and 2015 was less than 40% for benzene at the Auchencorth Moss site, and therefore 2013 data has been selected for inclusion in the assessment. Concentrations of benzene are shown to be below the relevant standards in 2013.

Table 9: Auchencorth Moss automatic monitoring site details

Site ID	Site name	Site type	OS grid reference	
			x	y
UKA00451	Auchencorth Moss	Rural background	322166	656128

Table 10: Auchencorth Moss benzene monitoring data

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)		
			2013	2014	2015
Benzene	Max 1-hour mean	195	5.0	*	*

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)		
			2013	2014	2015
	Annual mean	3.25	0.25	*	*

Notes: '*' indicates data capture less than 75% at the monitoring site in this year.

B1.7.1.4 Sulphur Dioxide (SO_2)

The nearest urban background monitoring site to Dundee which measures for SO_2 in the Edinburgh St Leonards site. Details of the monitoring site are outlined in Table 7, and this is considered to best represent background SO_2 concentrations at the proposed development site.

Concentrations for SO_2 in 2013, 2014 and 2015 at the Edinburgh St Leonards monitoring site are shown in Table 11, and an average of the 2013 to 2015 monitoring data has been selected for inclusion in the assessment. All measured SO_2 concentrations are below the relevant standards.

Table 11: Edinburgh St Leonards SO_2 monitoring data

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)			
			2013	2014	2015	Average
SO_2	Max 15-minute mean	266	61.0	65.0	80.0	68.7
	Max 1-hour mean	350	42.0	51.0	38.0	43.7
	Max 24-hour mean	125	11.0	11.0	7.0	9.7
	Annual mean	20	1.4	1.4	1.6	1.5

B1.7.1.5 Fine Particulate Matter (PM_{10} and $PM_{2.5}$)

The Mains Loan urban background monitoring site in Dundee also measures for PM_{10}, and this is therefore considered to best represent background PM_{10} concentrations in the local area. Details of the monitoring site are outlined in Table 5. Average concentrations for PM_{10} in 2013, 2014 and 2015 at the Mains Loan monitoring site are shown in Table 12.

There is no $PM_{2.5}$ monitoring carried out at a background location in Dundee, and therefore monitoring data from Edinburgh St Leonards is considered to best represent background $PM_{2.5}$ concentrations. Details of the monitoring site are outlined in Table 7. Average concentrations for $PM_{2.5}$ in 2013, 2014 and 2015 at the Edinburgh St Leonards monitoring site are shown in Table 13. Data capture in 2014 was less than 75%, and therefore 2013 and 2015 $PM_{2.5}$ data has been selected for inclusion in the assessment.

Table 12: Mains Loan PM_{10} monitoring data

Pollutant	Averaging period	Standard ($\mu g/m^3$)	Concentration ($\mu g/m^3$)			
			2013	2014	2015	Average
PM_{10}	Max 24-hour mean	50 (7 exceedences allowed)	52.0	56.0	51.0	53.0
	Annual mean	18	11.8	12.9	12.1	12.3

Table 13: Edinburgh St Leonards $PM_{2.5}$ monitoring data

Pollutant	Averaging period	Standard (µg/m³)	Concentration (µg/m³)			
			2013	2014	2015	Average
$PM_{2.5}$	Annual mean	10	7.7	*	6.6	7.2

Notes: '*' indicates data capture less than 75% at the monitoring site in this year.

B1.7.1.6 Hydrogen Fluoride (HF) and Hydrogen Chloride (HCl)

There is no background monitoring carried out in the UK for HF, as HF is emitted by industrial sources which are regulated[28], and there is no monitoring for HCl carried out in Dundee. The closest monitoring sites for to the proposed development which carries out automatic monitoring for HCl is Auchencorth Moss, which is located in a rural background location. Site details are shown in Table 9.

Monitoring data for HCl been reviewed and is presented in Table 14. Data capture in 2015 was less than 65% for HCl at the Auchencorth Moss site, and therefore 2013 and 2014 data has been selected for inclusion in the assessment. Concentrations of HCl are shown to be well below the 1-hour mean standard in 2013 and 2014.

Table 14: Auchencorth Moss HCl monitoring data

Pollutant	Averaging period	Standard (µg/m³)	Concentration (µg/m³)			
			2013	2014	2015	Average
HCl	Max 1-hour mean	750	4.8	1.9	*	3.4

Notes: '*' indicates data capture less than 75% at the monitoring site in this year.

B1.7.1.7 Ammonia (NH_3)

There is no monitoring carried out for ammonia in Dundee. The nearest automatic monitoring site which measures for ammonia is Auchencorth Moss. A review of ammonia concentrations by the gaseous active method at Edinburgh St Leonards in 2013 to 2015 showed that concentrations were lower at this site than at the Auchencorth Moss site, therefore concentrations from Auchencorth Moss have been used as a worst case assessment. Site details are shown in Table 9 and monitoring data is presented in Table 15.

Data capture in 2015 at the Auchencorth Moss was below 75%, therefore concentrations from 2013 and 2014 have been used in the assessment. Concentrations of ammonia are shown to be well below the relevant standards for 2013 and 2014.

Table 15: Auchencorth Moss NH_3 monitoring data

Pollutant	Averaging period	Standard (µg/m³)	Concentration (µg/m³)			
			2013	2014	2015	Average
NH_3	Max 1-hour mean	2,500	20.0	20.8	*	20.4

[28] SEPA (2016) SPRI http://apps.sepa.org.uk/spripa/Pages/SubstanceInformation.aspx?pid=7

Pollutant	Averaging period	Standard (µg/m^3)	Concentration (µg/m^3)			
			2013	2014	2015	Average
	Annual mean	180	1.2	1.2	*	1.2

Notes: '*' indicates data capture less than 75% at the monitoring site in this year.

B1.7.1.8 Dioxins and Furans

There is no monitoring carried out for dioxins and furans in Dundee. The nearest monitoring site which measures for dioxins and furans is Auchencorth Moss, and the latest year of monitoring data is 2010. Site details are shown in Table 9 and monitoring data is presented in Table 16. Concentrations of dioxins and furans in 2010 have been used in the assessment.

Table 16: Auchencorth Moss dioxins and furans monitoring data

Pollutant	Averaging period	Standard (fg TEQ/m^3)	Concentration (fg TEQ/m^3)
			2010
Dioxins and furans	Annual mean	None	19.1

B1.7.1.9 Polychlorinated Biphenyls (PCBs)

There is no monitoring carried out for PCBs in Dundee. The nearest monitoring site which measures for PCBs is Auchencorth Moss, and site details are shown in Table 9. The latest year of monitoring data for PCBs is 2010, and therefore concentrations of PCBs in 2010 have been used in the assessment.

Monitoring data is presented in Table 17 and concentrations of PCBs are shown to be well below the relevant standards for 2010. The max 1-hour mean has been calculated as twice the annual mean concentration.

Table 17: Auchencorth Moss PCBs monitoring data

Pollutant	Averaging period	Standard (µg/m^3)	Concentration (µg/m^3)
			2010
PCBs	Max 1-hour mean	6	0.000076
	Annual mean	0.2	0.000038

B1.7.1.10 Polycyclic Aromatic Hydrocarbons (PAH)

Polycyclic Aromatic Hydrocarbons (PAHs) are measured as benzo(a)pyrene, as representative of total PAH concentrations. There is no monitoring carried out in Dundee for PAH, and therefore monitoring data from Edinburgh St Leonards is considered to best represent background PAH concentrations at the proposed development site. A review of PAH concentrations at Edinburgh St Leonards in 2013 to 2015 showed that concentrations were higher at this site than at the Auchencorth Moss site, therefore concentrations from Edinburgh St Leonards have been used as a worst case assessment.

Details of the monitoring site are outlined in Table 7 and average concentrations for PAH are shown in Table 18. Average concentrations for 2013 to 2015 has been selected for inclusion in the assessment. Concentrations of benzo(a)pyrene are shown to be well below the annual mean standard in 2013 to 2014.

Table 18: Edinburgh St Leonards PAH monitoring data

Pollutant	Averaging period	Standard (ng/m^3)	Concentration (ng/m^3)			
			2013	2014	2015	Average
PAH (benzo(a)pyrene)	Annual mean	0.25	0.08	0.06	0.07	0.07

B1.7.1.11 Trace Metals

Trace metals included in this assessment are: lead (Pb), arsenic (As), cadmium (Cd), nickel (Ni), thallium (Ti), mercury (Hg), antimony (Sb), chromium (Cr and CrVI), cobalt (Co), copper (Cu), manganese (Mn) and vanadium (V).

There is no monitoring carried out for trace metals in Dundee. The nearest monitoring site which measures for trace metals is Auchencorth Moss, and site details are shown in Table 9.

Concentrations for trace metals are shown in Table 19, and average concentrations for 2013 to 2015 has been selected for inclusion in the assessment. The max 1-hour mean has been calculated as twice the annual mean concentration.

For antimony and mercury, data was only available for 2013, and therefore this has been used in the assessment. For chromium, concentrations in 2015 were greater than average concentrations over the period from 2013 to 2015, therefore data for 2015 has been used as a worst case assessment. Concentrations of CrVI are assumed to be 20% of total Cr, as recommended in the EA guidance[29].

Monitoring data is presented in Table 19. Concentrations of all trace metals are shown to be well below the relevant objectives, except for CrVI, however this is an estimation of the background concentrations.

Table 19: Auchencorth Moss trace metals monitoring data

Pollutant	Averaging period	Standard (ng/m^3)	Concentration (ng/m^3)			
			2013	2014	2015	Average
Arsenic (As)	Annual mean	3	0.21	0.30	0.14	0.22
Antimony (Sb)	Annual mean	5000	0.23	*	*	-
	Max 1-hour mean	150,000	0.46	*	*	-
Cadmium (Cd)	Annual mean	5	0.02	0.04	0.03	0.03
Lead (Pb)	Annual mean	250	1.27	1.30	1.23	1.27
Nickel (Ni)	Annual mean	20	0.28	0.47	0.47	0.40
Thallium (Tl),	Annual mean	1,000	None			
Mercury (Hg)	Max 1-hour mean	7,500	1.8	*	*	-
	Annual mean	250	0.9	*	*	-
Chromium (Cr) II and III	Max 1-hour mean	150,000	1.56	1.45	2.10	2.10
	Annual mean	5,000	0.78	0.73	1.05	1.05
Chromium (Cr) VI	Annual mean	0.2	0.16	0.15	0.21	0.21

[29] Environment Agency (2012) Releases from municipal waste incinerators: Guidance to applicants on impact assessment for group 3 metals stack.

Pollutant	Averaging period	Standard (ng/m^3)	Concentration (ng/m^3)			
			2013	2014	2015	Average
Cobalt (Co)	Annual mean	1,000	0.02	0.03	0.02	0.02
Copper (Cu)	Max 1-hour mean	200,000	1.98	1.61	1.58	1.72
	Annual mean	10,000	0.99	0.80	0.79	0.86
Manganese (Mn)	Max 1-hour mean	1,500,000	2.00	1.73	1.93	1.88
	Annual mean	150	1.00	0.86	0.96	0.94
Vanadium (V)	Max 1-hour mean	1,000	0.83	0.78	0.52	0.71
	Annual mean	5,000	0.42	0.39	0.26	0.36

Notes: '*' indicates no data at the monitoring site in this year.

B1.8 Construction Dust Assessment Methodology

The effects of dust emissions arising from demolition and construction have been assessed using the qualitative approach described in the latest guidance[30] by the IAQM. Emissions from NRMM are likely to be small and so have not been assessed in this report. The use of machinery that is compliant with current standards for emissions will be adequate to ensure that impacts from these equipment will be negligible.

An 'impact' is described as a change in pollutant concentrations or dust deposition, while an 'effect' is described as the consequence of an impact. The main impacts that may arise during demolition and construction of the proposed development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM_{10} concentrations as a result of dust generating activities on site; and
- An increase in NO_2 and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new structures and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from a site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave a site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

For each of these dust-generating activities, the guidance considers three separate effects: annoyance due to dust soiling; harm to ecological receptors; and the risk of health effects due to a significant increase in PM_{10} exposure. The receptors can be

30 Institute of Air Quality Management (2014); Guidance on the assessment of dust from demolition and construction

human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

The methodology takes into account the scale on which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM_{10} concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. These factors are then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the site.

There are five steps in the assessment process described in the IAQM guidance. These are summarised in Figure 1 and a further description is provided in the following sections.

Step 1: Need for Assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary (for ecological receptors that is 50m) and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from the site entrance(s).

Step 2: Assess Risk of Dust Impacts

This step is split into three sections as follows:

2A. Define the potential dust emission magnitude;

2B. Define the sensitivity of the area; and

2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table 20.

Figure 1: IAQM dust assessment methodology

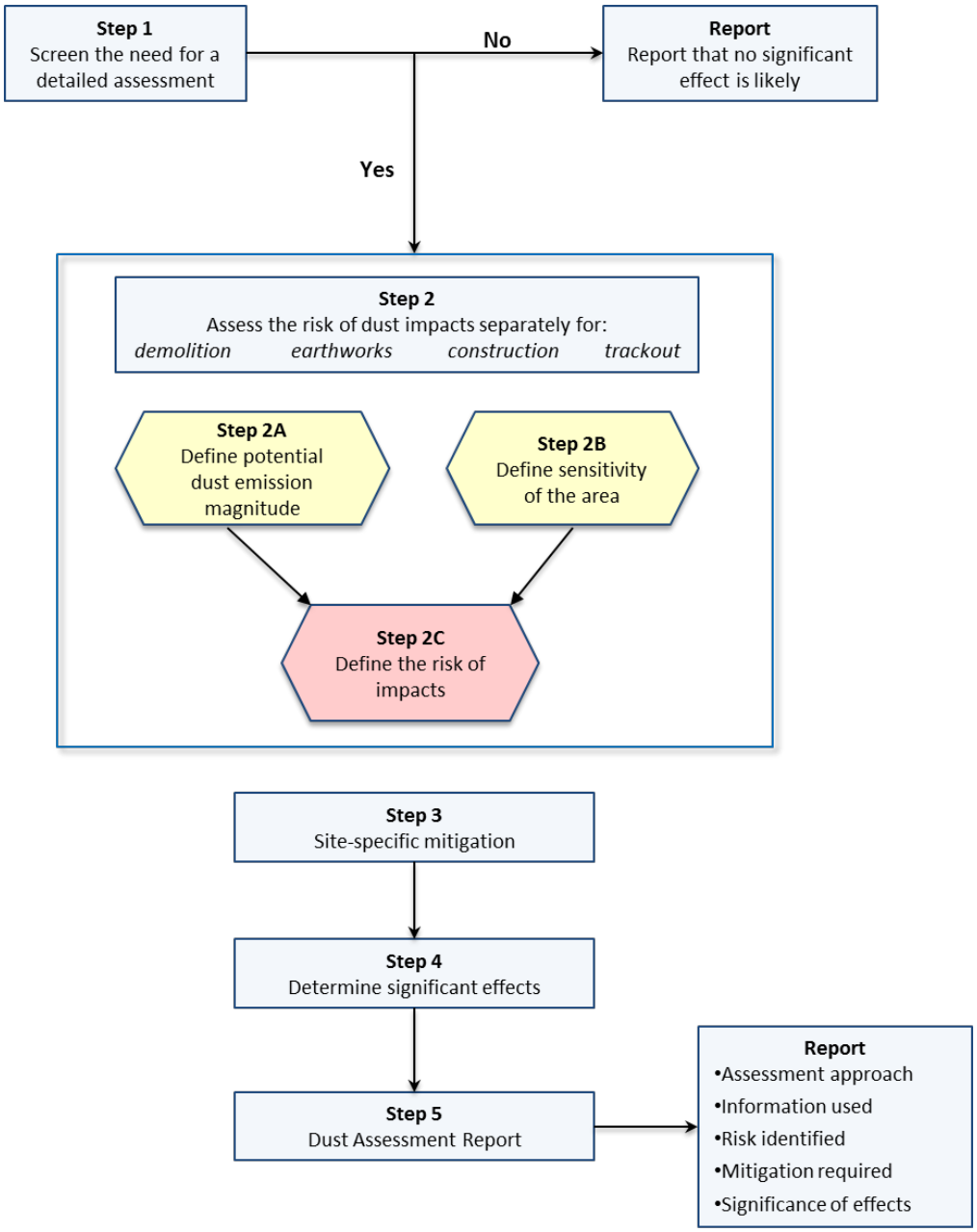

Table 20: Categorisation of dust emission magnitude

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

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any other site-specific factors. Tables 4 and 5 show the criteria for defining the sensitivity of the area to different dust effects.

Table 21: 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 22: 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						
> 18µg/m^3	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	< 10		Medium	Low		
16 – 18µg/m^3	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	< 10					
14 – 16µg/m^3	> 100	High	Medium	Low	Low	Low
	10 – 100					
	< 10	Medium	Low			
< 14µg/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

The overall risk of the impacts for each activity is then determined (step 2C) prior to the identification of any necessary mitigation measures (Table 23) and an overall risk for the site is then derived.

Step 3: Determine the Site-Specific Mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

Table 23: 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
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

Step 4: Determine Any Significant Residual Effects

After the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a Dust Assessment Report

The last step of the assessment is the preparation of a Dust Assessment Report. This forms part of the ES chapter.

B1.9 Road Traffic Emissions

The development has the potential to impact existing air quality as a result of road traffic exhaust emissions, such as NO_2 and particulate matter, associated with vehicles travelling to and from the site during the construction and the operational phases. A screening assessment has been undertaken using the criteria contained within the EPUK/IAQM land-use guidance document[31] to determine the potential local air quality effects associated with the potential trip generation as a result of the proposed development. The result of the screening assesment is contained in the ES chapter.

[31] Moorcroft and Barrowcliffe et al. (2015) Land-use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management, London

The EPUK/IAQM guidance document details the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- A change of LDV flows of more than 100 in Annual Average Traffic Daily (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- A change in road alignment of more than 5m and the road is in an AQMA;
- Introduction of a new junction that causes a significant change in vehicle acceleration/deceleration;
- Introduction or change of a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- An underground car park with extraction system.

Should these criteria not be met, then the EPUK/IAQM guidance document considers air quality impacts associated with a scheme to be negligible and no further assessment is required.

B1.9.1 Assessment of Impacts and Significance of Effects

The IAQM/EPUK guidance[32] provides a framework for air quality professionals operating within the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals.

It should be noted that strictly this guidance only applies to the planning system in England and Wales, but has been used here in the absence of Scotland-specific guidance. The document states that the general principles of air quality assessment set out within this guidance document are applicable in all parts of the UK.

The guidance provides an approach to determining the impacts on local air quality at individual receptors and the overall significance of local air quality effects resulting from a proposed development. The first step is to define the impact descriptors at each sensitive receptor as follows:

- Predict the absolute change in annual mean pollutant concentrations as a proportion of the relevant assessment level (i.e. air quality standard), to determine the magnitude of change;
- Calculate the total predicted pollutant concentrations as a proportion of the relevant assessment level; and
- Examine the magnitude of change in relation to the total predicted pollutant concentrations to determine the impact descriptor.

[32] Moorcroft & Barrowcliffe et al. (2015); Land-use Planning & Development Control: Planning for Air Quality; Institute of Air Quality Management; London

The impact descriptor therefore depends on the magnitude of the change in predicted concentrations and the total predicted concentrations in relation to the air quality standard, as shown in Table 24.

The guidance also notes that where the change in concentrations is less that 0.5% of the assessment level, only negligible impacts would be anticipated.

The second step is to make a judgement on the overall significance of effect for a proposed development. The impact descriptors at each individual receptor is used with a set of qualitative factors such as:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Professional judgement should be used to determine the overall significance of effects. However, in some circumstances where the proposed development can be judged in isolation, it is likely that a 'moderate' or 'substantial' impact will give rise to a significance effect, while a 'negligible' or 'slight' impact will not result in a significant effect.

Determination of significance using this methodology will be applied in the assessment of road traffic emissions.

Table 24: Impact descriptors for the air quality assessment of traffic emissions

Total predicted annual mean concentrations	**% Change in concentrations relative to air quality standard**			
	1%	**2 – 5%**	**6 – 10%**	**> 10%**
< 75% of standard	Negligible	Negligible	Slight	Moderate
76 – 94% of standard	Negligible	Slight	Moderate	Moderate
95 – 102% of standard	Slight	Moderate	Moderate	Substantial
103 – 109% of standard	Moderate	Moderate	Substantial	Substantial
> 110% of standard	Moderate	Substantial	Substantial	Substantial

B2 Air Quality Stack Height Assessment

MVV Environment Services Ltd

Baldovie Proposed EfW

Stack Height Assessment

Final | 25 May 2016

Job number 245510

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ARUP

Document Verification

ARUP

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Contents

1 Introduction

Ove Arup and Partners Ltd (Arup) has been commissioned by MVV Environment Services Ltd to undertake air quality modelling to assess the impacts from the various stack heights being considered for the proposed 40MW thermal input Baldovie Energy from Waste (EfW) plant in Dundee City Council area.

This report details the results of an air quality modelling study undertaken to assess the potential stack height options based on the proposed plant specifications.

The selection of an appropriate chimney stack height includes the consideration of a sufficiently high stack height to achieve adequate dispersion of pollutants against other constraints such as the visual impact.

The modelling in this report has been undertaken at the level required to compare options and a full modelling study will be undertaken and reported at a later date.

The study has focussed on emissions of nitrogen dioxide (NO_2) as the pollutant of concern in the local area.

2 Legislation and Assessment Criteria

The Pollution Prevention and Control (Scotland) Regulations[1] came into force in January 2013 to implement the requirements of the EU Industrial Emissions Directive (IED)[2], as well as consolidating the previous Pollution Prevention and Control (Scotland) Regulations (2012).

Scottish Environment Protection Agency (SEPA) regulates large combustion plant under the Pollution Prevention and Control (Scotland) Regulations 2012, and it sets limits for pollutants from regulated processes.

SEPA does not have fixed published criteria to determine whether the emissions from a process will be acceptable. Each process is assessed on a case-by-case basis taking into account local conditions. SEPA expects 'Best Available Techniques' (BAT) to be used to reduce air quality impacts as far as possible. One key consideration for SEPA is compliance with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[3].

2.1 Air Quality Objectives and Limit Values

There is a statutory duty placed on SEPA, in carrying out all its pollution control functions, to have regard to the requirements of the Air Quality Strategy for England, Scotland, Wales and Northern Ireland and the limit values for Scotland set in the Air Quality Standards (Scotland) Regulations 2010[4].

Air quality limit values and objectives are quality standards for clean air. They can be used as assessment criteria for determining the significance of any potential changes in local air quality resulting from the development proposals.

Some pollutants have standards expressed as annual average (long-term) concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, one-hour or 15-minute average (short-term) concentrations due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out the Scottish air quality limit values for human health.

[1] The Pollution Prevention and Control (Scotland) Regulations 2012 (2012 No. 360)
[2] European Union Industrial Emissions Directive 2010/75/EU (2010)
[3] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)
[4] Air Quality Standards (Scotland) Regulations 2010

Table 1: Air quality limit values for Scotland[4]

Pollutant	Averaging Period	Limit Value / Objective	Date for Compliance	Basis
Nitrogen Dioxide (NO_2)	1 hour mean	200µg/m^3 not to be exceeded more than 18 times a year	31 Dec 2005	UK
	Annual mean	40µg/m^3	31 Dec 2005	UK
Sulphur Dioxide (SO_2)	15 minute mean	266µg/m^3 not to be exceeded more than 35 times a year	31 Dec 2005	UK
	1 hour mean	350µg/m^3 not to be exceeded more than 24 times a year	31 Dec 2004	UK
	Daily mean	125µg/m^3 not to be exceeded more than 3 times a year	31 Dec 2004	UK
Fine Particulate Matter (PM_{10})	Daily mean	50µg/m^3 not to be exceeded more than 7 times a year	31 Dec 2010	Scotland
	Annual mean	18µg/m^3	31 Dec 2010	Scotland
Very Fine Particulate Matter ($PM_{2.5}$)	Annual mean	10µg/m^3	2020	Scotland
Benzene (C_6H_6)	Running annual mean	3.25µg/m^3	31 Dec 2010	Scotland
Carbon Monoxide (CO)	Running 8-hour mean	10mg/m^3	31 Dec 2003	Scotland
Lead (Pb)	Annual mean	0.25µg/m^3	31 Dec 2008	UK

2.2 National Policy Statement

The overarching National Policy Statement for Energy (EN-1) includes details on how air quality should be considered in the planning process, this in contained in Section 5.2 of the document which states:

"*The IPC should generally give air quality considerations substantial weight where a project would lead to a deterioration in air quality in an area, or leads to a new area where air quality breaches any national air quality limits. However air quality considerations will also be important where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits.*

In all cases the IPC must take account of any relevant statutory air quality limits. Where a project is likely to lead to a breach of such limits the developers should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to proceed. In the event that a project will lead to non-compliance with a statutory limit the IPC should refuse consent."

This statement was written when the Infrastructure Planning Commission existed. It has now been incorporated into the National Infrastructure Directorate of the Planning Inspectorate. The key criteria here are whether the project "leads to a deterioration in air quality" and whether there is "a new area where air quality breaches any national air quality limits". If the project leads to a new breach of a statutory limit then the Planning Inspectorate should refuse permission.

2.3 SEPA H1 Guidance

The SEPA Integrated Pollution Prevention and Control (IPPC) H1 guidance document[5] was produced by the Environment Agency for England and Wales in collaboration with SEPA and the Northern Ireland Environment and Heritage Service (EHS). It outlines the methodology to be used to carry out an environmental assessment of the impact of the emissions resulting from an installation. To gain a permit from SEPA, operators must show that they have developed proposals to apply BAT and that no significant pollution will be caused.

Box 3.3.2 of the guidance document notes that process contributions can be considered so insignificant that no further investigation is required if:

- the long term process contribution is <1% of the long term environmental standard; and
- the short term process contribution is <10% of the short term environmental standard.

This provides a useful view of when impacts may definitely be considered acceptable, but they are very stringent criteria and are not a test of significant impact.

[5] SEPA (2003) H1 Guidance: Integrated Pollution Prevention and Control (IPPC): Environmental Assessment and Appraisal of BAT (Version 6 July 2003)

3 Methodology

The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at and in the vicinity of the proposed development site;
- An assessment of the potential changes in air quality arising from the operation of the proposed development at various heights; and
- Determination of the proposed stack height.

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment – these are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

Emissions associated with the proposed EfW plant have the potential to cause increases in pollutant concentrations in the vicinity of the site. Concentrations of NO_2 have been quantified through dispersion modelling, at various stack heights, in accordance with the methodology outlined in the following sections.

3.1 Dispersion Model

The ADMS 5 dispersion model, version 5.1, the most up-to-date version of the model at the time of this study, has been used.

The ADMS model has been widely validated for industrial point sources, and is accepted as being 'fit-for-purpose' for environmental impact assessments of stack releases. It is regularly tested against other dispersion models by the Environment Agency's (EA) Air Quality Modelling and Assessment Unit (AQMAU). The model incorporates the latest understanding of boundary layer meteorology and dispersion.

3.2 Meteorological Data

Meteorological data used in this assessment was taken from the RAF Leuchars Airport meteorological station for a five year monitoring period from 1st January 2011 to 31st December 2015 (inclusive). Defra guidance LAQM.TG16 [6] recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling. Leuchars lies around 12km to the south of the proposed EfW site. Figure 1 shows the wind rose for Leuchars, from which it can be seen that the dominant wind direction is west south-westerly.

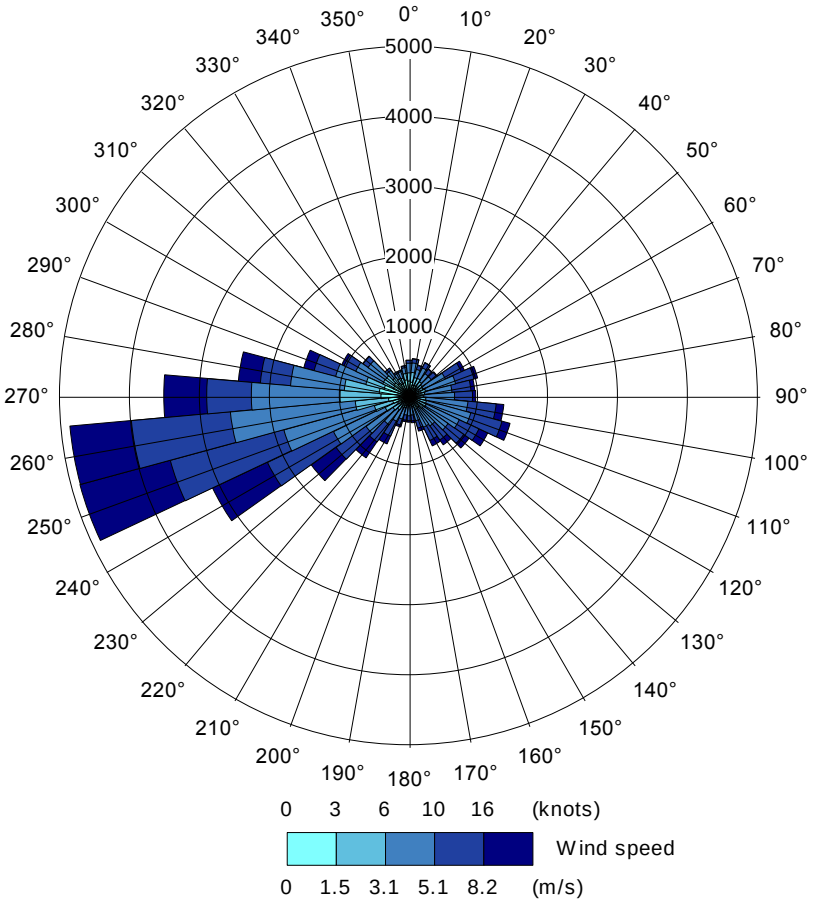
Dispersion models may include special treatment for calm wind conditions under which dispersion of air pollutants is more difficult to calculate. Without the use of the special treatment for calm conditions, ADMS treats calm wind conditions by setting the minimum wind speed to 0.75m/s. LAQM.TG16 recommends that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be

[6] Local Air Quality Management Technical Guidance LAQM.TG16, DEFRA, 2016.

used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedences. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably greater than 90%.

The 2011 to 2015 meteorological data from Leuchars Airport includes 42,250 lines of usable hourly data out of the total 43,824 for the five years, which corresponds to 96% of usable data. This is above the 90% threshold and this data therefore meets the requirement of the Defra guidance.

Figure 1: Wind rose for RAF Leuchars Airport 2011 to 2015



3.3 Complex Terrain

Large scale terrain and costal effects will be captured to an extent by the RAF Leuchars meteorological data. More local terrain may have an effect; terrain data has been obtained from the Ordnance Survey (OS) for inclusion in the model.

3.4 Building Effects

Buildings can have a significant effect on the dispersion of pollutants, particularly if they are at least 30-40% of the height of the stack. The plume from the stack can be entrained in the cavity zone downwind of the building, which can lead to higher

ground level concentrations near the stack than would be expected in the absence of buildings and can affect the dispersion of pollutants in the atmosphere. The downwash effects have been taken into account by the ADMS 5 dispersion model.

Building input geometries on and around the Baldovie site have been included in the model and are shown in Table 2. The complex building geometry has been simplified so as to be included within the model which only accepts rectangular or circular building shapes.

Table 2: Building geometries

ID	Building Name	NGR* (m)		Height (m)	Length (m)	Width (m)	Angle (°)
		X	Y				
1	Aerospace Tooling	344296	733073	11.8	55	60	250
2	Rembrand Timber	344408	733150	13.1	48	40	245
3	Forties Road	344535	733174	9.5	44	98	258
4	DERL 1	344533	733062	25.9	66	52	258
5	DERL 2	344580	733074	25.0	28	44	258
6	DERL 3	344548	732952	28.9	90	91	260
7	Proposed EfW	344580	732858	35.0	50	122	258
8	Michelin 1	344858	732917	14.7	182	70	260
9	Michelin 2	344973	732799	14.7	96	336	260
10	Michelin 3	345028	732898	19.3	42	50	260
11	Michelin 4	345128	732698	15.0	165	75	260
Note: *NGR = National Grid Reference							

3.5 Wind Turbine Effects

Wind turbines can also affect dispersion. There are two wind turbines located on the Michelin site to the east of the Baldovie site.

Data for the wind turbines has been collated and included in the model, and is shown in Table 3. This includes the hub height and the thrust coefficient at the different wind speeds for which the turbine would be operational.

Table 3: Wind turbine model input parameters

Rated power output	2,300kW
Make/model	Enercon E70
Number of units	2
Location	344987, 732726 and 344790, 732926
Turbine rotor diameter	71m
Hub height	85m
Wind speed at hub height (m/s)	**Thrust Coefficient (Ct)**
1	0.00
2	0.10
3	0.27
4	0.36
5	0.42
6	0.46
7	0.48
8	0.50
9	0.50
10	0.50
11	0.49
12	0.45
13	0.39
14	0.34
15	0.28
16	0.23
17	0.19
18	0.16
19	0.14
20	0.12
21	0.10
22	0.09
23	0.08
24	0.07
25	0.06

3.6 Surface Roughness

Surface roughness is a parameter that describes the nature of the local terrain and is important in the modelling as it defines how turbulence resulting from the air flow over the ground is treated in the model. In relatively flat (smooth surface) areas the surface roughness is low and turbulence from this source is lower than a built-up urban area.

Typical surface roughness values range from 1.5m (for cities, forests and industrial areas) to 0.0001m (for water or sandy deserts). In this assessment, the general land use in the local study area can be described as "parkland, open suburbia" with a corresponding surface roughness of 0.5m.

3.7 Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the extent to which stable atmospheric conditions are limited by the heat island effect. A minimum Monin-Obukhov length of 30m has been used in this dispersion modelling study, representing "mixed urban/industrial" land uses.

3.8 Assessment Extents

Ambient pollutant concentrations have been predicted at locations over a Cartesian grid of 10km by 10km in extent with a resolution of 100m, to provide a prediction of the maximum pollutant concentration throughout the assessment domain.

The modelled grid extent was: 339637, 727880 to 349637, 727880, at a height of 1.5m, representative of ground receptor height.

3.9 Emissions

The current design of the development proposes that a new 100,000tpa EfW plant (of approximate size 40MW thermal input) will be built, initially to operate in parallel with the existing DERL plant. After the DERL plant has closed the EfW will continue to operate.

Oxides of nitrogen (NOx) will be emitted by the proposed EfW plant, with a range of other pollutants. NOx is the focus of this study, as it is considered to be the main pollutant of concern in the vicinity of the proposed development, and is the pollutant with the highest emissions from the proposed EfW and the existing DERL plant.

As emissions will be greatest when both plants operate in parallel, this is the scenario which has been assessed. NOx emissions for the existing DERL plant have been taken from actual monitoring data in 2015, and emissions for the proposed EfW have been calculated from the 200mg/Nm^3 IED emission limit.

The parameters for the stacks and emissions for the proposed EfW and existing DERL plant are presented in Table 4. The plant have been considered to be in use continuously, and have been modelled as running each hour of every day.

Table 4: DERL and proposed EfW modelled parameters

Parameter	Unit	DERL Plant	Proposed EfW Plant
Stack location	NGR (m)	344624.7, 732995.9	344636.7, 344636.7
Stack diameter	m	1.15	1.57
Flue gas efflux velocity	m/s	19.6	15
Temperature	˚C	142	130
Stack height (from ground)	m	70	70 to 110
NOx	g/s	4.76	3.95

3.10 NOx to NO_2

The model predicts NOx concentrations which comprise nitric oxide (NO) and nitrogen dioxide (NO_2). NOx is emitted from combustion processes, primarily as NO with a small percentage of NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO_2. NO_2 is associated with effects on human health, the air quality standards for the protection of human health are based on NO_2 rather than total NOx or NO. A suitable NOx:NO_2 conversion has been applied to the modelled NOx concentrations in order to determine the impact of the NOx emissions on ambient concentrations of NO_2. This assessment has followed the methodology set out by the Environment Agency[7] which assumes that 70% of long-term and 35% of short-term NOx concentrations will be NO_2.

[7] Environment Agency, Air Quality Modelling and Assessment Unit, Conversion ratios for NOx and NO_2

4 Existing Air Quality

The site is located on the Baldovie Industrial Estate, to the East of the City of Dundee.

The entire Dundee City Council area was declared an Air Quality Management Area (AQMA) in 2013. The AQMA was declared due to exceedances of the 1-hour and annual mean NO_2 air quality objectives, and the annual mean PM_{10} air quality objective[4]. Figure 2 shows the site location and the boundaries of the AQMA.

Figure 2: Dundee AQMA

4.1 Local Air Quality Monitoring

The city of Dundee carries out monitoring of NO_2 and PM_{10} concentrations at seven monitoring sites in the city. Local monitoring data on the Air Quality Scotland website has been reviewed, and data from all automatic air quality sites in Dundee is shown in Table 5 and Table 6, with site locations shown in Figure 3.

There are seven automatic monitoring sites in Dundee, Table 5 shows the annual mean concentrations of NO_2 and PM_{10}. Annual mean concentrations of NO_2 exceeded the air quality objective of 40 µg/m^3 at two kerbside sites (DUN5 Seagate and DUN6 Lochee Road) and two roadside monitoring sites (DUNM Meadowside and DUN7 Whitehall Street) in 2014. Annual mean concentrations of PM_{10} exceeded or equalled the air quality objective of 18 µg/m^3 at the same two kerbside sites in 2014.

Table 6 shows the number of exceedances of the short term air quality objectives for NO_2 and PM_{10}. For PM_{10} daily mean concentrations of 50 µg/m^3 are not to be exceeded more than 7 times a year, and for NO_2 hourly mean concentrations of 200 µg/m^3 are not to be exceeded more than 18 times a year. There were no sites which exceeded either objective in 2014 or 2015, but the number of exceedances for PM_{10} was equalled at one roadside site in 2015.

Figure 3: Dundee City Council automatic monitoring sites

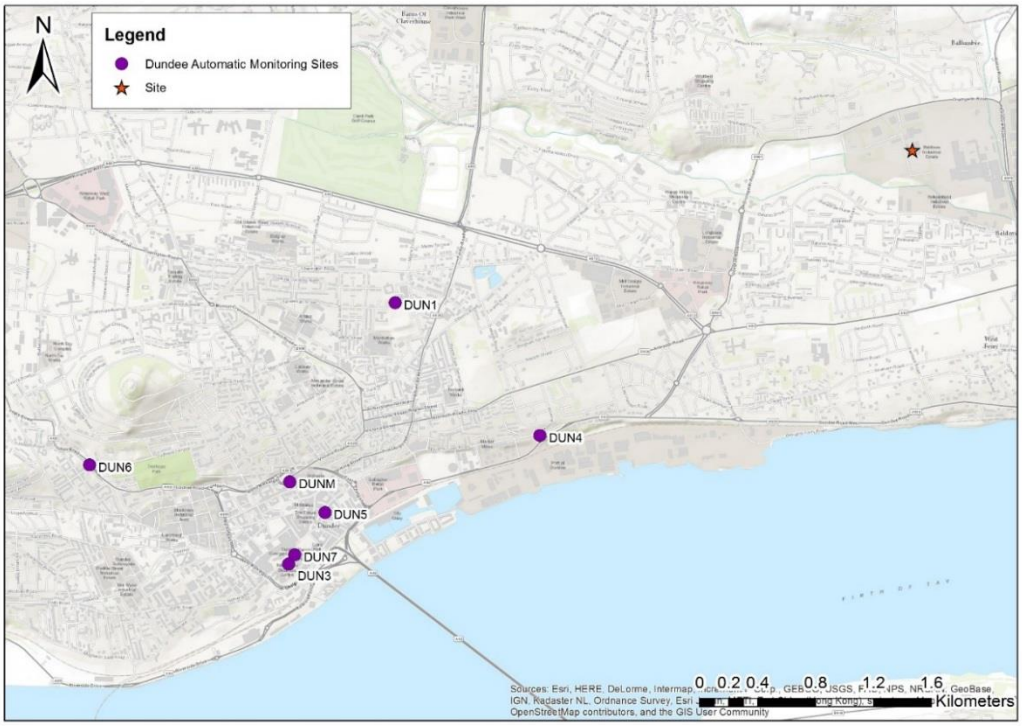


Table 5: Long-term local automatic air quality monitoring data

Site ID	Site name	Site type	NGR (m)		Annual mean NO_2 concentration (µg/m^3)		Annual mean PM_{10} concentration (µg/m^3)	
			x	y	2014	2015	2014	2015
DUN1	Mains Loan	Urban background	340970	731892	13	10	13	12
DUN3	Union Street	Roadside	340234	730091	29	28	16	17
DUN5	Seagate	Kerbside	340486	730446	**55**	**50**	18	14
DUN4	Broughty Ferry Road	Urban industrial	341970	730976	-	-	15	13
DUNM	Meadowside	Roadside	340243	730658	**40**	38	17	16
DUN6	Lochee Road	Kerbside	338859	730774	**46**	**48**	**19**	**20**
DUN7	Whitehall Street	Roadside	340277	730154	**43**	36	-	-

Notes: '-' indicates no monitoring of this pollutant is undertaken at this site. Concentrations in **bold** exceed the relevant air quality objectives.

Table 6: Short-term local automatic air quality monitoring data

Site ID	Site name	Site type	NGR (m)		No. exceedances of hourly mean 200µg/m^3 NO_2 air quality objective		No. exceedances of daily mean 50µg/m^3 PM_{10} air quality objective	
			x	y	2014	2015	2014	2015
DUN1	Mains Loan	Urban background	340970	731892	0	0	1	2
DUN3	Union Street	Roadside	340234	730091	0	0	2	7
DUN5	Seagate	Kerbside	340486	730446	0	0	2	3
DUN4	Broughty Ferry Road	Urban industrial	341970	730976	0	0	1	2
DUNM	Meadowside	Roadside	340243	730658	0	0	2	4
DUN6	Lochee Road	Kerbside	338859	730774	1	6	1	5
DUN7	Whitehall Street	Roadside	340277	730154	0	0	-	-
Notes: '-' indicates no monitoring of this pollutant is undertaken at this site. Concentrations in **bold** exceed the relevant air quality objectives.								

4.2 Defra Background

The Defra website[8] includes estimated background air pollution data for each 1km by 1km OS grid square in the UK.

Table 6 shows the predicted background NO_2, NOx, PM_{10} and $PM_{2.5}$ concentrations for the relevant grid square for the proposed Baldovie EfW site, centred on 344500, 732500.

Defra background concentrations for the relevant grid square are predicted to be well below the air quality objectives for annual mean NO_2 and PM_{10}. This suggests that it is unlikely that the air quality for the site will exceed the objectives.

Table 7: Defra predicted background concentrations in 2015 and 2020

Year	Annual mean concentration (µg/m^3)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
2015	15.8	12.0	8.3	6.0
2020	13.4	10.2	10.9	7.1

[8] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

4.3 Project Specific Monitoring

MVV is currently undertaking baseline monitoring of NO_2 in the area around the Baldovie site.

Monitoring is being undertaken using diffusion tubes, which are a passive monitoring method widely used in the UK for measuring ambient concentrations of NO_2. Diffusion tubes consist of a small plastic tube containing a chemical reagent which absorbs the pollutant to be measured (in this case NO_2) directly from the air.

Eleven monitoring points have been selected, including one adjacent to the DERL site, locations close to residential properties, one background location and one co-located with an automatic monitor operated by Dundee City Council. The monitoring locations are shown in Figure 4.

The first five months (November 2015 – April 2016) of monitoring have been carried out and results are shown in Table 8. They show that average concentrations at all monitoring sites close to the proposed development are below the annual mean air quality objective. The only site at which concentrations currently exceed the objective value is that co-located with the Dundee Meadowside automatic monitor. However, the results have not yet been bias adjusted and so are indicative at this stage. In addition, only annual mean concentrations should be compared to the annual limit value.

Figure 4: MVV monitoring sites

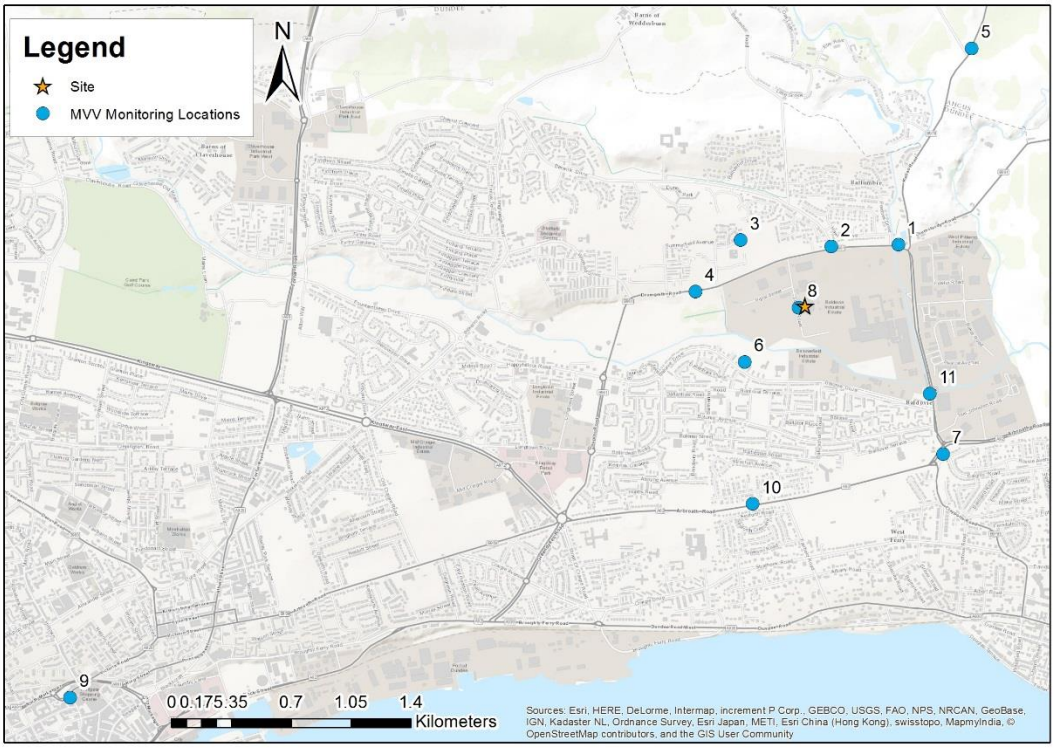


Table 8: MVV air quality monitoring data for the five 1-month periods (November 2015 – April 2016)

Site ID	Site Name	Site Type	OS Grid Ref		Mean NO_2 concentration ($\mu g/m^3$)					
			x	y	Period 1	Period 2	Period 3	Period 4	Period 5	Average
1	Baldovie/Drumgieth Road	Roadside	345088	733302	39.0	25.2	34.5	32.0	24.5	31.0
2	Drumgeith Road	Roadside	344696	733290	**41.0**	24.6	34.3	32.2	23.0	31.0
3	Britannia Drive	Roadside	344167	733328	20.7	15.5	18.7	15.6	8.6	15.8
4	Britannia Drive	Roadside	343903	733028	33.2	21.1	30.3	28.5	16.5	25.9
5	Kellas Road	Background	345517	734449	21.4	16.9	17.9	16.9	9.7	16.6
6	Balmerino Road	Roadside	344190	732616	22.2	16.3	21.4	20.0	9.3	17.8
7	Balunie Drive	Roadside	345349	732079	24.6	29.8	37.9	37.5	24.7	30.9
8	Baldovie Road (Proposed EfW Site)	Roadside	344504	732934	22.8	17.8	21.6	21.4	12.0	19.1
9	Meadowside Automatic Monitor	Roadside	340245	730655	**51.2**	**40.1**	**46.5**	**45.1**	39.1	**44.4**
10	Arbroath Road/Gotterstone Avenue	Roadside	344236	731786	-	-	-	42.4	29.1	35.7
11	4 Brot'y Ferry Court	Roadside	345272	732430	-	-	-	31.9	21.0	26.4

Notes: Concentrations in **bold** exceed the NO_2 air quality objective, however this strictly applies to a full year of data. '-' denotes no monitoring undertaken at that site during that period. Average results have not been annualised or bias adjusted, and so are indicative at this stage.

5 Results

5.1 Existing Plant

The existing DERL plant has been modelled at its height of 70m (above ground level). The predicted annual mean NO_2 concentrations for the existing DERL plant are shown as a contour plot in Figure 7. The results show peak concentrations to the north-east of the stack and a second, smaller peak to the north-west.

The point of maximum impact on the grid for the DERL plant for annual mean NO_2 is 2.95µg/m^3, and for hourly-mean NO_2 is 14.7µg/m^3.

5.2 Impact of Proposed EfW

The predicted NO_2 concentrations for the proposed EfW plant have been assessed. The modelling has examined the impact of the stack at heights between 70m and 110m (above ground level), to select an appropriate stack height to enable pollutant dispersion.

Predicted annual mean and hourly mean process contributions at the point of maximum impact on the grid are shown in Table 9, and have been plotted in Figure 5 (annual mean) and Figure 6 (hourly mean).

The hourly mean graph shows a beneficial increase in stack height up to around 87.5m. At heights above 90m, the air quality benefit of increasing the stack height further appears to be reduced. There does not appear to be a pronounced beneficial change in incremental stack height for the annual mean process contributions.

It is considered that the use of a 90m stack represents a height at which the visual impact of a high stack would begin to outweigh the air pollutant dispersion benefits.

Table 9: Predicted maximum NO_2 concentrations (µg/m^3)

Concentration	**Height (m)**						
	70	**75**	**80**	**82.5**	**85**	**87.5**	**90**
Max annual mean NO_2 concentration (µg/m^3)	1.98	1.51	1.10	0.97	0.86	0.77	0.69
Max hourly mean NO_2 concentration (µg/m^3)	6.82	6.04	5.21	5.10	4.96	3.18	2.96
	Height (m)						
	92.5	**95**	**97.5**	**100**	**105**	**110**	**-**
Max annual mean NO_2 concentration (µg/m^3)	0.61	0.55	0.48	0.42	0.32	0.25	-
Max hourly mean NO_2 concentration (µg/m^3)	2.79	2.68	2.54	2.41	2.18	1.94	-

Figure 5: Predicted maximum annual mean NO_2 concentrations ($\mu g/m^3$) by stack height

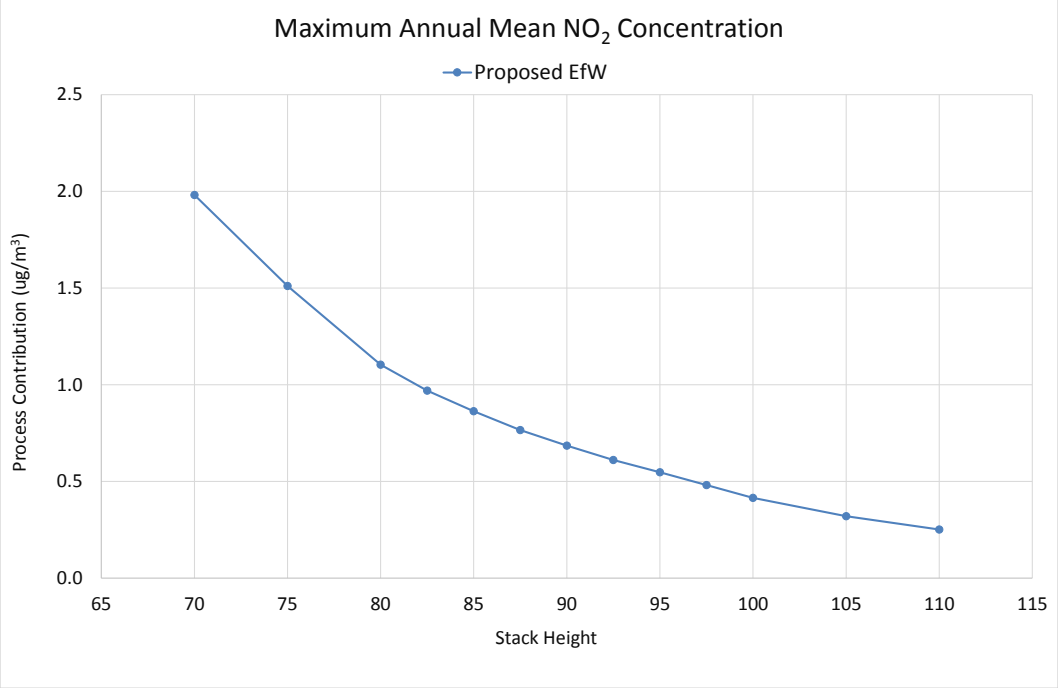
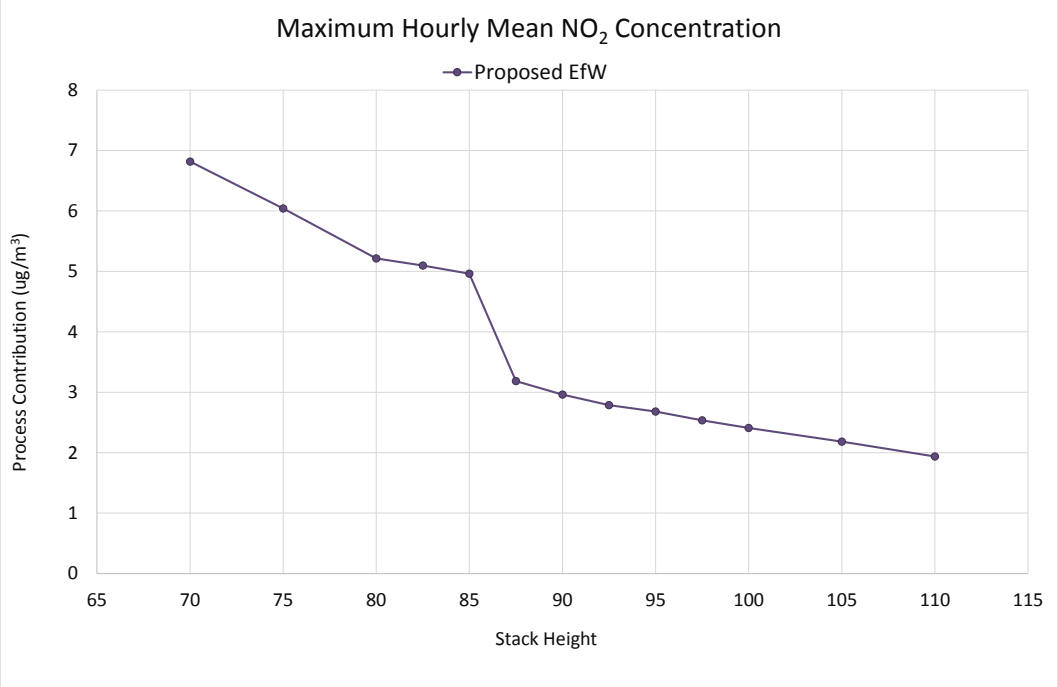


Figure 6: Predicted maximum hourly mean NO_2 concentrations ($\mu g/m^3$) by stack height



5.2.1 Long-term concentrations

Contour plots of the long-term (annual mean) process concentrations of NO_2 (in $\mu g/m^3$) are shown in Figure 8, Figure 9 and Figure 10 for proposed EfW stack heights of 80m, 90m and 100m respectively. The 80m modelled stack has the

largest area with an increased impact, however there is less change in the area of greatest impact between the 90m and 100m stack contour plots.

In all cases the results show peak concentrations to the north-east of the stack and a second, smaller peak to the north-west. The area of maximum impact for the 90m stack is located approximately 600m to the north-east of the proposed EfW, and is located on the area of commercial use, which is not largely used for residential purposes.

The results show that for each 5m increase in height of the proposed EfW stack, the long-term maximum impact reduced by 0.2 to 0.4µg/m^3. This is less than or equal to 1% of the annual mean objective for NO_2.

Examination of the background air quality in the location of the point of maximum impact in 2015 (taken from Defra maps for the area) shows that existing NO_2 concentrations in this area are 12.0µg/m^3 suggesting that with the addition of the contribution from the proposed EfW, the resulting concentrations would remain well below the air quality objective and EU limit value of 40µg/m^3.

5.2.2 Short-term concentrations

Contour plots of the short-term (hourly mean) process concentrations of NO_2 (in µg/m^3) are shown in Figure 13, Figure 14 and Figure 15 for proposed EfW stack heights of 80m, 90m and 100m respectively. The 80m modelled stack has the largest area with an increased impact.

The areas of maximum short-term impact for all stack heights are to the south-east and north-west of the proposed EfW. The area of maximum impact for the 90m stack is located approximately 500m to the north-west of the proposed EfW, just north of Drumgeith Road.

It is important to note that building downwash has an important influence on predicted concentrations. Should changes to building heights be made, then this could affect the conclusions of the stack height assessment work and further modelling would be required to confirm the optimum stack height.

5.2.3 Combined Effect

Figure 11 shows the combined effect of the existing DERL plant and the proposed EfW for long-term NO_2 concentrations, and Figure 16 shows the combined short-term NO_2 concentrations, for an EfW stack height of 90m.

For the long-term process concentrations, the area of maximum impact is located to the north-east of the proposed EfW, which is an area of commercial use to the east of Baldovie Road.

For the short-term process concentrations, the area of maximum impact is located to the north-west, north, north-east and east of the proposed EfW.

Figure 7: Predicted long-term NO_2 process concentrations ($\mu g/m^3$) due to the existing DERL plant

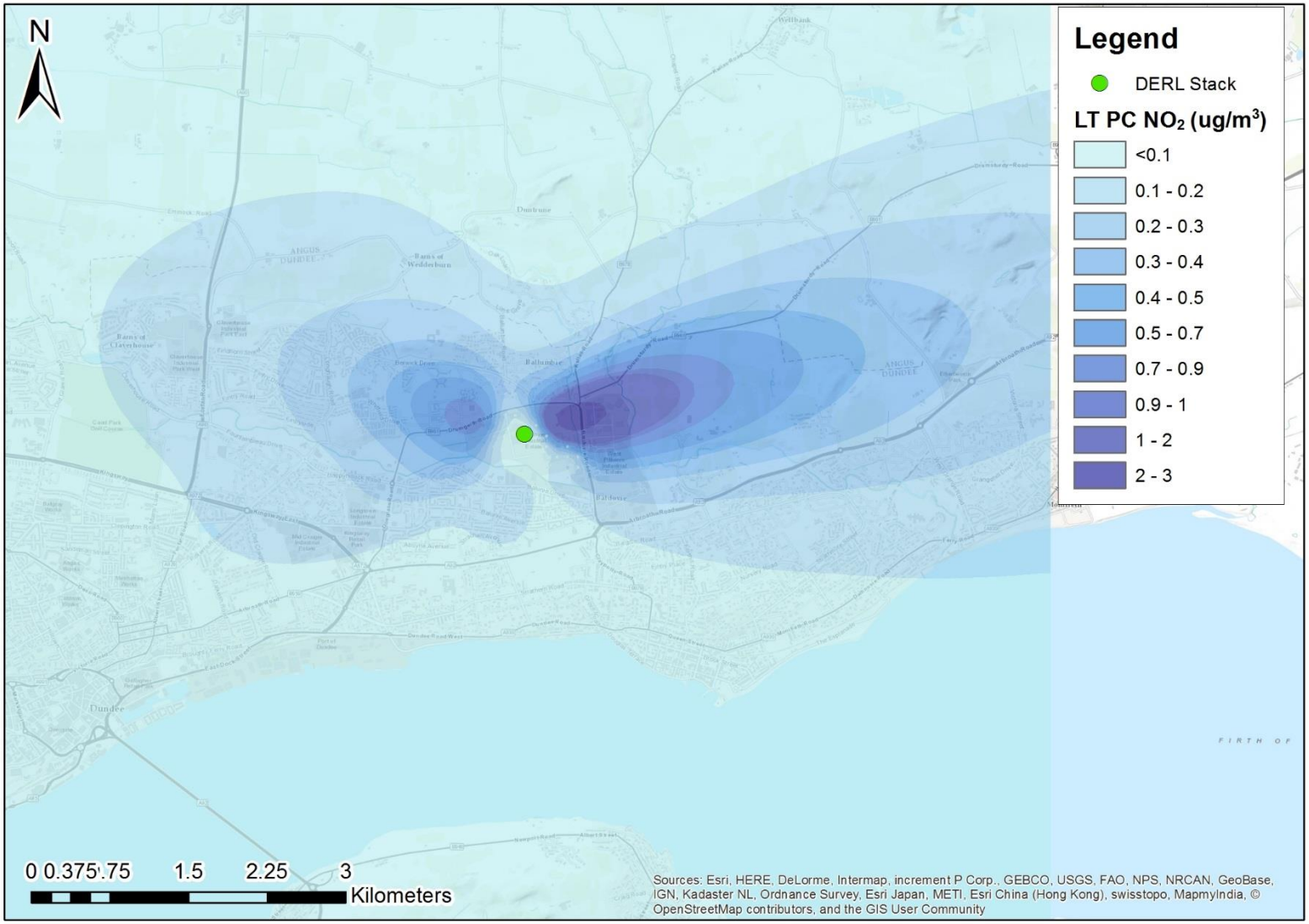


Figure 8: Predicted long-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with an 80m stack height

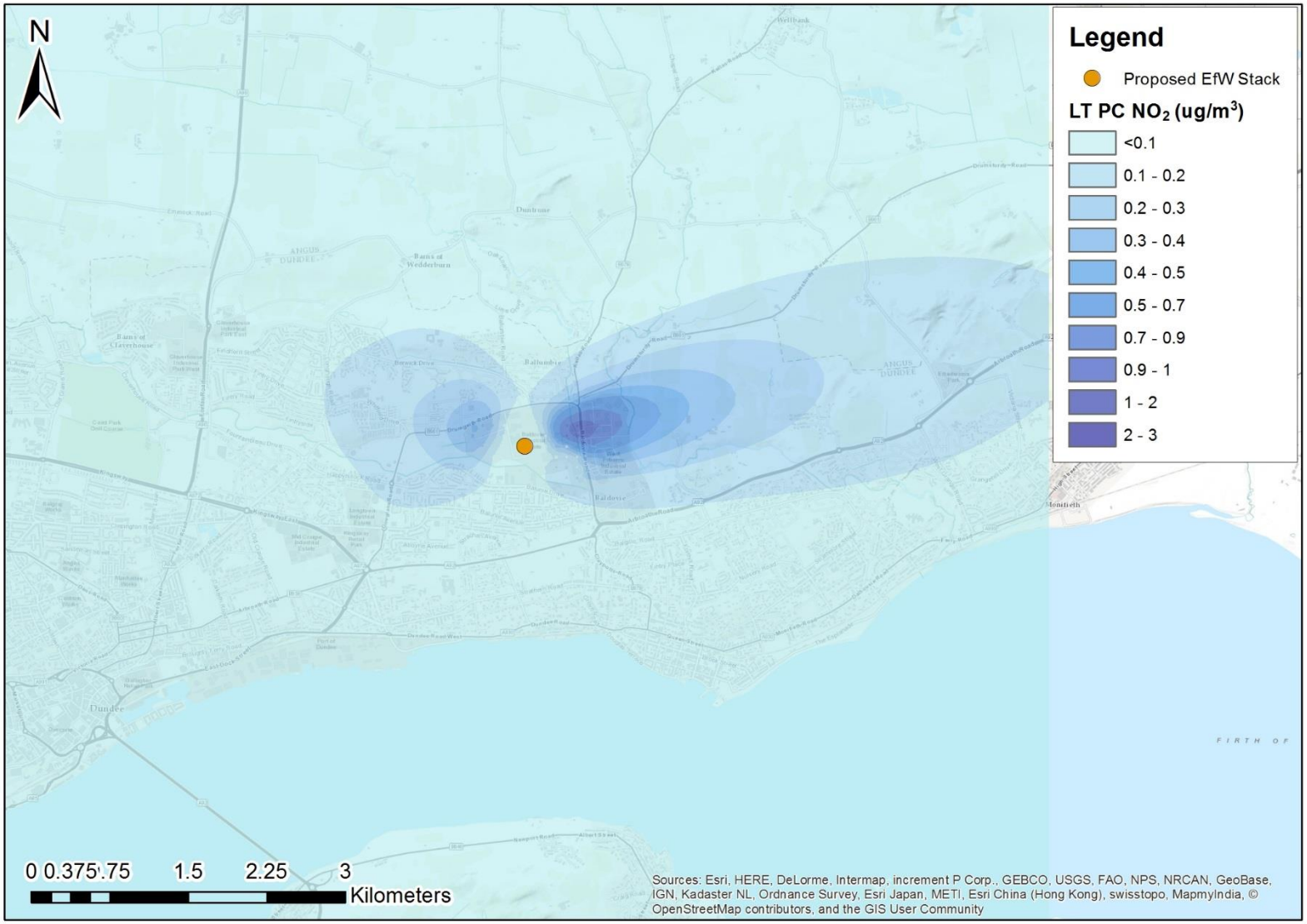


Figure 9: Predicted long-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with a 90m stack height

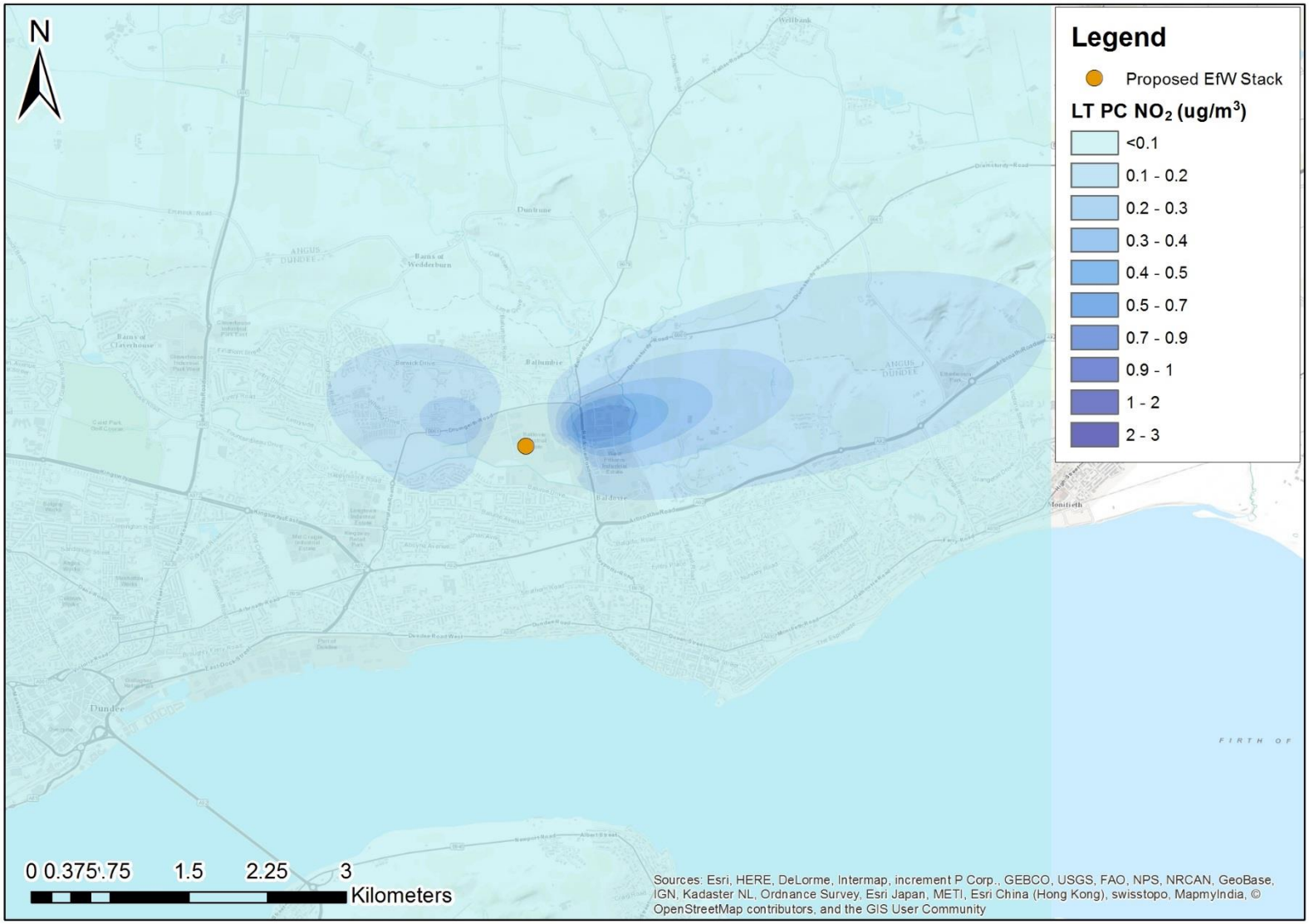


Figure 10: Predicted long-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with a 100m stack height

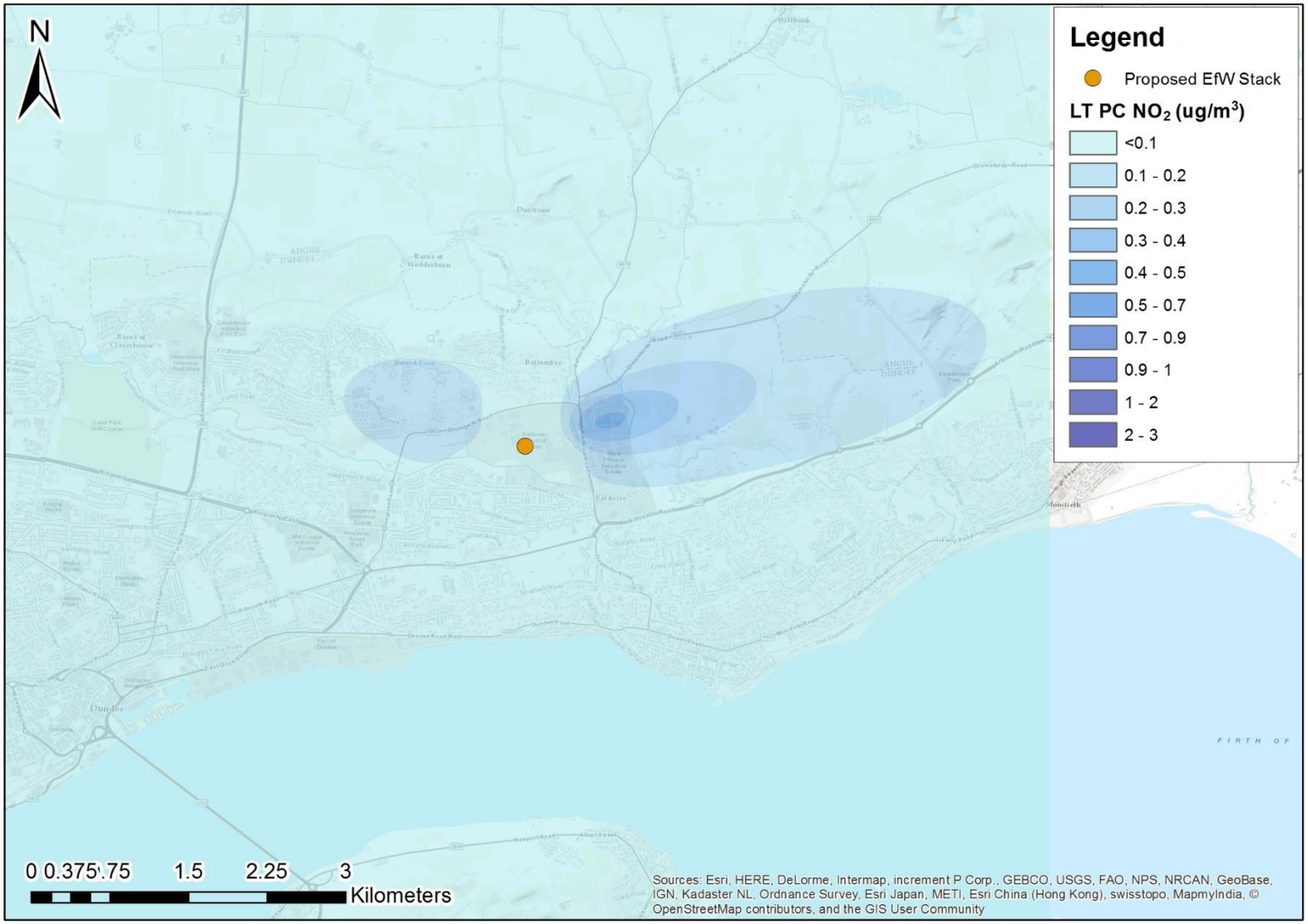


Figure 11: Predicted long-term NO_2 process concentrations ($\mu g/m^3$) due to the combined DERL plant and proposed EfW with a 90m stack height

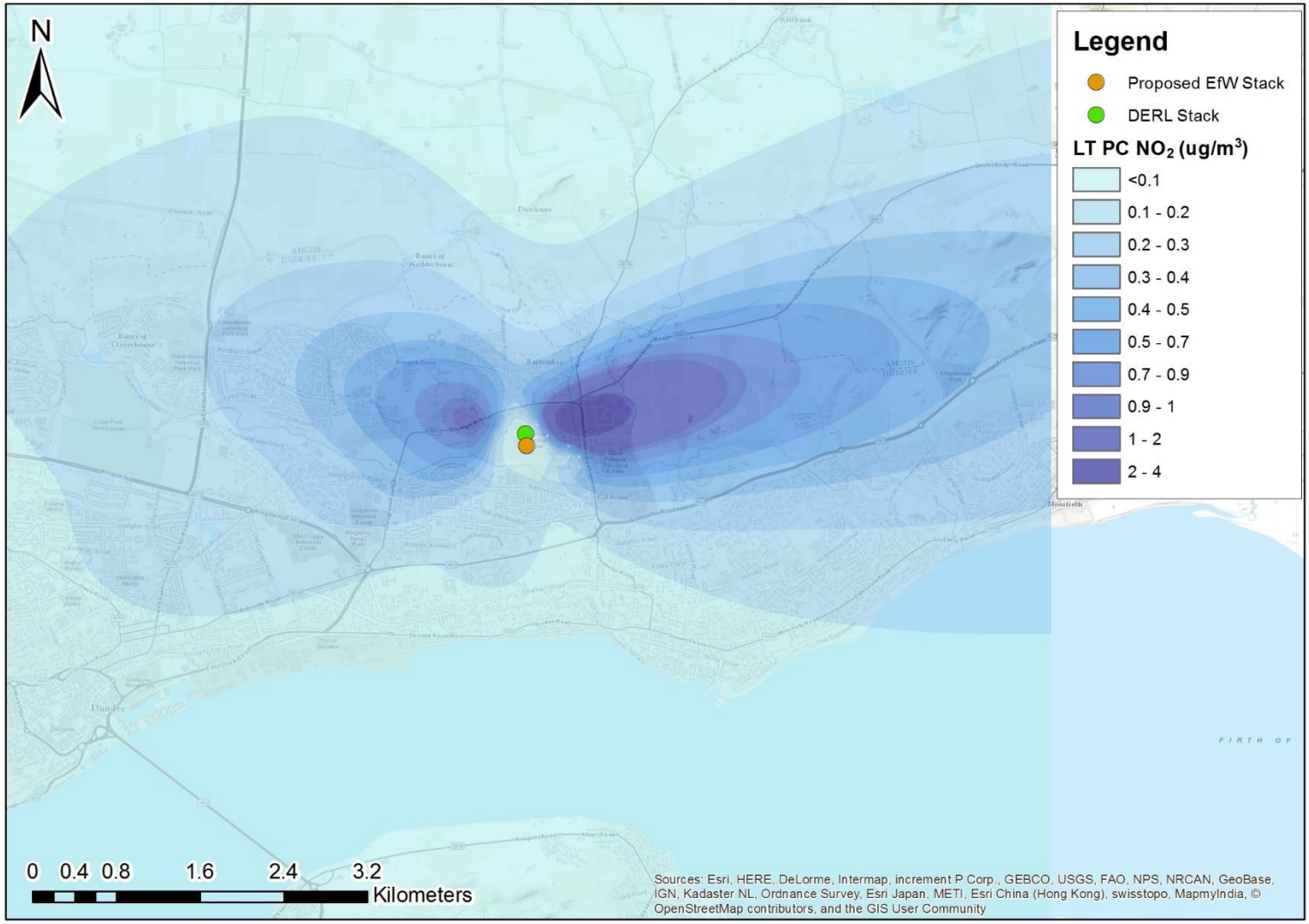


Figure 12: Predicted short-term NO_2 process concentrations ($\mu g/m^3$) due to the existing DERL plant

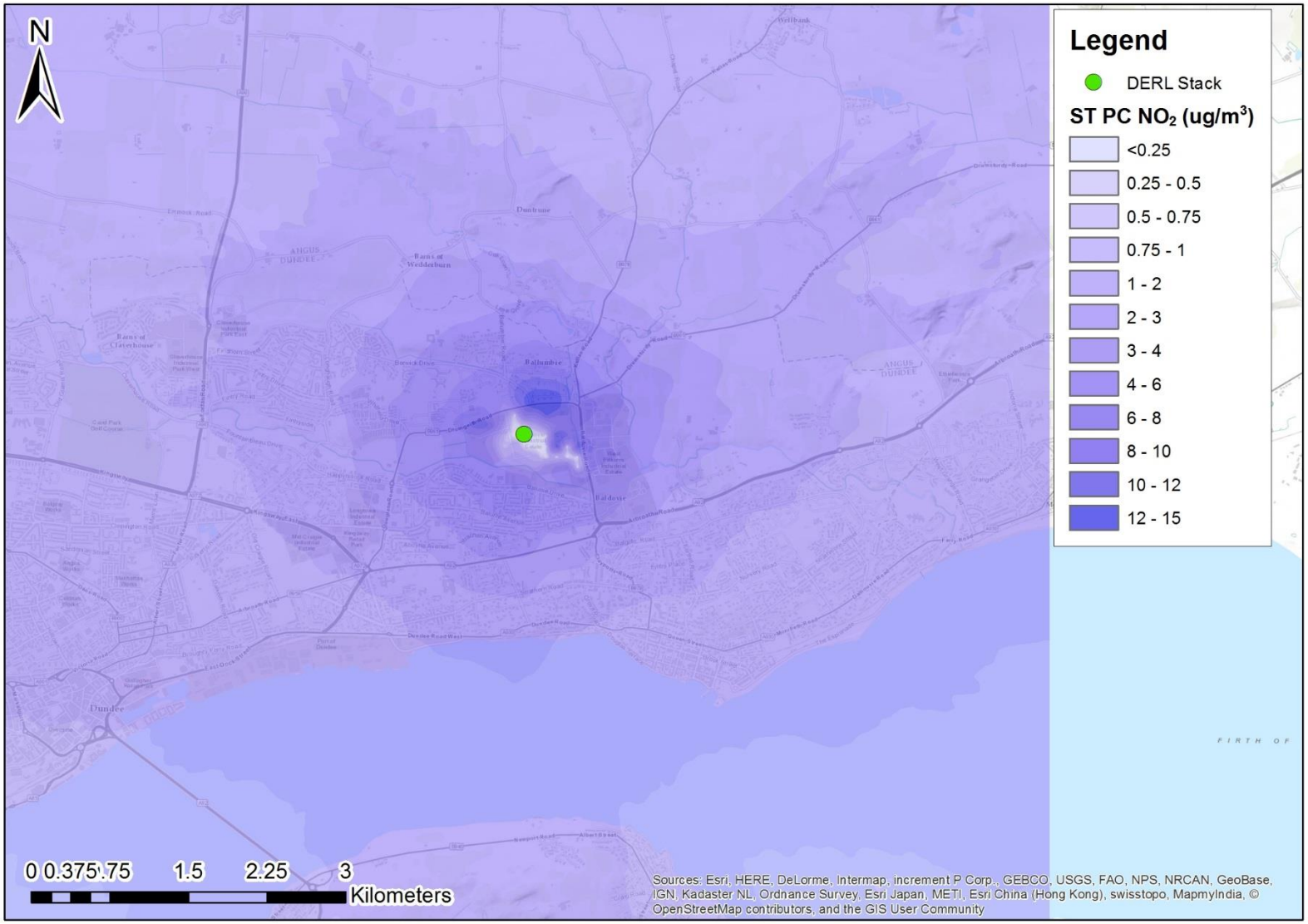


Figure 13: Predicted short-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with an 80m stack height

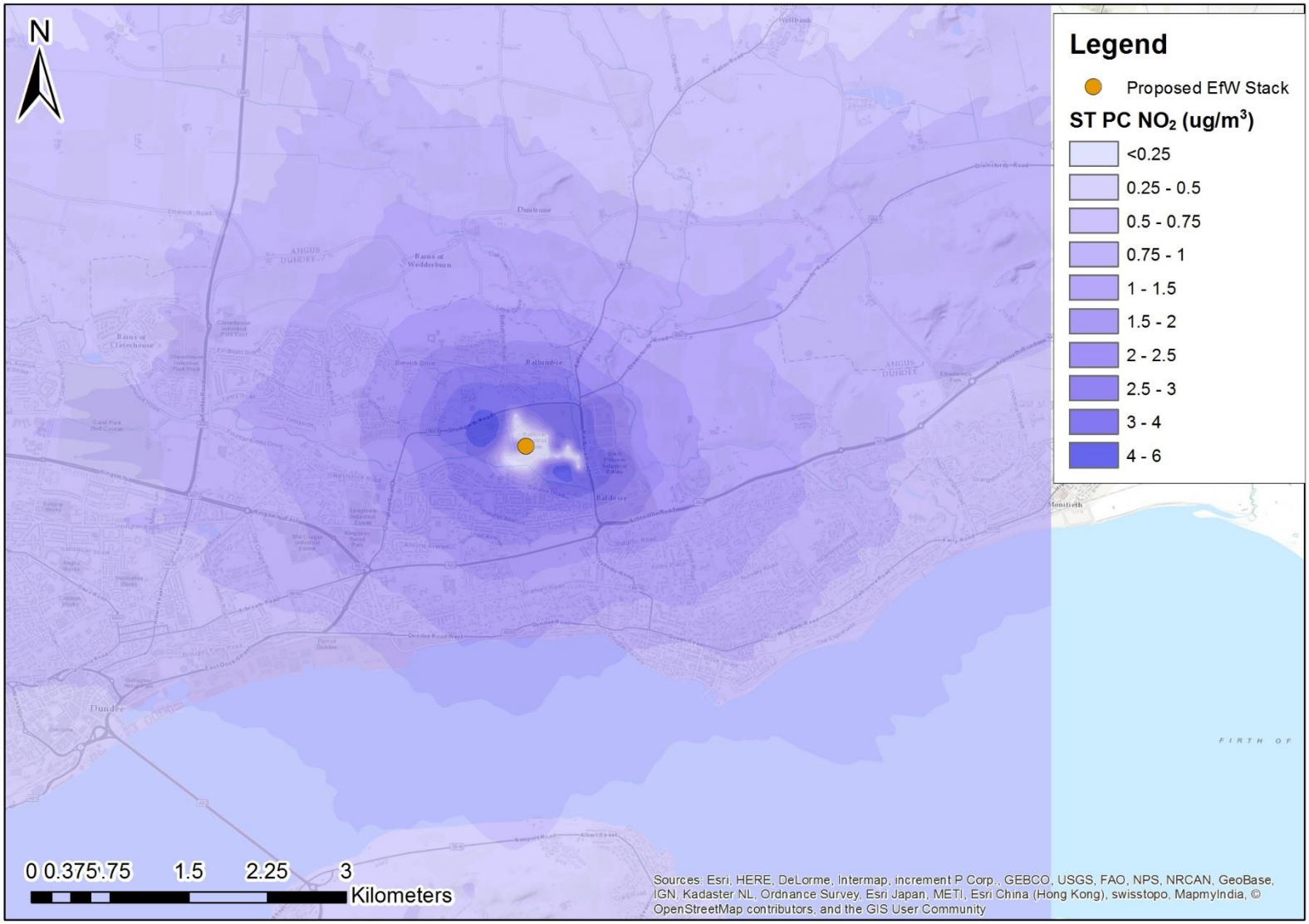


Figure 14: Predicted short-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with a 90m stack height

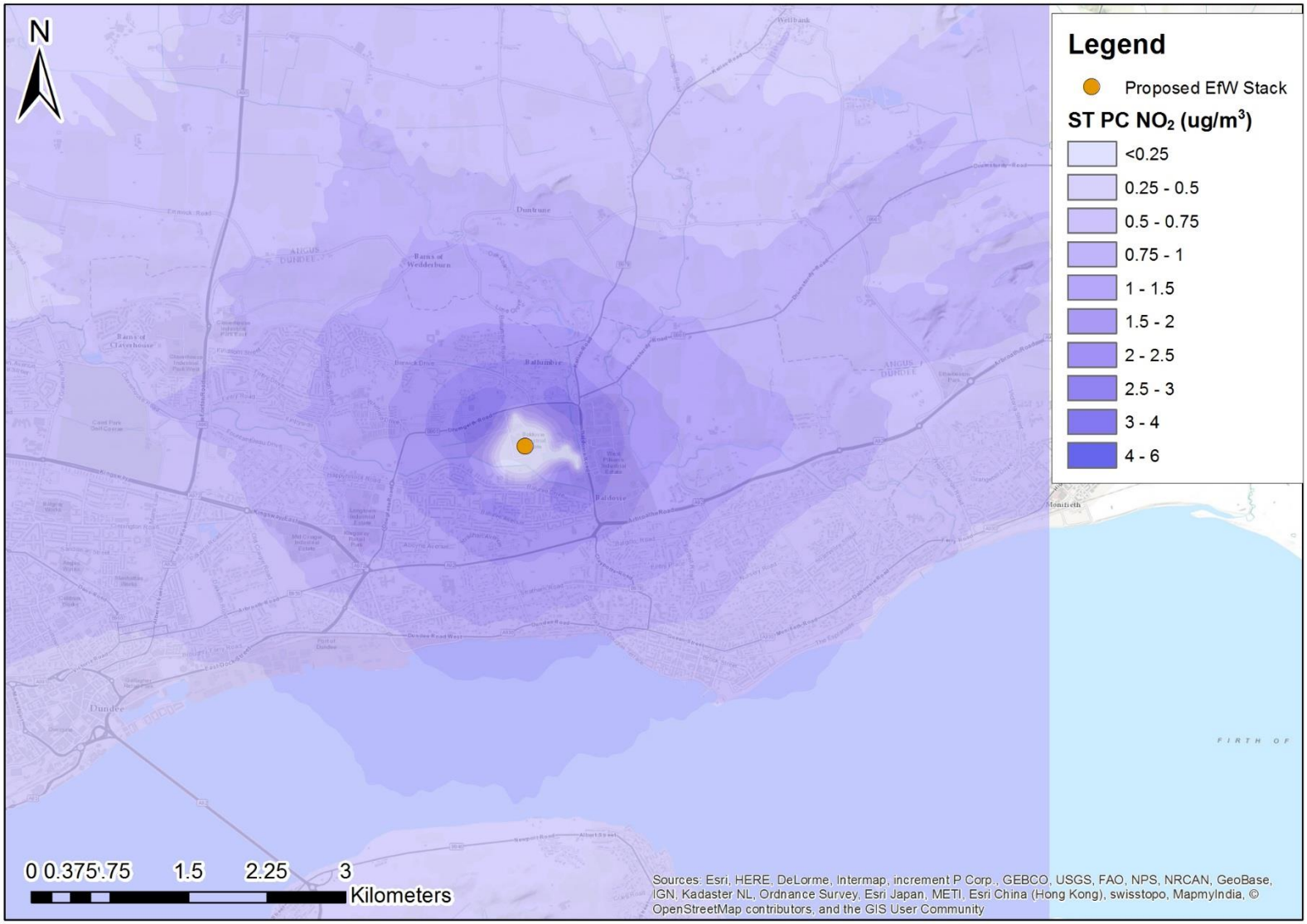


Figure 15: Predicted short-term NO_2 process concentrations ($\mu g/m^3$) due to the proposed EfW with a 100m stack height

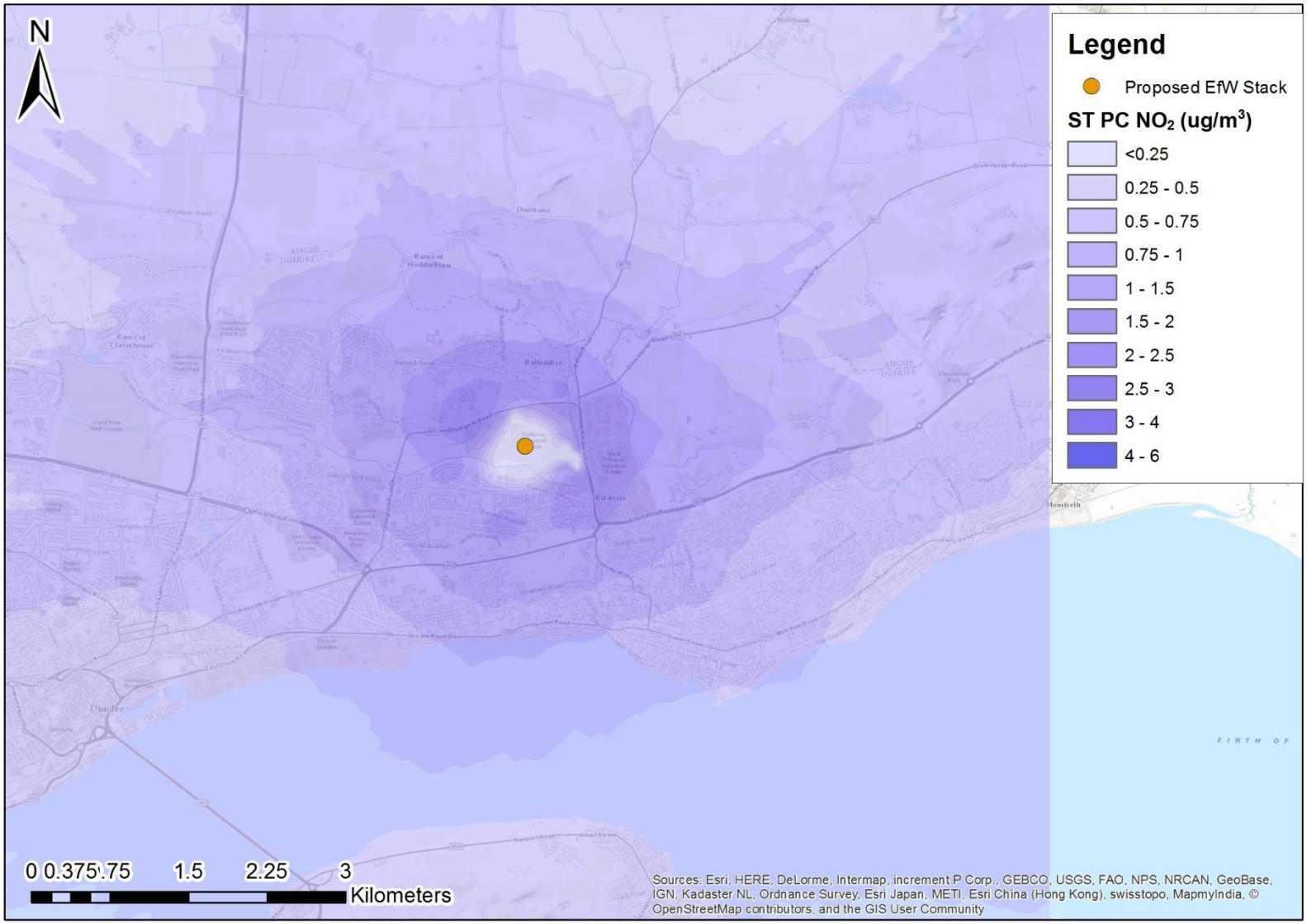
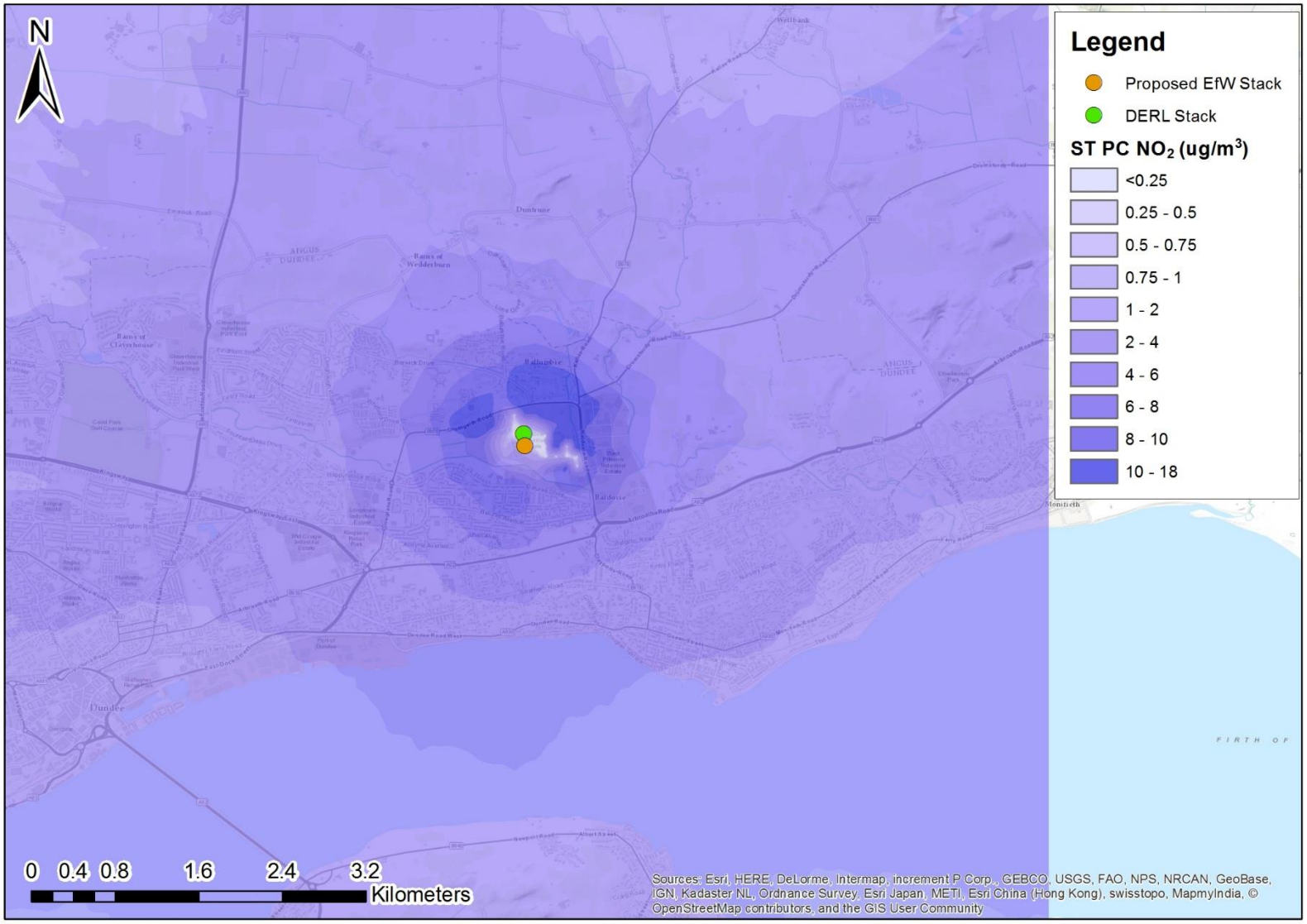


Figure 16: Predicted short-term NO_2 process concentrations ($\mu g/m^3$) due to the combined DERL plant and proposed EfW with a 90m stack height



6 Conclusions

An air quality modelling study has been carried out to assess the impacts from the various stack heights being considered for the proposed 40MW thermal input Baldovie Energy from Waste (EfW) plant. The assessment has been based on the latest design plans for the proposed development.

A review of background concentrations suggests that concentrations are likely to be well below the air quality objectives for annual mean NO_2 and PM_{10}.

The modelling study has predicted NO_2 concentrations for the existing DERL plant and the proposed EfW plant, and has examined the impact of the stack at heights between 70m and 110m (above ground level).

Contour plots of the long-term NO_2 process concentrations shows that peak concentrations are predicted to be located to the north-east of the proposed EfW stack and a second, smaller peak to the north-west. The area of maximum impact is located approximately 600m to the north-east of the proposed EfW, and is located on the area of commercial use.

Contour plots of the short-term NO_2 process concentrations are predicted to be located to the south-east and north-west of the proposed EfW. The area of maximum impact is located approximately 500m to the north-west.

Annual mean (long-term) concentrations are predicted to drop off steadily with height. Hourly mean (short-term) concentrations show a beneficial increase in stack height up to around 87.5m. Then at heights above 90m, the air quality benefit of increasing the stack height further appears to be reduced. As such, it is considered that the use of a 90m stack represents a height at which the visual impact of a high stack would begin to outweigh the air pollutant dispersion benefits.

Appendix C

Ecology

MVV Energie

Dundee & Angus Waste Management Services

Preliminary Ecological Appraisal

Report/MVV/Ex/Phase1

Issue | 15 February 2016

Job number 245510-00

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Contents

Appendices

Appendix B

Target Notes

Appendix C

Site Photographs

Executive Summary

This report details the results of the Preliminary Ecological Appraisal undertaken for the proposed development of the Energy from Waste (EfW) Plant in Dundee. The key results of the appraisal are:

- The Firth of Tay and Eden Estuary Special Area of Conservation is located approximately 1.3km south of the development redline boundary and is considered ecologically connected to the site by the watercourse;
- Twelve habitats were identified within and adjacent to the development redline boundary. Where possible the removal of scrub and trees should be avoided, otherwise replacement planting should be considered;
- Two invasive plant species were recorded within the development redline boundary. Indian balsam (*Impatiens glandulifera*) was present on both the Dighty Water and Fithie Burn in moderate to high densities. Giant hogweed (*Heracleum mantegazzianum*) was recorded in small stands in three areas within the development redline boundary. The control of invasive plant species would require a Wildlife and Natural Environment (Scotland) Act 2011 licence application to allow for the safe control and removal of invasive species from site;
- As part of the Extended Phase 1 Habitat survey, a riparian mammal survey was undertaken. Signs of otter (*Lutra lutra*) activity were recorded on the Dighty Water and Fithie Burn. As otter is a European Protected Species (EPS), a licence may be required if otter shelters are recorded and disturbance is considered likely. Signs of water vole (*Arvicola amphibius*) activity were not recorded, however the Dighty Water is considered to offer suitable habitat for this species. Further survey for both species should be undertaken;
- A bat roost risk assessment was undertaken as part of the Extended Phase 1 Habitat survey. The Dundee Energy Recycling Ltd (DERL) building and a mature sycamore (*Acer pseudoplatanus*) tree in the parkland in the north of the site have low bat roost potential. One activity survey should be undertaken on the DERL building, between May and September. The tree is outside of the zone of direct impact and so should not have to be subject to survey. SNH will be consulted on this approach;
- Overall, the site offers suitable breeding bird habitat, most notably within areas of broad-leaved and mixed woodland, dense and scattered scrub and semi-improved and marshy grassland present within the development redline boundary. Breeding bird surveys across the whole site, as recommended by Dundee City Council, should be undertaken between March and August; and
- Both burns, but particularly the Dighty Water, offer suitable habitat for kingfisher. A kingfisher survey comprising three visits between March and August should be undertaken if areas within 100m of the burns could be subject to disturbance.

1 Introduction

MVV Energie has been invited to develop a detailed solution for the Dundee and Angus waste management service, which utilises a site at Baldovie currently operated by Dundee Energy Recycling Ltd (DERL). MVV Energie require planning and permitting consultancy services to support the bidding process and, if selected for final dialogue, to prepare planning and permitting applications for the Energy from Waste (EfW) site in Dundee.

Ove Arup and Partners Ltd (Arup) has been commissioned by MVV Energie to prepare the planning application for the EfW development. As part of this commission, a Preliminary Ecological Appraisal has been undertaken by Arup, as detailed in this report.

1.1 Aim of Report

The purpose of this report is to identify the habitats within the application area, assess the potential for, or presence of, any protected or notable species; determine potential ecological impacts and to specify additional survey requirements required to inform a planning application.

1.2 Report Structure

The report includes:

- Section 2: Legislation and Policy
- Section 3: Methodology
- Section 4: Results
- Section 5: Evaluation
- Section 6: Conclusion and Recommendations

1.3 Site Description

The site covers approximately 69.5 hectares (ha) and is located in the north east of Dundee City. The site is bound by the Fithie Burn to the east, the Dighty Water to the south and west, and residential housing to the north.

This report appraises the habitats, flora and fauna within the zone of influence of the proposed EfW plant in Dundee, at National Grid Reference NO 44519 33043.

2 Legislation and Policy

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. There is also a range of policy documents relating to biodiversity that apply to developments requiring planning permission. These are briefly outlined below.

2.1 Legislation

2.1.1 Wildlife and Countryside Act 1981 (WCA 1981) (as amended)

This is the primary legislation covering endangered species in Scotland and sets out the framework for the designation of Sites of Special Scientific Interest (SSSIs). It confers differing levels of protection on species themselves, their habitats, or both, depending on their conservation status. Species offered protection by the act are listed in a series of schedules. This is the main piece of legislation regulating the release of non-native species in Great Britain, however it was amended in April 2011 by the Wildlife and Natural Environment (Scotland) Act 2011.

2.1.2 Wildlife and Natural Environment (Scotland) Act 2011 (WANE Act)

This Act updates legislation protecting Scottish wildlife and ensures legislation, which regulates and manages the natural environment, is fit for purpose. This Act seeks to:

- Regulate invasive non-native species;
- Change the licensing system for protected species;
- Strengthen protection of badgers (*Meles meles*); and
- Make operational changes to the management of SSSIs.

All of the provisions contained in this Act amend or revoke other pieces of legislation; the act does not contain any stand-alone provisions. This act amends the legislation outlined in the WCA 1981, in relation to non-native species. These amendments have enabled Scotland to adopt the internationally recognised three-stage approach to dealing with invasive non-native species, and aim to:

- Prevent the release and spread of non-native animal and plant species into areas where they can cause damage to native species and habitats and to economic interests;
- Ensure a rapid response to new populations can be undertaken; and
- Ensure effective control and eradication measures can be carried out when problem situations arise.

A Code of Practice, issued under section 14C of the Wildlife and Countryside Act 1981, sets out how one should act responsibly within the law to ensure that non-native species under one's ownership, care and management, do not cause further harm to the environment.

2.1.3 Nature Conservation (Scotland) Act 2004

This Act introduces a range of protection and enforcement measures to safeguard and enhance Scotland's natural heritage. It affords a greater level of protection to SSSIs. This Act has also amended the WCA 1981 by the addition of the term 'recklessly' to Section 1(5) and Section 9 (4) which has resulted in additional obligations with respect to protected species. As such, it is now an offence to intentionally or recklessly disturb protected species listed on the relevant Schedules of the Act. This act also introduced a number of new measures to tackle non-native species.

2.1.4 EC Directive Conservation of Natural Habitats & Flora (92/43/EEC)

The Conservation (Natural Habitats etc) Regulations 1994 (as amended in Scotland most recently in 2011 and 2012) are the British response to the Habitats & Species Directive 1992 issued by the European Community (EC). They offer protection to a number of plant and animal species throughout the EC via the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). In the United Kingdom these regulations are implemented through the WCA 1981 (as amended). The Regulations for the protection of European Protected Species (EPS) (e.g. otter (Lutra lutra) and bats) were strengthened in 2011 and 2012. Key changes include the removal of most of the defences from regulation 40 and regulation 43 including the removal of the '*incidental result of an otherwise lawful operation*', and the increase in the threshold for the offence of deliberately disturbing an EPS.

2.1.5 Directive 2009/147/EC (Birds Directive) on the Conservation of Wild Birds

The Directive 2009/147/EC (Birds Directive) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. In the UK, the provisions of the Birds Directive are implemented through the WCA 1981 (as amended) and as outlined above through the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended).

2.1.6 The Protection of Badgers Act 1992

This Act brings together all the legislation that is specific to badgers, with the exception of their inclusion on Schedule 6 of the WCA 1981 (as amended), which prohibits certain methods of taking or capture. The Act makes it an offence to intentionally kill or ill-treat a badger, and destroy, disturb or obstruct a sett. Specifically, it imposes restrictions on works carried out within certain distances

of badger setts. Any works that will directly impact on an existing sett are only permitted subject to approval through the issue of a licence from Scottish Natural Heritage.

2.2 Policy

2.2.1 Scottish Planning Policy

The Scottish Planning Policy (SPP) was published in June 2014. The policies in the Framework took immediate effect and previous planning guidance has been revoked and replaced by SPP. Therefore, SPP is a material consideration in all planning decisions from June 2014. SPP refers the responsibilities of the local authorities to conserve the natural environment. All public bodies including local planning authorities are required to consider habitats and species of Principal Importance listed in Section 2(4) of the Nature Conservation (Scotland) Act 2004 and Priority Species/Habitats within Biodiversity Action Plans when considering a planning application.

The SPP requires developments to "*seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats*".

2.2.2 'UK Post-2010 Biodiversity Framework'

The 'UK Post-2010 Biodiversity Framework' (July 2012) supersedes the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the Convention on Biological Diversity's (CBD) 'Strategic Plan for Biodiversity 2011–2020' and its 20 'Aichi targets', at Nagoya, Japan in October 2010, and the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The framework demonstrates how the UK contributes to achieving the 'Aichi targets', and identifies the activities required to complement the country biodiversity strategies in achieving the targets.

This framework supersedes the UK Biodiversity Action Plan (BAP), first published in 1994, which set out a list of Habitat Action Plans (HAPs) and Species Action Plans (SAPs). The UK BAP lists of priority species and habitats remain, and are an important and valuable reference source to provide statutory lists of species (e.g. Scottish Biodiversity List in Scotland) of local and nationally priority in England, Scotland, Wales and Northern Ireland. These nationwide plans are implemented on a local level through Local Biodiversity Action Plans (LBAPs), which are drawn up by individual Local Authorities.

2.2.3 Dundee LBAP

Tayside Biodiversity Partnership has produced an LBAP for the Borough. It sets out habitats of regional, national and international importance within Dundee, and is intended to take forward the UK Post-2010 Biodiversity Framework (what used to be termed the UK BAP) at a regional level. Key species, those of UK Priority

or UK Conservation Concern are identified when threats to preferred habitats are identified. The primary aim of the plan is to enable the conservation and enhancement of biodiversity within Dundee and therefore contribute to the maintenance of national and global biodiversity. It identifies where action needs to be taken to implement national targets for species and identifies the appropriate mechanisms to ensure delivery. Key species set out in the Tayside LBAP are detailed in Table 1.

Table 1: Habitat Action Plans and Species Action Plans covered by the Tayside LBAP.

Species Action Plans	**Habitat Action Plans**
Pipistrelle bat	Businesses with land
Brown long-eared bat	Urban and community woodlands
Hedgehog	Urban waters
Song thrush	
House sparrow	
House martin	
Swift	
Moorhen	
Heron	
Tawny owl	
Common frog	
Common toad	

2.2.4 Non-Statutory Local Sites

Non-statutory local sites are referred to as Local Nature Reserves (LNR) within the region. These sites are of county importance for their wildlife value. They have no statutory protection but are recognised by Local Authorities and statutory agencies and their presence is fully considered when determining planning applications.

3 Methodology

3.1 Overview

A review of existing records on designated sites, habitats and protected and notable species within 2km of the development redline boundary was undertaken. Following this, a site walkover was conducted, to verify existing ecological information about the site, including the results of a Phase 1 Habitat survey undertaken by ECOS Countryside Services LLP for a proposed expansion of the nearby Michelin factory. The site walkover was also used to assess the potential of the site to support protected and notable species, with particular focus on habitats with the potential to support bats, badger, otter, water vole (*Arvicola amphibius*) and birds.

3.2 Desk Study

A search of the following sources of information was carried out to identify designated sites and protected species recorded within 2km of the development redline boundary of the Dundee EfW site:

- Scottish Natural Heritage Sitelink (SNHi), data and information about sites of national and international importance across Scotland - http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/;
- The Scottish Government's Land Information Search Tool- http://map.environment.scotland.gov.uk/landinformationsearch/lis_map.html;
- Scottish Environment Protection Agency (SEPA), River Basin Management Plan Interactive Map - http://gis.sepa.org.uk/rbmp/; and
- The McManus Museum Biological Records was contacted on 16th September 2015 and asked to provide records of any protected or notable species and statutory and non-statutory designated sites within 2km of the site.

3.3 Field Survey

3.3.1 Phase 1 Habitat Survey

An ecological field survey of the site was carried out on 9th September 2015. The survey covered an area within the development redline boundary, detailed in Appendix A. Habitats were identified using the standard Phase 1 Habitat survey methodology (JNCC, 2010[1]). As part of the field survey, the potential for the site to support any legally protected or notable faunal species (e.g. UK and Tayside LBAP[2] priority species) was also assessed as outlined in the Chartered Institute

[1] Joint Nature Conservation Committee (JNCC) (2010) *Handbook for Phase 1 Habitat Survey. A technique for environmental audit*. Revised re-print. JNCC, Peterborough.
[2] Tayside Biodiversity Partnership (2015) *Tayside Local Habitat Action Plan*. Available at: http://www.taysidebiodiversity.co.uk/ (accessed 08/12/15).

for Ecology and Environmental Management (CIEEM) Preliminary Ecological Assessment (PEA) guidance[3].

The aim of the Phase 1 Habitat survey is to provide a rapid record of the habitats present within a set location. Habitats are classified into categories on account of set features which allow for the location, extent and distribution of these habitats to be recorded. A colour coded map, including target notes is produced to further aid this.

Unless otherwise specified, detailed faunal surveys were not undertaken at this stage; rather the potential for the site to support each species or species group was assessed based on the known range of each species or species group, and the suitability of the habitats within the site. Field signs or sightings of such species were recorded as observed.

3.3.2 Bat Roost Risk Assessment

As part of the Extended Phase 1 Habitat survey, a visual inspection of the buildings and mature trees present within the development redline boundary was undertaken.

The methodology for assessing the bat roost potential of buildings followed the Bat Conservation Trust's 'Bat Surveys, Good Practice Guidelines' Edition 2 (BCT, 2012)[4].

Each potential feature was observed from all accessible angles and examined with binoculars. Features that could potentially be suitable to support a bat roost, and their subsequent category, are outlined in Table 2 and Table 3.

All mature trees located within the development redline boundary, including those within the area of parkland north of Drumgeith Road, were assessed for their bat roost potential.

Table 2: Features of trees commonly used by bats for roosting and shelter, and field signs that indicate use of buildings by bats[5].

Potential to support roosting bats	Equivalent tree categories within Hundt (2012)	Description
High	**Category 1***	• A feature which, due to its size, depth, shape, orientation or other physical properties (such as ability to maintain a constant temperature, accessibility for bats) is considered to be ideal for use by bats. • Potential feeding remains, urine staining or scratch marks (in the absence of droppings) within or around the feature are likely to indicate

[3] Chartered Institute for Ecology and Environmental Management (2013) *Guidelines for Preliminary Ecological Appraisal.* CIEEM, Winchester.

[4]

[5] Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines*. 2nd edition. Bat Conservation Trust, London.

Potential to support roosting bats	Equivalent tree categories within Hundt (2012)	Description
		presence of a bat occupation and therefore suggest high potential that a roost is present. • In the absence of such signs, assigning a feature high potential will also be informed by the surveyor's knowledge of bat ecology and preferred roost types (relative to the feature being assessed). • The quality of the surrounding habitat for bats will also be considered. • Potential examples of high potential features are: o A south facing opening on a trunk that appears to form a significant wound within the tree, with uncluttered drop zone and good connectivity to other areas of suitable habitat;
Moderate	**Category 1**	A feature which would be considered ideal for use by bats were it not for one or more key factors which limit its potential.
Low	**Category 2**	A tree containing features where use by bats cannot be ruled out but is considered unlikely based on size, depth, construction aspect, habitat location etc.
Negligible	**Category 3**	A tree which is considered to lack any features suitable for use by roosting bats.

Table 3: Features of buildings commonly used by bats for roosting and shelter.

Likelihood of bats being present	Feature of the building or built structure and its location
Higher	• Pre-20th Century or early 20th Century construction • Agricultural buildings of traditional brick, stone or timber construction • Large and complicated roof void with unobstructed flying spaces • Large (>20cm) roof timbers with mortise joints, cracks and holes • Entrances for bats to fly through • Poorly maintained fabric providing ready access points for bats into roofs, walls, bridges, but at the same time not too draughty and cool • Roof warmed by the sun, in particular south facing roofs • Weatherboarding and/or hanging tiles with gaps • Low level of disturbance by humans • Bridge structures, follies, aqueducts and viaducts over water and/or wet ground • Buildings and built structures in proximity to each other providing a variety of roosting opportunities throughout the year • Buildings and built structures close to good foraging habitat, in particular mature trees, parkland, woodland or wetland, especially in a rural setting • For rarer species, buildings or built structures in the core area of their distribution

Likelihood of bats being present	Feature of the building or built structure and its location
Lower	• Modern, well maintained buildings or built structures that provide few opportunities for access by bats • Small, cluttered roof space • Buildings and built structures comprised of prefabricated steel and sheet material • Cool, shaded, light or draughty roof voids • Roof voids with a dense cover of cobwebs and no sections of clean ridge board • High level of regular disturbance • Highly urbanised location with a few or no mature trees, parkland, woodland or wetland • High levels of external lighting

External Inspection

All buildings on the site were assessed externally for their potential to support roosting bats where accessible. These included all buildings located centrally adjacent to Forties Road and Piper Street.

All external parts of the buildings and mature trees were initially examined with high resolution binoculars (8 x 42) to identify potential access points for roosting bats. Where cavities offering potential access to the building by bats, or which could offer roosting opportunities in their own right, were identified, these were examined where visible from the ground with a high-powered hand-held torch.

Internal Inspection

Buildings assessed as having no exterior features with bat roost potential were subsequently not subject to interior inspections.

3.3.3 Badger

A search for signs to determine the presence of badger and indications of badger activity by identification of the locations of setts, latrines, footprints and paths was undertaken during the walkover. Within the survey area, hedgerow boundaries, embankments and other features with potential to be used by badger were given particular attention. Survey methodology followed best practice and standards as outlined in Harris *et al*. (1989)[6].

3.3.4 Otter

The Dighty Water and the Fithie Burn were checked for signs of otter activity. The survey involved searching for the range of otter signs in accordance with

[6] Harris, S., Cresswell, P. & Jefferies, D. (1989) *Surveying for badgers*. Mammal Society, Southampton.

standard methodology and guidance from English Nature[7]. A list of signs that were searched for includes:

- Spraints;
- Food remains;
- Rolling places;
- Slides down river banks;
- Footprints or paths; and
- Shelters (either holts or couches).

3.3.5 Water Vole

The Dighty Water and the Fithie Burn were surveyed for signs of water vole activity. The survey was conducted in accordance with the Water Vole Conservation Handbook[8]. This entailed walking upstream, adjacent to the channel, and searching the margins and banks for field signs, comprising any combination of the following:

- Burrows and bolt-holes in the banks;
- Footprints in any soft mud and silt at the margins;
- Cylindrical, blunt-ended droppings, often deposited in 'latrines' to mark range boundaries or favoured spots close to burrows;
- Chewed lengths of vegetation and deposited in feeding stations;
- Trampled runways through bankside vegetation;
- Occasionally above-ground nests of finely shredded vegetation; and
- Feeding 'lawns' around burrow entrances.

3.3.6 Ornithology

A search for signs of breeding birds from the 2015 breeding bird season, as well as suitable breeding bird habitat, was undertaken as part of the Extended Phase 1 Habitat survey. All areas, within the development redline boundary, of suitable vegetation for breeding birds were searched. This included areas of scrub, hedgerows, buildings and trees. An assessment of the suitability of habitat for breeding birds was also conducted. Survey methodology and habitat assessment followed best practice and standards as outlined in Gilbert *et al.* 1998[9], but did not

[7] Chanin P. (2003) *Monitoring the Otter*. *Conserving Natura 2000 Rivers Monitoring Series No.10*. English Nature, Peterborough.
[8] Strachan, R. & Moorhouse, T. (2006) *Water Vole Conservation Handbook*. 2nd Edition. Wildlife Conservation Research Unit (WildCRU), Oxford University.
[9] Gilbert, G., Gibbons, D.W. & Evans, J. (1998) *Bird Monitoring Methods*. The Royal Society for the Protection of Birds, London.

constitute a formal breeding bird survey as it was outside the recognised breeding season. This is widely accepted as being between March and August. Particular focus was given to those species listed on Schedule 1 of the WCA 1981 (as amended), which could be active on site, this included barn owl (*Tyto alba*) and kingfisher (*Alcedo atthis*).

3.4 Survey Limitations

Direct access to some buildings within the development redline boundary was not possible. As a result, buildings within the site which could not be accessed to be surveyed for their bat roost potential, were surveyed from the nearest public footpath.

Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present, or that it will not be present in the future. Professional judgement however, allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

4 Results

4.1 Overview

This section sets out the designated sites within close proximity to the development redline boundary, the consultation undertaken in relation to the proposed development, and the findings of the field survey, including highlighting any notable habitats and the potential of habitats to support protected and notable species.

4.2 Desk Study

4.2.1 Statutory Designations

One internationally designated site is located within 2km of the proposed development boundary. A further two internationally designated sites are located over 2km from the development redline boundary. Table 4 details these sites, their location and qualifying features.

Table 4: Internationally and Nationally designated sites, designation and distance from the development redline boundary.

Site	**Designation**	**Approximate distance from site**	**Principal Citation/Designation**
Firth of Tay and Eden Estuary	SAC	1.3km south	Annex I habitats that are a primary reason for selection of this site include: • Estuaries - The Firth of Tay and the Eden estuary are two high-quality estuarine areas. The two estuaries have been proposed within a single site because they are integral components of a large, geo-morphologically complex area that incorporates a mosaic of estuarine and coastal habitats. The Tay is the least-modified of the large east coast estuaries in Scotland, while the Eden estuary represents a smaller 'pocket' estuary. Annex 1 habitats which are present as a qualifying feature, but not a primary reason for selection of the site include: • Sandbanks which are slightly covered by sea water all the time; and • Mud-flats and sand-flats not covered by seawater at low tide. Annex II species that are a primary reason for selection of this site include: • Harbour seal (*Phoca vitulina*) - The Firth of Tay & Eden Estuary supports a nationally important breeding colony of harbour seal, part of the east coast population of common seals that typically utilise sandbanks. Around 600 adults haul-out at the site to rest, pup and moult, representing around 2% of the UK population of this species.
Firth of Tay and Eden Estuary	SPA	2.4km south east	The Firth of Tay & Eden Estuary SPA is a complex of estuarine and coastal habitats in eastern Scotland stretching from the mouth of the River Earn in the inner Firth of Tay east to Barry Sands on the Angus coast and St Andrews on the Fife Coast. The site includes extensive invertebrate-rich intertidal flats and

			areas of reedbed, saltmarsh and sand dune. The SPA is contained within the following SSSIs: Inner Tay Estuary, Monifieth Bay, Barry Links, Tayport-Tentsmuir Coast and Eden Estuary. The SPA qualifies under Article 4.2 by regularly supporting in winter over 20,000 waterfowl with a 1990/91-94/95 winter peak mean of 48,000 waterfowl, comprising 28,000 wildfowl and 20,000 waders. This assemblage includes internationally and nationally important wintering populations (1990/91-94/95 winter peak means).
Firth of Tay and Eden Estuary	Ramsar	2.4km south east	The Firth of Tay and Eden Estuary is a complex of estuarine and coastal habitats in eastern Scotland. The site includes extensive invertebrate-rich intertidal mudflats and sand-flats created by the massive sediment load deposited by the River Tay. Also present are large areas of reedbed and sand-dune and a small amount of saltmarsh. The site supports an internationally important assemblage of wintering waterfowl including internationally important populations of several species. Fourteen species of bird breed in nationally important numbers. Abertay Sands are also important as a major haul-out site for both grey seals *Halichoerus grypus* and breeding common seals *Phoca vitulina.*
Monifieth Bay	Site of Special Scientific Interest (SSSI)	2.4km south east	Monifieth Bay is situated on the north shore of the outer Firth of Tay 5 km east of Dundee. It consists primarily of intertidal sand and mud, extending for four km along the coast and up to 1km seawards. The site is important as the extensive mud flats with its rich invertebrate population provide a feeding ground for wintering waders specifically important numbers of sanderling. Sanderling utilise Monifieth Bay at low tide to feed on the exposed mud and sand. They roost elsewhere, mainly on Buddon Ness to the east and on Lucky Scalp on the south side of the estuary. Monifieth Bay SSSI is designated for biological features.

4.2.2 Non-Statutory Designations

No non-statutory designated sites are located within 2km of the development redline boundary.

The closest non-statutory designated sites are:

- Trittock Mill Ponds Local Nature Reserve (LNR), located approximately 3.5km west of the development redline boundary; and Broughty Ferry LNR, located approximately 3.9km south east of the development redline boundary.

As a result of the non-statutory designated sites' location and lack of ecological connectivity to the proposed development site, these non-statutory designated sites will not be considered further in this appraisal.

4.3 Consultation

Table 5 details consultation which was held between Arup and other relevant organisations regarding the flora and fauna present within the development redline boundary.

Table 5: Consultee recommendations and responses.

Consultee	Date contacted	Recommendations	Response
Operations Officer, Tayside & Grampian, SNH.	21st December 2015	SNH do not intend to offer formal comment on this proposal, however it is recommended local groups and the local biological records centre are consulted.	Noted. Consultation with recommended organisations has been undertaken, see below.
Greenspace Team Leader, Dundee City Council.	29th October 2015	Would suggest a breeding bird survey is undertaken - possible nesting sites for ground breeding birds on potential development site west. Would also recommend contact is made with Dighty Connect, as they have done a lot of work in the vicinity and know	Noted. A breeding bird survey will be scoped into the ecological surveys. Dighty Connect were contacted. See response below.

		the area's natural heritage.	
McManus Museum Biological Records	16th September 2015	Biological records were received, however biological records have not been updated since 1996.	Records noted, however as a result of the date records made, information can be used to inform the historical importance of the site.
Dighty Connect and EDEN (East Dundee Environment Network)	9th December 2015	Otter and water vole records from the site are submitted to the National Biodiversity Network (NBN). The local British Trust for Ornithology (BTO) ringer will be contacted and records passed on if consent given.	Noted. This will be reviewed for otter and water vole information.

4.4 Field Survey

The results of the field survey undertaken within and adjacent to the site area are described below. The results of the field survey will be divided into habitats and fauna (protected species).

4.4.1 Habitats

The Phase 1 Habitat map in Appendix A graphically represents the habitats recorded within the development redline boundary as well as the development redline boundary. The following habitat types were identified within the site:

- Broad-leaved parkland / scattered trees;
- Broad-leaved woodland plantation;
- Mixed woodland plantation;
- Scrub – dense / continuous;
- Scrub – scattered;
- Neutral grassland;

- Tall herb and fern – ruderal;
- Swamp;
- Amenity grassland;
- Ephemeral / short perennial;
- Buildings and hardstanding; and
- Bare ground.

A total of 15 target notes were identified, of which nine referred to specific flora features identified throughout the site, and these are presented in Table B1, Appendix B. Photographs of habitats recorded are presented in Appendix C.

4.4.1.1 Broad-leaved Parkland / Scattered Trees (Phase 1 Habitat Code A3.1)

Broad-leaved parkland/scattered trees are present in several areas within the western, central and southern aspects of the development redline boundary. This habitat is present within the parkland adjacent to the north of Drumgeith Road, adjacent to a tributary of the Dighty Water on the western boundary of the site and in four further areas in the centre and south of the site. In all areas, the density of trees is of a low level. See photographs 1 – 2, Appendix C. Broad-leaved tree species included English oak (*Quercus robur*), hazel (*Corylus avellana*), sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), common lime (*Tila x europaea*), horse chestnut (*Aesculus hippocastanum*) and willow (*Salix* sp).

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.2 Broad-leaved Woodland Plantation (A1.1.2)

Broad-leaved woodland plantation is one of the most abundant habitat types present within the development redline boundary. Two plantations comprising of silver birch are located centrally, adjacent to the DERL site. Two plantations comprising of English oak, common hawthorn (*Crataegus monogyna*), hazel, wild cherry (*Prunus avium*), rowan (*Sorbus aucuparia*) and elder (*Sambucus nigra*), are located in the west of the site. See photograph 3, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.3 Mixed Woodland Plantation (A1.3.2)

Mixed woodland plantation is located in the north and south of the development redline boundary. A mixed woodland plantation is located within the parkland adjacent to Drumgeith Road. A mixed plantation is located adjacent to the south of Drumgeith Road and adjacent to the DERL site. Three further mixed plantations are located in the south of the site adjacent to the Dighty Water. All mixed woodland plantations are small in size. Species comprise of Sitka spruce (*Picea sitchensis*), Scots pine (*Pinus sylvestris*), alder (*Alnus glutinosa*), rowan,

sycamore, common lime, silver birch and horse chestnut. See photographs 4 – 5, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.4 Scrub – Dense / Continuous (A2.1)

Dense / continuous scrub is located in one location in the west of the site to the south of Drumgeith Road. This area of dense / continuous scrub is small in size, however is comprised of a relatively high number of species. These include; bramble (*Rubus fruticosus* agg.), common nettle (*Urtica dioica*), cleavers (*Galium aparine*), elder, hazel and common hawthorn. See photograph 6 Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.5 Scrub – Scattered (A2.2)

Scattered scrub is located in four areas within the development redline boundary, three in the north of the site and one adjacent to the Dighty Water in the south of the site. Each area of scattered scrub in the north of the site is located adjacent to areas of hardstanding or roads. Species present in each area are similar and comprise of the following; bramble, cleavers, common nettle, elder, creeping buttercup (*Ranunculus repens*) and common dandelion (*Taraxacum officinale* agg.). See photographs 7 – 8, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.6 Neutral Grassland – Semi-improved (B2.2)

Neutral semi-improved grassland is the most abundant grassland type present within the development redline boundary. Neutral semi-improved grassland is located centrally within the site and in the south of the site adjacent to the Dighty Water. The most abundant species recorded was tufted hairgrass (*Deschampsia cespitosa*), however annual meadow grass (*Poa annua*), creeping buttercup and common dandelion are also recorded. See photograph 9, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.7 Tall Herb and Fern – Ruderal (C3.1)

Ruderal tall herb and fern is located in several areas occurring in low density across the development redline boundary. Similar to most areas of scattered scrub, areas of ruderal tall herb and fern are mostly located adjacent to areas of hardstanding and roads. All locations are dominated by rosebay willowherb (*Chamerion angustifolium*), however common nettle and common dandelion are also present. See photograph 11, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.8 Swamp (F1)

Marshy grassland is located in two small areas in the south west of the site, both being adjacent to the Dighty Water. These two locations are dominated by common reed (*Phragmites australis*), with tufted hairgrass and annual meadow grass are also present. See photograph 10, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.9 Amenity Grassland (J1.2)

Amenity grassland is located in four areas within the development redline boundary, most notably to the north of Drumgeith Road and in the south west of the site. Dominant species identified include common species such as perennial ryegrass (*Lolium perenne*), white clover (*Trifolium repens*), annual meadow grass, creeping buttercup and common dandelion. See photograph 12, Appendix C.

This habitat is not considered to have the potential to provide breeding bird habitat.

4.4.1.10 Ephemeral/Short Perennial (J1.3)

Ephemeral/short perennial is located in one area in the west of the development redline boundary. Dominant species identified include common species such as oxeye daisy (*Leucanthemum vulgare*) and white clover. See photograph 13, Appendix C.

This habitat type is not considered to have the potential to provide breeding bird habitat.

4.4.1.11 Buildings and Hardstanding (J3.6)

This is one of most dominant habitat types present within the development redline boundary. Extensive areas of buildings and hardstanding are present across the site. These areas are associated with the DERL site and connecting road infrastructure and the overall the industrial nature of the site.

This habitat is considered to have the potential to provide breeding bird habitat, in or on the buildings.

4.4.1.12 Bare Ground (J4)

Bare ground is located in a single area in the south east of the development redline boundary, adjacent to the Dighty Water. This is newly created area of bare ground as a result of construction work at the Michelin factory. See photograph 14, Appendix C.

This habitat is considered to have the potential to provide breeding bird habitat.

4.4.1.13 Invasive Plant Species

Invasive plant species are present in multiple locations around the perimeter of the development redline boundary. These areas include four locations on the banks of the Fithie Burn, two locations on the banks of the Dighty Water and two locations on the south side of Drumgeith Road. Invasive species recorded were giant hogweed (*Heracleum mantegazzianum*) and Indian balsam (*Impatiens glandulifera*). Details of these invasive species are given in Table B1, target notes 1-6, 8, 9 & 14, Appendix B. See photographs 15 – 18, Appendix C.

4.4.2 Fauna

During the Phase 1 Habitat survey, habitats were assessed for their potential to support protected species. The protected species groups assessed include:

- Mammals (terrestrial and riparian); and
- Birds.

Section 4.3.1.1 to 4.3.1.12 describes the suitability of the site and surrounding habitats for protected species.

4.4.2.1 Badger

The area within the development redline boundary is predominantly woodland and grassland and consequently deemed suitable for badger. No signs of badger activity in this area were identified during the Extended Phase 1 Habitat survey however, and no recent historical records of badger in the area have been recorded. The site is considered to offer suitable foraging habitat for badger but be unsuitable for sett creation.

4.4.2.2 Riparian Mammals

As highlighted in section 1.1, the site is bound to the west and south by Dighty Water and to the east by Fithie Burn. Both watercourses were considered as being of suitable habitat for riparian mammals and consequently, a survey for signs of activity of otter and water vole was undertaken.

Signs of otter activity were recorded on both watercourses. Most activity was recorded on the Fithie Burn with prints and spraints recorded in five locations. A single otter spraint was recorded at a potential otter couch in a moderate hollow under tree roots on the west bank of the Fithie Burn at National Grid Reference NO 45070 33138. A single spraint was also recorded on a log under a cherry tree on the west bank of the Fithie Burn. Both potential couches are located in areas which are relatively quiet and not regularly disturbed by human activity, including dogs being walked.

A spraint was recorded under a foot bridge close to the confluence with Dighty Water in the south east of the site at National Grid Reference NO 45259 32477. Otter prints and spraints were recorded under the access bridge to the Michelin factory at National Grid Reference NO 45123 33008. Otter spraint was also

recorded adjacent to the Drumgeith Road bridge over the Fithie Burn at National Grid Reference NO 45065 33282.

Otter activity on Dighty Water, in the form of fresh spraint, was recorded in one location on Dighty Water at National Grid Reference NO 44810 32567.

Details of each of these locations are given in Table B1, target notes 7, 12, 13, 15 – 17, Appendix B. See photographs 19 – 21, Appendix C.

Further otter surveys, undertaken on 19th November 2015 and 16th December 2015 recorded fresh activity at these sites.

No signs of water vole were identified during the Extended Phase 1 Habitat survey, however the Dighty Water is considered to offer suitable habitat for this species.

4.4.2.3 Bats

Most buildings and trees within the development redline boundary were considered to be of negligible bat roost potential as a result of an absence of features with suitable bat roost potential. As assessed using the guidance in Table 2 and Table 3.

The DERL building however, located centrally within the development redline boundary at National Grid Reference NO 44531 33050, was considered to be of low bat roost potential as a result of potential bat access to roof cavities and the lack of human/industrial activity in sections of the building.

A sycamore tree within the parkland to the north of Drumgeith Road at National Grid Reference NO 44228 33269, was identified as being of low bat roost potential on account of two cavities on a main branch in a northern exposure being identified. No signs of staining were recorded.

Details of these features with bat roost potential are given in Table B1, target notes 10 – 11, Appendix B. See photographs 22 – 23, Appendix C.

4.4.2.4 Birds

Areas of broad-leaved and mixed plantations and scattered trees, dense and scattered scrub, grassland and watercourses located throughout the development redline boundary have the potential to offer suitable breeding and foraging habitat for two Schedule 1 species and common passerines.

Species of birds recorded on site include wood pigeon (*Columba palumbus*), chaffinch (*Fringilla coelebs*), blackbird (*Turdus merula*), robin (*Erithacus rubecula*), song thrush (*Turdus philomelos*), kestrel (*Falco tinnunculus*), common gull (*Larus canus*), herring gull (*Larus argentatus*), dipper (*Cinclus cinclus*), blue tit (*Parus caeruleus*), coal tit (*Parus ater*), wren (*Troglodytes troglodytes*), house sparrow (*Passer domesticus*), dunnock (*Prunella modularis*), pied wagtail (*Motacilla alba yarrelli*), grey wagtail (*Motacilla cinerea*), jackdaw (*Corvus monedula*), starling (*Sturnus vulgaris*) and siskin (*Carduelis spinus*). An active wood pigeon nest was recorded at National Grid Reference NO 44583 33098 in

an immature Scots pine in an area of mixed woodland adjacent to the north of the DERL site. Details are given in Table B1, target note 18, Appendix B. The remainder of species were not recorded nesting, as, generally, the breeding bird season is seen as being March – August inclusive. This survey did not constitute a formal breeding bird survey.

Of the species recorded on site, four species, song thrush, herring gull, starling and house sparrow are red listed species of conservation concern[10]. Four species, common gull, kestrel, dipper and dunnock are amber listed species of conservation concern[10].

Two species recorded, song thrush and house sparrow, are also key species listed on the Dundee LBAP.

Both burns, particularly the Dighty Water, offer suitable habitat for kingfisher.

[10] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. & Gregory, R. (2015) *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds 108.

5 Evaluation

5.1 Designations

5.1.1 Statutory Designated Sites

One statutory designated site, Firth of Tay and Eden Estuary SAC, is located approximately 1.3km south of the development redline boundary. It is considered the Firth of Tay and Eden Estuary SAC is ecologically connected to the development on account of the watercourses on site, as the Dighty Water and Fithie Burn both flow into the Firth of Tay.

5.1.2 Non-statutory Designated Sites

There are no non-statutory designated sites within 2km of the development redline boundary.

5.2 Habitats

A total of 12 habitats were recorded within and immediately adjacent to the development redline boundary. None of the habitats listed on the Dundee LBAP were recorded within, or immediately adjacent to, the development redline boundary.

It is considered the habitats present, particularly those along the Dighty Water in the south of the site form important wildlife corridors. The proposed development has the potential to impact on these wildlife corridors.

Important habitats are areas of mature broad-leaved and mixed woodland and neutral semi-improved grassland, as these provide habitat and cover for a variety of species.

5.2.1 Invasive Plant Species

Invasive plant species Indian balsam and giant hogweed were recorded along the northern, south-eastern and western boundaries of the development redline boundary.

Indian balsam, the most prevalent invasive species recorded, was most abundant along the Dighty Water and the Fithie Burn. Five small stands of giant hogweed were identified on site, along the northern and western aspects of the development redline boundary.

Giant hogweed is listed in the WANE Act 2011 (see section 2.1.2), which makes it an offence to: "*release and spread non-native plant species into areas where they can cause damage to native species and habitats and to economic interests.*"

5.3 Fauna

5.3.1 Riparian Mammals

Otter

Signs of otter activity were recorded on both watercourses present on site, Dighty Water to the south and west and Fithie Burn to the east of the site.

The Dighty Water and Fithie Burn provide very good habitat for otter as the water runs clean and there is dense vegetation on both banks, suitable for sheltering.

Otter are subject to European protection under the Conservation (Natural Habitats etc) Regulations 1994 (as amended), which is transposed through the provisions of the WCA 1981 (as amended). This legislation means that it is an offence to deliberately capture, injure or kill an otter; to deliberately disturb an otter in such a way as to significantly affect its ability to breed and rear young or its local distribution; or to damage or destroy a breeding or resting place used by otters.

Water Vole

No signs of water vole were recorded during the Extended Phase 1 Habitat survey, however Dighty Water is considered to offer suitable habitat for this species.

Water vole are listed on Schedule 5 of the WCA 1981 (as amended). In Scotland, the legal protection associated with this listing is currently restricted to the water vole's places of shelter or protection, and does not extend to the animals themselves, however, full protection covering the animals themselves is proposed.

At present it is an offence to intentionally or recklessly damage, destroy or obstruct access to any structure or place which a water vole uses for shelter or protection, and to disturb a water vole while it is using such a place.

5.3.2 Bats

A bat roost risk assessment of all buildings within the development redline boundary was undertaken as part of the Extended Phase 1 Habitat Survey. Two features were identified as being of low bat roost potential. These comprise the DERL building located centrally within the development redline boundary, and a single mature sycamore tree located in the parkland to the north of the development redline boundary.

British bat species are fully protected through their inclusion in Schedule 5 of the WCA 1981 (as amended) and in The Conservation (Natural Habitats etc) Regulations 1994 (as amended), as an EPS. Under this legislation, it is an offence to: intentionally kill, injure or take a bat; to intentionally or recklessly damage its habitat; to destroy or obstruct access to any structure or place used for shelter or protection by a bat; or to disturb an animal while it is occupying a structure or place which it uses for that purpose.

5.3.3 Birds

All areas of trees and scrub within the site and the semi-improved and marshy grassland in the south and west of the site offer suitable habitat for breeding birds and foraging barn owl. Both burns, but particularly the Dighty Water, offer suitable habitat for kingfisher.

Four red listed birds of conservation concern[10] and four amber listed birds of conservation concern[10] were recorded on site, however none of these were recorded nesting.

All birds are protected under Section 1 of the WCA 1981 (as amended) in that it is an offence to intentionally kill, injure or take any wild bird or take, damage, or destroy the nest while in use or being built and take or destroy an egg. Certain birds (listed in Schedule 1 of the WCA 1981 (as amended)) receive extra protection. For these species, it is also an offence to recklessly disturb a species whilst it is on its nest or the dependent young.

During the nesting season (March – August inclusive) the nests of all bird species are protected under the WCA (as amended) 1981 against damage or destruction.

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6 Conclusions and Recommendations

6.1 Overview

This section sets out the conclusions and subsequent recommendations for future action by MVV Energie, in terms of site designations, habitats and protected and notable species.

6.2 Conclusions

The key conclusions of this Preliminary Ecological Appraisal are:

- The Firth of Tay and Eden Estuary Special Area of Conservation is located approximately 1.3km south of the development redline boundary and is considered ecologically connected to the site by the watercourse;
- Twelve habitats were identified within and adjacent to the development redline boundary, of which the most ecologically important are the watercourses and associated swamp which form a wildlife corridor through the site, and areas of woodland and neutral semi-improved grassland;
- Two invasive plant species were recorded within the development redline boundary. Indian balsam was recorded in high to moderate densities along the full lengths of both watercourses. Giant hogweed was recorded within the Michelin site in low densities, and in low densities along both watercourse and in areas of scrub within the centre and west of the site;
- Otter activity has been recorded on both the Dighty Water and Fithie Burns. Dighty Water has very good habitat for otter as it runs clean and has dense vegetation on both banks, suitable for sheltering. Two potential couch locations were recorded during surveys of the Fithie Burn. Should these features become confirmed otter couches, and potentially subject to disturbance, an EPS licence would need to be applied for, to allow works to commence within 50m of a confirmed otter couch;
- Signs of water vole were not recorded, however the Dighty Water offers suitable areas of habitat for water vole;
- Both the DERL building and one mature sycamore tree in the parkland north of the B961 have low bat roost potential. The tree is however considered to be outside of the zone of direct impact;
- Overall, the site offers suitable breeding bird habitat, most notably within areas of broad-leaved and mixed woodland, dense and scattered scrub and semi-improved and marshy grassland present within the development redline boundary; and
- Both burns, but particularly the Dighty Water, offer suitable habitat for kingfisher.

6.3 Recommendations

Avoidance and Mitigation

- Where possible the removal of woodland and/or broadleaved trees should be avoided;
- Where retaining mature broad-leaved woodland, mixed woodland and neutral semi-improved grassland is not possible, consideration should be given to the implementation of replacement planting;
- In line with best practice, all areas 'contaminated' by invasive plant species should be treated and cleared using appropriate methods. It is therefore recommended that an appropriate programme of treatment and eradication works is formulated as part of the proposed development;
- For all works located in close proximity to identified stands of invasive species (if not eradicated), it is recommended that a Method Statement is prepared to ensure that no invasive plant species are spread during works;
- Any proposed vegetation removal should be undertaken outside of the bird breeding season;
- Should vegetation clearance, including tree removal, need to be undertaken during the breeding bird season, it is recommended such areas of vegetation be surveyed by a suitably qualified ecologist immediately prior to their removal, in order to avoid the potential to damage or destroy active bird nests. Any trees with active nests will need to be left undisturbed until the birds have finished breeding, which may impact the programme of works; and
- Should vegetation clearance be required, it is recommended supplementary planting of native species of trees and scrub is undertaken, to mitigate for the loss of potential suitable breeding bird habitat.

Further, species specific, mitigation measures can be proposed once further surveys have been undertaken and more information is available on the details of the proposed development.

Further Surveys

- Due to the highly invasive nature of giant hogweed and Indian balsam, if there is a delay of over two years between the field survey (9th September 2015) and works commencing on site, it is recommended that an updated invasive plant species survey is undertaken to map any potential spread of these invasive plants which may have occurred;
- Further surveys should be undertaken to determine whether otter shelters are present on site. These can be undertaken at any time of year. It is also recommended camera traps are used to monitor otter activity. Camera traps can be positioned at a location and left in situ to record activity,

giving a clearer understanding of otter activity and movements along the watercourses;

- Surveys for water vole should be undertaken to determine whether water vole are present along the watercourses. These should be undertaken between April and October;
- One bat activity survey should be undertaken on the DERL building, between May and September. The tree with low bat roost potential is outside of the zone of direct impact, and so should not have to be subject to survey, although SNH will be consulted on this approach;
- Breeding bird surveys across the whole site, as recommended by Dundee City Council, should be undertaken between March and August; and
- A formal kingfisher survey, comprising three survey visits, should be undertaken during the early part of the bird breeding season between March and August.

This report is the result of survey work undertaken on 9th September 2015 and subsequent otter surveys undertaken on 19th November and 16th December 2015. This report refers, within the limitations stated, to the condition or proposed development of the site at the time of the inspections. Further surveys outlined in the recommendations and conclusion, will be undertaken to inform any Ecological Impact Assessment (EcIA) as part of an Environmental Statement (ES). Changes in legislation, guidance and best practice may necessitate a re-assessment/survey. It is also advised that if there is a delay of over a year in undertaking the works, a re-survey may be required. No warranty is given as to the possibility of future changes in the condition of the site.

This report is produced solely for the benefit of MVV Energie and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

Appendix A

Phase 1 Habitat Map and Development Redline Boundary

Revision	Date	By	Chkd	Appd
P1	14-12-15	LEH	AC	AC

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Client

MVV Energie

Job Title

Dundee energy from waste plant

Drawing Title

Extended phase 1 habitat survey

Scale at A3

Job No
245510-00

Drawing Status

Drawing No
001

Revision
P1

Appendix B

Target Notes

B1 Phase 1 Habitat Survey Target Notes.

Target Note Number	Description
1	Moderate to high density area of Indian balsam (*Impatiens glandulifera*) on north bank of Dighty Water.
2	Small stand of giant hogweed (*Heracleum mantegazzianum*) on east bank of Dighty Water.
3	Small stand of giant hogweed on south verge of Drumgeith Road.
4	Small stand of giant hogweed on east and west banks of Fithie Burn.
5	Moderate to high density area of Indian balsam on east bank of Fithie Burn.
6	Moderate to high density area of Indian balsam on east bank of Fithie Burn, adjacent to the Michelin factory car park.
7	Otter (*Lutra lutra*) prints and spraint on sand bank under the access bridge to the Michelin factory.
8	Moderate area of Indian balsam on east bank of Fithie Burn.
9	Small stand of giant hogweed on south verge of Drumgeith Road.
10	Mature sycamore (*Acer pseudoplatanus*) tree with two features with low bat roost potential on north aspect branch.
11	Dundee Energy Recycling Ltd (DERL) building considered to have low bat roost potential, due to access to roof cavity and spacing under corrugated wall, particularly the north east and south east aspects of the building.
12	Fresh otter spraint on small rock on the north bank of Dighty Water.
13	Otter spraint under foot bridge on east bank of the Fithie Burn.
14	Small stand of giant hogweed on east and west banks of the Fithie Burn, adjacent to the access bridge of the Michelin factory.
15	Otter spraint in the Fithie Burn in the middle of the channel, adjacent to the Drumgeith Road bridge.

16	Otter spraint recorded at the entrance to a potential couch in a moderate hollow under tree roots covered by ivy on the west bank of the Fithie Burn. Adjacent to this spraint and potential couch location is another potential couch in a moderate cavity under exposed willow (*Salix* sp.) tree roots.
17	Otter spraint on an old log under a cherry tree on the west bank of the Fithie Burn. Adjacent to this spraint location is an area of tree roots, providing a moderate cavity in the bank.
18	Active wood pigeon (*Columba palumbus*) nest in Scots pine (*Pinus sylvestris*) in mixed woodland plantation adjacent to the north of the DERL site.

Appendix C

Site Photographs

C1 Site Photographs

Photograph 1. Broad-leaved parkland/scattered trees and amenity grassland located to the north of Drumgeith Road.

Photograph 2. Broad-leaved parkland/scattered trees and amenity grassland located to the north of Drumgeith Road.

Photograph 3. Broad-leaved woodland plantation located centrally on site, adjacent to the Dundee Energy Recycling Ltd (DERL) site.

Photograph 4. Mixed woodland plantation present within the amenity grassland north of Drumgeith Road.

Photograph 5. Mixed woodland plantation adjacent to the DERL site. An active wood pigeon (*Columba palumbus*) nest was identified at this location.

Photograph 6. Dense/continuous scrub located to the south of Drumgeith Road.

Photograph 7. Scattered scrub located centrally within the development redline boundary.

Photograph 8. Scattered scrub located adjacent to derelict industrial areas.

Photograph 9. Neutral semi-improved grassland is the dominant habitat type in the south west of the development redline boundary.

Photograph 10. Swamp is present in two areas within the development redline boundary.

Photograph 11. Tall ruderal herb and fern is present around areas of hardstanding and buildings.

Photograph 12. Amenity grassland located north of Drumgeith Road.

Photograph 14. Ephemeral/short perennial is present centrally in areas of derelict hardstanding.

Photograph 14. Bare ground is located in one area adjacent to Dighty Water in the south east of the site.

Photograph 15. Indian balsam (*Impatiens glandulifera*) present in the north east of the site, adjacent to Drumgeith Road and Baldovie Road at a moderate scale.

Photograph 16. Indian balsam was also recorded on the north bank of Dighty Water at a moderate scale.

Photograph 17. A small stand of giant hogweed (*Heracleum mantegazzianum*) was also recorded adjacent to Dighty Water.

Photograph 18. A small stand of giant hogweed was also recorded adjacent to the south of Drumgeith Road.

Photograph 19. Otter (*Lutra lutra*) activity in the form of a single spraint was recorded in the north east of the site on the Fithie Burn.

Photograph 20. Otter prints and spraints were also recorded further downstream on the Fithie Burn, under the access bridge to the Michelin factory.

Photograph 21. Otter spraint was also recorded on Dighty Water adjacent to the development redline boundary to the south.

Photograph 22. A mature sycamore located within the parkland to the north of the site was considered to be of low bat roost potential as a result of two holes suitable for bats being identified (highlighted by the arrows).

Photograph 23. The DERL building located centrally within the development redline boundary is considered to offer low bat roost potential on account of direct internal access.

Photograph 24. The north west aspect of the DERL building had access behind the corrugated walls which are considered to offer low bat roost potential.

MVV Environment Services Ltd

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Bat Survey Report

MVV/Rep/Bats/Add

Issue | 25 October 2016

Job number 245510-05

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Contents

Appendices

Executive Summary

The purpose of this report is to provide the results of bat surveys at the MVV Environment Services Ltd Energy from Waste Combined Heat and Power Facility (EfW CHP) site in Dundee.

A bat scoping assessment was undertaken on the 9th September 2015. Two features possessing low bat roosting potential were identified within the initial survey area; the Baldovie Waste Recycling and Waste Processing Plant building located near the proposed scheme, and a mature sycamore tree in parkland to the north of the proposed scheme.

Following consultation with Scottish Natural Heritage (SNH), it was agreed that no further surveys were required on the sycamore tree as it would not be affected by the proposed scheme.

In accordance with best practice guidelines, a single bat emergence survey was undertaken on the building in June 2016. No bats were recorded during this survey and it is therefore considered unlikely that bats are roosting on the site.

Areas on or adjacent to the site, notably along the corridor of the Dighty Water, to the south of the proposed scheme, provide suitable commuting and foraging habitat for bats. These habitats should be retained and enhanced as part of the landscaping proposals for the site, in accordance with Scottish Planning Policy.

1 Introduction

Ove Arup and Partners Ltd (Arup) was commissioned by MVV Environment Services Ltd to undertake ecological surveys at their proposed development site in Dundee to inform an Environmental Statement (ES).

The site covers approximately 69.5 hectares (ha) and is located in the north east of Dundee City. The site is bound by the Fithie Burn to the east, the Dighty Water to the south and west, and residential housing to the north. The initial survey area is illustrated in Appendix A.

1.1 Aim of this Report

This is a species specific report. The aim of this document it to:

- Assess the baseline ecological features of relevance to bats at the site;
- Identify and describe all potential effects to bats from the proposed scheme;
- Detail and general mitigation measures required to ensure compliance with nature conservation legislation and to address any potential effects of the proposed scheme on bats; and
- Identify how mitigation measures could be implemented.

1.2 Report Structure

This report includes:

Section 2: Legislation, Planning Policy and Guidance;

Section 3: Methodology;

Section 4: Results; and

Section 5: Conclusions and Recommendations.

2 Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. Much of this legislation exists within, and also independently of, the planning process.

Detailed information on all relevant legislation and guidance is presented in Appendix B.

Legislation and policy relevant to this species report comprises:

- Nature Conservation (Scotland) Act 2004;
- Wildlife and Countryside Act 1981 (WCA 1981) (as amended); and
- Scottish Planning Policy.

Guidance relevant to this species report comprises:

- UK Post-2010 Biodiversity Framework[1];
- Scottish Biodiversity Strategy[2], [3]; and
- Tayside Local Biodiversity Action Plan[4].

Species-specific and survey methodology guidance comprises:

- Habitats and scoping:
    - The Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Preliminary Ecological Appraisal[5] (PEA); and
    - CIEEM Guidelines for Ecological Impact Assessment[6].
- Bat Field Surveys:
    - Bat Conservation Trust, Bat Surveys, Good Practice Guidelines[7]; and

[1] Defra (2012) UK Post-2010 Biodiversity Framework. Available at: http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf (Accessed 23 September 2016)
[2] Scottish Executive (2004) Scotland's Biodiversity: It's in Your Hands. Scottish Executive, Edinburgh.
[3] The Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland. The Scottish Government, Edinburgh.
[4] Tayside Local Biodiversity Action Plan http://www.taysidebiodiversity.co.uk/action-plan/action-plan-new-lbap-2015/ (Accessed 23 September 2016).
[5] Chartered Institute for Ecology and Environmental Management (2013) Guidelines for Preliminary Ecological Assessment Appraisal. CIEEM, Winchester.
[6] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
[7] Hundt, L. (2012) Bat Surveys: Good Practice Guidelines, 2nd edition, The Bat Conservation Trust, London.

- Bat Surveys for Professional Ecologists: Good Practice Guidelines[8].

[8] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) The Bat Conservation Trust, London.

3 Methodology

3.1 Desk Study

A search of the following sources of information was carried out to identify historic bat records within a 2km buffer of the initial survey area of the proposed scheme:

- The 2015 Ecological Survey Report on 'Michelin Baldovie Road, Dundee' produced by ECOS Countryside Services LLP[9] (this site lies within the initial survey area provided for this proposed scheme); and
- The McManus Museum Biological Records (contacted on 16th September 2015).

3.2 Field Survey

The surveys were undertaken by Arup Ecologist Andrew Cole, and supported by Arup Graduate Ecologist Nichelle Murray. Andrew has over nine years' experience, specialising in protected species surveys, and is an associate member of CIEEM.

3.2.1 Bat Scoping Assessment

A bat scoping assessment of all buildings and mature trees present within the initial survey area was undertaken on 9th September 2015.

The methodology used was in accordance with the Bat Conservation Trust's 'Bat Surveys, Good Practice Guidelines' 2nd Edition (BCT, 2012)[7, 10]. Each potential feature on a structure or tree was externally inspected from the ground using high resolution binoculars (8 x 42) and a hand-held high powered torch. Where a building supported external features of suitability for roosting bats, an internal inspection was undertaken.

Buildings, trees and other structures were assessed for their potential to support roosting bats in accordance with the following criteria:

- Negligible – no features likely to be used by roosting bats;
- Low – a structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation);
- Moderate – a structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and

[9] ECOS (2015) Ecological Survey Report on Michelin Baldovie Road, Dundee.
[10] Since this scoping survey was carried out, the third edition of the BCT guidance has been released. Roost classification and survey effort recommended at this site would remain the same under the new guidance.

surrounding habitat, but unlikely to support a roost of high conservation status;

- High – a structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat; and
- Confirmed roosting - evidence indicates that roosting bats are present, e.g. bats seen roosting or observed flying from a roost; droppings, carcasses or feeding remains, found; and/or bats heard 'chattering' inside on a warm day or at dusk and bats recorded/observed using an area for foraging or commuting.

3.2.2 Bat Emergence Survey

The bat scoping assessment identified the presence of two features with a low potential to support roosting bats within the initial survey area; the Baldovie Waste Recycling and Waste Processing Plant and a mature sycamore tree. As a result, one emergence survey was undertaken on the 16th June 2016 following best practice guidance[8].

Two surveyors, each carrying a Bat Box II bat detector, was assigned a pre-determined area of the building to observe based upon the bat scoping assessment. One surveyor focused on the south aspect of the Baldovie Waste Recycling and Waste Processing Plant and the second on the south west aspect. In addition, each Bat Box was connected to a Roland R-05 digital recorder. The sound files recorded during this survey were retained for further analysis and species confirmation. The weather conditions during the surveys are detailed in Table 3.

Table 1 - Bat survey details

Date	Building Ref.	Survey Type	Sunset Time	Survey Times (Start – End)	Temperatures ºC (Start – End – Low)	Weather Conditions
16th June 2016	Baldovie Waste Recycling and Waste Processing Plant	Emergence	22:05	21:45 – 00:00	12 – 11 - 11	Beaufort scale 2 (wind), scattered cloud (2/8), no rain.

3.3 Assumptions and Limitations

Ecological surveys are limited by factors which affect the presence of animals such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. This is not considered to be a significant limitation in this instance as professional judgement allows for the likely presence of these species to be predicted with sufficient certainty for this site.

It has been assumed that no construction activities associated with this proposed scheme will take place to the north of Dumgeith Road. Therefore, any features possessing bat roosting potential which lie to the north of Drumgeith Road have been scoped out of surveys. This approach was agreed with the Operations Officer at Scottish Natural Heritage (SNH).

4 Results

4.1 Desk Study

Data provided by McManus Museum Biological Records included 13 records of bats within 2km of the initial survey area, dated between 1987 and 1998. Of these, twelve are listed as '*Pipistrelle*' and one as '*bats*'. The most recent bat data record provided by this source is dated July 1998. It is therefore considered that these records do not provide an accurate assessment of the current bat population in the area, although are useful to gain an insight into the historic context.

The ECOS report[9] summarises on surveys undertaken in 2014 and 2015. A bat scoping assessment of the land to the east of the proposed scheme (within the Michelin site), identified eight trees possessing a low bat roost potential. However, no further bat surveys were undertaken on these features.

4.2 Field Surveys

4.2.1 Bat Scoping Assessment

The majority of buildings and trees within the initial survey area were categorised as having negligible bat roost potential due to an absence of any suitable features. One building and one tree were identified as possessing features of low bat roosting potential as detailed in Table 2 and identified in Appendix A.

Table 2 - Details of features with bat roost potential

Feature	Grid reference	Description	Bat roost potential
Mature Sycamore (*Acer pseudoplatanus*) (see Appendix C – Figure 1)	NO 44228 33269	Located within the parkland to the north of Drumgeith Road; two small upwards facing cavities with a clear drop zone present on north aspect of a branch; no evidence of staining or field signs recorded.	Low
Baldovie Waste Recycling and Waste Processing Plant (see Appendix C – Figure 2)	NO 44531 33050	Gaps under the corrugated wall, particularly along the north east and south east aspects of the building potentially allowing access to the roof cavity; minimal human or industrial activity taking place within and around the building.	Low

4.2.2 Bat Emergence Survey

Following consultation between Andrew Cole and the Operations Officer at SNH in June 2016, it was agreed that bat surveys did not need to be undertaken on the sycamore tree. As it is located approximately 200m away from the proposed scheme and is separated from the proposed scheme by Drumgeith Road, it was agreed that no disturbance effects would impact the tree as a result of any construction works or operational activities.

During the emergence survey on the Baldovie Waste Recycling and Waste Processing Plant no bats were recorded emerging from the features of interest by either surveyor. Furthermore, no foraging or commuting bats were recorded.

5 Conclusions and Recommendations

No bats were recorded during the emergence survey of the Baldovie Waste Recycling and Waste Processing Plant building and it is considered unlikely that bats are roosting within the initial survey area. No further bat surveys are required.

There are habitats present within and adjacent to the site, particularly along the corridor of the Dighty Water, which provide suitable commuting and foraging habitat for bats. It is recommended that these habitats are retained and enhanced so as to improve the resource for bats on site, in accordance with Scottish Planning Policy.

Appendix A

Initial Survey Area

A4

Legend

Initial Survey Area

Feature of low bat roost potential

Issue	Date	By	Chkd	Appd
P1	10.10.2016	CM	ZW	FM

Metres
0 150 300 600

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MVV Environment Baldovie Ltd

Job Title
Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Bat Survey Map

Scale at A4
1:12,500

Job No	Drawing Status
245510-05	**Issue 1**

Drawing No	Issue
001	**P1**

MXD Location

Appendix B

Relevant Legislation, Planning Policy and Guidance

B1 Relevant Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. There is also a range of policy documents relating to biodiversity that apply to developments requiring planning permission. These are briefly outlined below.

B1.1 Legislation

B1.1.1 Nature Conservation (Scotland) Act 2004

This Act introduces a range of protection and enforcement measures to safeguard and enhance Scotland's natural heritage. It affords a greater level of protection to SSSIs. This Act has also amended the Wildlife and Countryside Act by the addition of the term 'recklessly' to Section 1(5) and Section 9 (4) which has resulted in additional obligations with respect to protected species. As such, it is now an offence to intentionally or recklessly disturb protected species listed on the relevant Schedules of the Act, such as bats. Furthermore, as a result of this Act, all public bodies including local planning authorities are also required to consider habitats and species of Principal Importance listed in Section 2(4) of the Act. This includes several bat species.

B1.1.2 Wildlife and Countryside Act 1981 (WCA 1981) (as amended)

This is the primary legislation covering endangered species in Scotland and sets out the framework for the designation of Sites of Special Scientific Interest (SSSI). It confers differing levels of protection on species themselves, their habitats, or both, depending on their conservation status. Species offered protection by the Act are listed in a series of schedules and includes all British bat species (*Vespertilionidae* and *Rhinolophidae*), which receive full protection under Section 9 of this Act.

B1.2 Policy

B1.2.1 Scottish Planning Policy

The Scottish Planning Policy (SPP) was published in June 2014. The policies in the Framework took immediate effect and previous planning guidance has been revoked and replaced by SPP. Therefore, SPP is a material consideration in all planning decisions from June 2014. SPP refers the responsibilities of the local authorities to conserve the natural environment. All public bodies including local planning authorities are required to consider habitats and species of Principal Importance listed in Section 2(4) of the Nature Conservation (Scotland) Act 2004,

which includes bats, and Priority Species/Habitats within Biodiversity Action Plans when considering a planning application.

The SPP requires developments to "seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats".

B1.3 Guidance

B1.3.1 'UK Post-2010 Biodiversity Framework'

The 'UK Post-2010 Biodiversity Framework' (July 2012) supersedes the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the Convention on Biological Diversity's (CBD), 'Strategic Plan for Biodiversity 2011–2020' and its 20 'Aichi targets', at Nagoya, Japan in October 2010, and the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The framework demonstrates how the UK contributes to achieving the 'Aichi targets', and identifies the activities required to complement the country biodiversity strategies in achieving the targets.

This framework supersedes the UK Biodiversity Action Plan (BAP), first published in 1994, which set out a list of Habitat Action Plans (HAPs) and Species Action Plans (SAPs). The UK BAP lists of priority species and habitats remain, and are an important and valuable reference source to provide statutory lists of species (e.g. Scottish Biodiversity List in Scotland) of local and national priority in England, Scotland, Wales and Northern Ireland. These nationwide plans are implemented on a local level through local biodiversity action plans, which are drawn up by individual Local Authorities.

B1.3.2 Scottish Biodiversity Strategy

The Scottish Biodiversity Strategy consists of two documents; '2020 Challenge for Scotland's Biodiversity' and 'Scotland's Biodiversity: It's in Your Hands'. Together, these documents focus on Scotland's response to the European Biodiversity Strategy for 2020 and the United Nations (UN) 'Aichi' targets, as well as setting out how the Scottish Government will conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future.

B1.3.3 Tayside LBAP

Tayside Biodiversity Partnership has produced a Local Biodiversity Action Plan (LBAP) for the Borough. It sets out habitats of regional, national and international importance within Dundee and is intended to take forward the UK BAP (now succeeded) at a regional level. Key species, those of UK Priority or UK Conservation Concern are identified when threats to preferred habitats are identified. The primary aim of the plan is to enable the conservation and enhancement of biodiversity within Dundee and therefore contribute to the maintenance of national and global biodiversity. It identifies where action needs

to be taken to implement national targets for species and identifies the appropriate mechanisms to ensure delivery.

The following bat species set out in the Tayside LBAP include:

- Brown long-eared bat *Plecotus auritus;*
- Natterer's bat *Myotis nattereri;*
- Daubenton's bat *Myotis daubentoni;*
- Common Pipistrelle *Pipistrellus pipistrellus* ; and
- Soprano Pipistrelle *Pipistrellus pygmeus.*

Appendix C

Site Photographs

Figure 1 - A mature sycamore located within parkland in the north of the proposed scheme (Appendix A) was considered to be of low bat roost potential as a result of two crevices suitable for bats being identified (indicated by the arrows).

Figure 2 - The exterior of the Baldovie Waste Recycling and Waste Processing Plant building supporting features of low bat roosting potential.

MVV Environment Services Ltd

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Ornithological Survey Report

MVV/Rep/OR/Add

Issue | 25 October 2016

Job number 245510-05

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Contents

Appendices

Executive Summary

The purpose of this report is to provide the results of ornithological surveys at the MVV Environment Services Ltd Energy from Waste Combined Heat and Power Facility (EfW CHP) site in Dundee.

Breeding bird and Kingfisher surveys were carried out on the 22nd March, 6th April and 16th June 2016. A total of 40 bird species were recorded within the initial survey area. Of these, seven are listed as Species of Principal Importance (SoPI), eleven are listed on the Local Biodiversity Action Plan (LBAP), five are listed on the Birds of Conservation Concern (BoCC) as red list, and eight as BoCC amber list.

Along the southern and eastern boundaries of the initial survey area, the Fithie Burn and the Dighty Water offer suitable breeding habitat for kingfisher (*Alcedo atthis*), a Schedule 1 species on the Wildlife and Countryside Act (WCA). A potential kingfisher burrow was identified along the Dighty Water at NO 44450 32685. It is recommended that a pre-construction survey for kingfisher burrows is undertaken by a suitably qualified ecologist (SQE) if works within 100m of either bank of either burn are programmed to occur within the bird breeding season (March to August inclusive).

The majority of vegetation on site offers suitable habitat for breeding birds. Any vegetation clearance or building demolition should be undertaken outwith the bird breeding season. If clearance cannot be undertaken outwith this period, then vegetation and buildings will need to be checked thoroughly, immediately prior to clearance or demolition works, by a SQE. Should an active nest be identified, an exclusion zone will need to be set up, within which any works are avoided until the nest has been recorded as inactive by the SQE. This would be approximately six weeks, but is dependent upon the species of bird identified nesting.

1 Introduction

Ove Arup and Partners Ltd (Arup) was commissioned by MVV Environment Services Ltd to undertake ecological surveys at their proposed development site in Dundee to inform an Environmental Statement (ES).

The site covers approximately 69.5 hectares (ha) and is located in the north east of Dundee City. The site is bound by the Fithie Burn to the east, the Dighty Water to the south and west, and residential housing to the north. The initial survey area is illustrated in Appendix A.

1.1 Aim of this Report

This is a species specific report. The aim of this document it to:

- Assess the baseline ecological features, specifically breeding birds, of the site;
- Identify and describe all potential effects to breeding birds from the proposed scheme;
- Detail general mitigation measures required to ensure compliance with nature conservation legislation and to address any potential effects of the proposed scheme on breeding birds; and
- Identify how mitigation measures could be implemented.

1.2 Report Structure

This report includes:

Section 2: Legislation, Planning Policy and Guidance;

Section 3: Methodology;

Section 4: Results; and

Section 5: Conclusions and Recommendations.

2 Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. Much of this legislation exists within, and also independently of, the planning process.

Detailed information on all relevant legislation and guidance is presented in Appendix B.

Legislation and policy relevant to this species report comprises:

- Nature Conservation (Scotland) Act 2004;
- Wildlife and Countryside Act 1981 (WCA 1981) (as amended);
- Conservation (Natural Habitats, & c) Regulations 1994 (as amended); and
- Scottish Planning Policy.

Guidance relevant to this species report comprises:

- UK Post-2010 Biodiversity Framework[1];
- Scottish Biodiversity Strategy[2], [3];
- Birds of Conservation Concern[4]; and
- Tayside Local Biodiversity Action Plan[5].

Species-specific and survey methodology guidance comprises:

- Habitats and scoping:
  - The Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Preliminary Ecological Appraisal[6] (PEA); and
  - CIEEM Guidelines for Ecological Impact Assessment[7].
- Breeding Bird Survey:

[1] UK Post-2010 Biodiversity Framework (2012) http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf (Accessed 23 September 2016).
[2] Scottish Executive (2004) Scotland's Biodiversity: It's in Your Hands. Scottish Executive, Edinburgh.
[3] The Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland. The Scottish Government, Edinburgh.
[4] Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands, and the Isle of Man (2015) https://www.rspb.org.uk/Images/birdsofconservationconcern4_tcm9-410743.pdf (Accessed 23 September 2016).
[5] Tayside Local Biodiversity Action Plan http://www.taysidebiodiversity.co.uk/action-plan/action-plan-new-lbap-2015/ (Accessed 23 September 2016).
[6] Chartered Institute for Ecology and Environmental Management (2011) Guidelines for Preliminary Ecological Assessment Appraisal. CIEEM, Winchester.
[7] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

- British Trust for Ornithology (BTO) BBS Methods[8].

[8] Nobel DG, Bashford RI and Baille SR (2000). Breeding Bird Survey 1999. British Trust for Ornithology.

3 Methodology

3.1 Desk Study

A search of the following sources of information was carried out to identify notable and/or protected bird species recorded within a 2km buffer of the initial survey area of the site:

- The 2015 Ecological Survey Report on 'Michelin Baldovie Road, Dundee' produced by ECOS Countryside Services[9] (this site lies within the initial survey area provided for this proposed scheme); and
- The McManus Museum Biological Records (contacted on 16th September 2015).

3.2 Field Survey

The surveys were undertaken by Arup Ecologist Andrew Cole. Andrew has over nine years' experience, specialising in protected species and ornithological surveys, and is an associate member of CIEEM.

3.2.1 Breeding Bird Survey

Three breeding bird surveys were undertaken within the initial survey area between March and June 2016 (Table 1).

Table 1 - Ornithological survey visits

Date (2016)	Start Time	End Time	Sunrise / Sunset Time	Temperature (ºC)	Precipitation	Wind (Beaufort scale)	Cloud Cover
23rd March	06:10	11:35	06:05 / 18:33	8	No rain	3	3/8
6th April	06:35	10:40	06:28 / 20:02	9	No rain	1	2/8
16th June	04:40	09:05	04:21 / 22:04	12	Occasional light showers	2	5/8

Surveys were adapted from the BTO Breeding Bird Survey method[8]. The first visit was undertaken in March (early transect count) and the final visit in mid-June (late transect count), at least four weeks after the first visit. The second survey was spaced between the first and third survey to allow for an accurate survey of the density of breeding birds onsite. The route of the walked transect was within 100m of all ground within the initial survey area, and a 50m buffer of the initial survey area. The route was walked at a slow pace, pausing at intervals to listen for bird song and to observe bird behaviour. Registrations were recorded

[9] ECOS (2015) Ecological Survey Report on Michelin Baldovie Road, Dundee.

on a 1:10,000 scale map using standard Common Birds Census recording codes and symbols[10].

Following all three surveys, analysis of the results was undertaken to establish the number of breeding territories for each species present within initial survey area.

Results from all three surveys were combined into a single map. Where records of the same bird species in open habitats were separated by less than a threshold distance of 500m for waders and 100m for passerines, they were considered to correspond to the same pair of birds and were merged accordingly. Where records of the same bird species were separated by more than this threshold distance, they were considered to correspond to different pairs of birds.

Exceptions to this methodology are:

- Species known to be communal nesters (e.g. herring gull (*Larus argentatus*)), in which case records within the threshold distances were not merged; and
- When surveyors visually identified different pairs of the same species within the threshold distance during an individual survey.

This consolidation exercise produced an estimate of the total number of territories for each bird species within the initial survey area.

3.3 Assumptions and Limitations

Ecological surveys are limited by factors which affect the presence of animals such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. This is not considered to be a significant limitation in this instance as professional judgement allows for the likely presence of these species to be predicted with sufficient certainty for this site.

It is acknowledged that the second survey on 6th April 2016 took place within four weeks of the first survey on 23rd March 2016. However, with professional judgement it is considered that this will not significantly adversely impact the survey results.

[10] Marchant, J.H. (1983) Common Birds Census Instructions. British Trust for Ornithology, Tring.

4 Results

4.1 Desk Study

The ECOS report[9] summarises surveys undertaken in 2014 and 2015. One record of kingfisher (*Alcedo atthis*) and one record of peregrine falcon (*Falco peregrinus*), which are both WCA (1981) Schedule 1 protected species, were identified. The kingfisher was recorded flying along the Dighty Water just outwith the initial survey area as part of the 2014 Bio Blitz event[11] and the peregrine falcon was seen flying overhead during the 2015 survey. The 2014 and 2015 surveys also recorded several other species listed on the Tayside LBAP (Table 2).

The most recent bird data record provided by the McManus Museum Biological Records centre has a date of October 2000. It is therefore considered that, although useful for context, these records do not provide an accurate assessment of the current bird assemblage.

Table 2 - Data from 2014/15 ECOS report highlighting WCA Schedule 1, BoCC Red List and Amber List, and Tayside LBAP bird species.

Taxon Common Name	**Sch1 (WCA)**	**Tayside LBAP**	**BoCC Red List**	**BoCC Amber List**
Bullfinch (*Pyrrhula pyrrhula*)		✓		✓
Buzzard (*Buteo buteo*)		✓		
Dunnock (*Prunella modularis*)				✓
Goldcrest (*Regulus regulus*)		✓		
Grey wagtail (*Motacilla cinerea*)				✓
Herring gull		✓	✓	
House sparrow (*Passer domesticus*)		✓	✓	
House martin (*Delichon urbica*)		✓		
Kestrel (*Falco tinnunculus*)		✓		✓
Kingfisher	✓	✓		
Linnet (*Carduelis cannabina*)		✓		
Oystercatcher (*Haematopus ostralegus*)		✓		
Peregrine falcon	✓	✓		
Reed bunting (*Emberiza schoeniclus*)		✓		✓
Song thrush (*Turdus philomelos*)		✓	✓	

[11] The Bio Blitz event was a dawn to dusk biological survey under taken in 2014 along the Dighty Water, organised by Michelin and Dighty Connect.

Taxon Common Name	Sch1 (WCA)	Tayside LBAP	BoCC Red List	BoCC Amber List
Swallow (*Hirundo rustica*)		✓		
Swift (*Apus apus*)		✓		

4.2 Field Surveys

Both watercourses are considered to offer potential foraging and breeding habitat for a riparian bird assemblage. In particular, Dighty Water offers good kingfisher habitat.

In total, 40 species of bird were recorded within the initial survey area during the breeding bird surveys in 2016. These comprised a mix of raptors, waders, gulls and passerines (Appendix C).

No Schedule 1 species were recorded within the initial survey area, although a potential kingfisher nest burrow was identified on the southern bank of the Dighty Water at NO 44450 32685.

A total of 18 Species of Principal Importance (SoPI)[12], Tayside LBAP[5] and Red and Amber listed BoCC[13] (Table 3) were recorded.

Table 3 - National and regional important species recorded

Species	Number of Territories	SoPI	Tayside LBAP	Red Listed BoCC	Amber Listed BoCC
Buzzard	2		✓		
Common gull	1				✓
Curlew	4	✓	✓	✓	
Dipper (*Cinclus cinclus*)	2				✓
Dunnock	22	✓			✓
Goldfinch	10		✓		
Great spotted woodpecker	1		✓		
Grey heron (*Ardea cinerea*)	1		✓		
Herring gull	37	✓	✓	✓	
House sparrow	1	✓	✓	✓	
Lesser redpoll (*Carduelis flammea cabaret*)	1	✓		✓	

[12] The Scottish Biodiversity List (SBL) is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL (Accessed 23 September 2016)

[13] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

Species	Number of Territories	SoPI	Tayside LBAP	Red Listed BoCC	Amber Listed BoCC
Mallard (*Anas platyrhynchos*)	3				✓
Mistle thrush (*Turdus viscivorus*)	4				✓
Oystercatcher	8		✓		✓
Reed bunting	2	✓	✓		✓
Song thrush	17	✓	✓	✓	
Sparrow hawk	1		✓		
Willow Warbler (*Phylloscopus trochilus*)	13				✓

The majority of species listed in Table 3 were recorded along the northern and southern boundaries of the initial survey area. The northern boundary, along Drumgieth Road, is dominated by broadleaved plantation woodland which provides good foraging and breeding habitat for a mix of woodland bird species. The amenity grassland and scatted trees to the north of Drumgieth Road provide moderate quality habitat for a more urban species assemblage. The southern boundary comprises areas of mixed plantation woodland, scrub and semi-improved neutral grassland associated with Dighty Water, which provides foraging and breeding habitat for a mixed bird assemblage including woodland and grassland species.

The remaining records were identified across the western half of the site, where a mosaic of marshy grassland, plantation woodland and scattered scrub habitats dominate, and along the eastern boundary of the Fithie Burn.

A total of 28 green listed BoCC were recorded during the breeding bird surveys. The green listed species were less concentrated along the boundaries than the SoPI, LBAP, red and amber listed BoCC species, but still reflected the general habitat preferences. Very few birds were recorded in the eastern half of the site, except along the banks of the Fithie Burn.

Appendix C presents maps of results of each survey, a list of species recorded within the initial survey area, and a territory map.

A peregrine falcon has historically been identified flying over the initial survey area. However, it is considered that habitats within and adjacent to the initial survey area are unsuitable for this species and no evidence of peregrine habitat use was recorded during the 2016 surveys.

5 Conclusions and Recommendations

5.1 Conclusions

A total of 40 bird species were recorded within the initial survey area, of which 18 possess local, regional or national status. All areas of scrub, trees, grassland, shrub and tall ruderal herbs offer suitable nesting habitat for breeding birds.

No Schedule 1 species were recorded during the breeding bird surveys. However, both the Fithie Burn and the Dighty Water offer suitable kingfisher foraging and nesting habitat. A potential kingfisher burrow was identified on the banks of the Dighty Water and a kingfisher was recorded during the 2014 BioBlitz.

A peregrine falcon was recorded flying over the site during the BioBlitz event in 2014. Habitats within and adjacent to the site boundary are considered unsuitable for this species and no evidence of peregrine habitat use was recorded during the 2016 surveys.

5.2 Recommendations

All birds and their nests are protected under the Wildlife and Countryside Act 1981 (as amended). It is an offence to intentionally kill, injure or take any wild bird, to take, damage, or destroy the nest while in use or being built, or to take or destroy an egg. In order to ensure compliance with this legislation, vegetation removal should be undertaken outwith the breeding bird season (March to August inclusive). If vegetation clearance cannot be undertaken during this period, then all vegetation will need to be checked thoroughly, immediately prior to clearance works, by a suitably qualified ecologist (SQE) (such as, those who are a member of CIEEM).

In order to comply with legislation, a pre-construction survey for kingfisher burrows should be undertaken by a SQE if works within 100m of each bank of either burn are programmed to occur between March and August (inclusive). If this survey identifies any active burrows then an exclusion zone of at least 100m should be put in place and no works undertaken within this area for as long as the nest is active (as monitored by the SQE).

Any lighting erected for construction or operation should be directional, orientated away from the watercourses and hooded to reduce light spill. Furthermore, should vegetation clearance be required, it is recommended that planting of native species of trees and scrub is incorporated as part of the landscaping plan in order to mitigate for the loss of suitable breeding bird habitat.

Appendix A

Initial Survey Area

A1

Appendix B

Relevant Legislation, Planning Policy and Guidance

B1 Relevant Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. There is also a range of policy documents relating to biodiversity that apply to developments requiring planning permission. These are briefly outlined below.

B1.1 Legislation

B1.1.1 Nature Conservation (Scotland) Act 2004

Habitats and species of principal importance in Scotland are listed under the provisions of the Nature Conservation (Scotland) Act 2004. These include all the habitats and species in Scotland identified as requiring action in the now succeeded UK Biodiversity Action Plan (UK BAP), and continue to be regarded as conservation priorities in the subsequent Scottish Biodiversity Strategy, which is supplemented by the 2020 Challenge for Scotland's Biodiversity. These are summarised on the Scottish Biodiversity List. All public bodies including local planning authorities are required to consider habitats and species of Principal Importance listed in Section 2(4) of the Nature Conservation (Scotland) Act 2004. Of particular relevance to this report are those bird species listed, which include:

- Bullfinch;
- Dunnock;
- House sparrow;
- Kingfisher; and
- Song thrush.

B1.1.2 Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, & c) Regulations 1994 (as amended)

This is the primary legislation covering endangered species in Scotland and sets out the framework for the designation of Sites of Special Scientific Interest (SSSI). It confers differing levels of protection on species themselves, their habitats, or both, depending on their conservation status. Species offered protection by the Act are listed in a series of schedules. This is the main piece of legislation regulating the release of non-native species in Great Britain, however it was amended in April 2011 by the Wildlife and Natural Environment (Scotland) Act, 2011.

All wild birds in the UK are protected under the Wildlife Countryside Act (WCA) 1981(as amended). Even common species like pigeons and blackbirds are protected. Some rarer species and those that are vulnerable to disturbance or

persecution receive further protection, for example by being listed under Schedule 1 of this Act.

It is an offence to intentionally or recklessly:

- Kill, injure or take a wild bird;
- Take, damage, destroy or interfere with a nest of any wild bird whilst it is in use or being built (or at any time for a nest habitually used by any bird listed in Schedule 1A of the WCA 1981);
- Obstruct or prevent any wild bird from using its nest;
- Take or destroy an egg of any wild bird;
- Disturb any wild bird listed on Schedule 1 whilst it is building a nest or is in, on, or near a nest containing eggs or young;
- Disturb the dependent young of any wild bird listed on Schedule 1; and
- Harass any wild bird listed on Schedule 1A.

It is also an offence to possess or control alive or dead wild bird, an egg of a wild bird (or any such derivatives), or to knowingly cause or permit any of the above acts to be carried out.

Of particular relevance to the proposed scheme are kingfisher which are listed on Schedule 1 of the WCA 1981. This results in additional protection against disturbing kingfisher at their nests, or their dependent young.

B1.2 Planning Policy

B1.2.1 Scottish Planning Policy

The Scottish Planning Policy (SPP) was published in June 2014. The policies in the Framework took immediate effect and previous planning guidance has been revoked and replaced by SPP. Therefore, SPP is a material consideration in all planning decisions from June 2014. SPP refers the responsibilities of the local authorities to conserve the natural environment. All public bodies including local planning authorities are required to consider habitats and species of Principal Importance listed in Section 2(4) of the Nature Conservation (Scotland) Act 2004 and Priority Species/Habitats within Biodiversity Action Plans when considering a planning application.

The SPP requires developments to “seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats”.

B1.3 Guidance

B1.3.1 'UK Post-2010 Biodiversity Framework'

The 'UK Post-2010 Biodiversity Framework' (July 2012) supersedes the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the Convention on Biological Diversity's (CBD), 'Strategic Plan for Biodiversity 2011–2020' and its 20 'Aichi targets', at Nagoya, Japan in October 2010, and the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The framework demonstrates how the UK contributes to achieving the 'Aichi targets', and identifies the activities required to complement the country biodiversity strategies in achieving the targets.

This framework supersedes the UK Biodiversity Action Plan (BAP), first published in 1994, which set out a list of Habitat Action Plans (HAPs) and Species Action Plans (SAPs). The UK BAP lists of priority species and habitats remain, and are an important and valuable reference source to provide statutory lists of species (e.g. Scottish Biodiversity List in Scotland) of local and nationally priority in England, Scotland, Wales and Northern Ireland. These nationwide plans are implemented on a local level through local biodiversity action plans, which are drawn up by individual Local Authorities.

B1.3.2 The Scottish Biodiversity Strategy

The Scottish Biodiversity Strategy consists of two documents; '2020 Challenge for Scotland's Biodiversity' and 'Scotland's Biodiversity: It's in Your Hands'. Together, these documents focus on Scotland's response to the European Biodiversity Strategy for 2020 and the United Nations (UN) 'Aichi' targets, as well as setting out how the Scottish Government will conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future.

B1.3.3 Birds of Conservation Concern

The UK's leading bird conservation organisations have worked together to review the status of birds in the UK, Channel Islands and Isle of Man. The review used up-to-date information on the status of birds in the UK and elsewhere in their ranges, drawing on data collated through the UK's bird monitoring schemes. Bird species are placed on one of three lists (Red, Amber or Green) based upon parameters such as the level of population decline globally and in the UK, the extent of their breeding range, and the size of their breeding population. The Red List contains the species of highest conservation priority, Amber is the next most critical group, followed by Green.

B1.3.4 Tayside Local Biodiversity Action Plan

Tayside Biodiversity Partnership has produced a Local Biodiversity Action Plan (LBAP) for the Borough. It sets out habitats of regional, national and international importance within Dundee and is intended to take forward the UK BAP (now

succeeded) at a regional level. Key species, those of UK Priority or UK Conservation Concern are identified when threats to preferred habitats are identified. The primary aim of the plan is to enable the conservation and enhancement of biodiversity within Dundee and therefore contribute to the maintenance of national and global biodiversity. It identifies where action needs to be taken to implement national targets for species and identifies the appropriate mechanisms to ensure delivery.

Key bird species set out in the Tayside LBAP include:

- Peregrine falcon;
- House sparrow;
- Barn owl;
- Kestrel;
- Buzzard;
- Goldfinch;
- Kingfisher;
- Herring gull; and
- Bullfinch.

Appendix C

Breeding Bird Survey Results for Initial Survey Area

C1 Survey Results for 23rd March 2016

A3

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

MXD Location

Legend

Initial Survey Area

Issue	Date	By	Chkd	Appd
P1	19.10.2016	CM	ZW	FM

Metres

0 50 100 200

ARUP

Scotstoun House, South Queensferry
EH30 9SE
+44 131 331 1999
www.arup.com

Client

MVV Environmental Baldovie Ltd

Job Title

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Breeding Bird Survey Results: 23rd March 2016

Scale at A3

1:4,000

Job No	Drawing Status
245510-05	**For Issue**

Drawing No	Issue
001	**P1**

C2 Survey Results for 6th April 2016

A3

Legend

- Initial Survey Area
- Potential kingfisher nest burrow

Issue	Date	By	Chkd	Appd
P1	19.10.2016	CM	ZW	FM

Metres
0 50 100 200

ARUP

Scotstoun House, South Queensferry
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Client

MVV Environmental Baldovie Ltd

Job Title

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Breeding Bird Survey Results: 6th April 2016

Scale at A3

1:4,000

Job No	Drawing Status
245510-05	**For Issue**

Drawing No	Issue
001	**P1**

MXD Location

C3 Survey Results for 16th June 2016

A3

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

MXD Location

Legend

Initial Survey Area

Issue	Date	By	Chkd	Appd
P1	19.10.2016	CM	ZW	FM

Metres
0 50 100 200

ARUP

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Client

MVV Environmental Baldovie Ltd

Job Title

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Breeding Bird Survey Results: 16th June 2016

Scale at A3

1:4,000

Job No	Drawing Status
245510-05	**For Issue**

Drawing No	Issue
001	**P1**

C4 Species and Number of Territories Recorded

BTO Code	Common Name	Scientific Name	Number of Territories
b.	Blackbird	*Turdus merula*	30
bc	Blackcap	*Sylvia atricapilla*	6
bt	Blue tit	*Parus caeruleus*	42
bz	Buzzard	*Buteo buteo*	2
c.	Carrion crow	*Corvus corone corone*	12
cd	Collared dove	*Streptopelia decaocto*	1
cc	Chiff chaff	*Phylloscopus collybita*	13
ch	Chaffinch	*Fringilla coelebs*	53
cm	Common gull	*Larus canus*	1
ct	Coal tit	*Parus ater*	8
cu	Curlew	*Numenius arquata*	4
d.	Dunnock	*Prunella modularis*	22
di	Dipper	*Cinclus cinclus*	2
g.	Green woodpecker	*Picus viridis*	2
gc	Goldcrest	*Regulus regulus*	5
go	Goldfinch	*Carduelis carduelis*	10
gr	Greenfinch	*Carduelis chloris*	4
gs	Great spotted woodpecker	*Dendrocopos major*	1
gt	Great tit	*Parus major*	11
gw	Garden warbler	*Sylvia borin*	3
h.	Grey heron	*Ardea cinerea*	1
hg	Herring gull	*Larus argentatus*	22
hs	House sparrow	*Passer domesticus*	1
jd	Jackdaw	*Corvus monedula*	4
lb	Lesser black-backed gull	*Larus fuscus*	23
lr	Lesser redpoll	*Carduelis flammea cabaret*	1
lt	Long-tailed tit	*Aegithalos caudatus*	9
m.	Mistle thrush	*Turdus viscivorus*	4
ma	Mallard	*Anas platyrhynchos*	3
mg	Magpie	*Pica pica*	1
oc	Oystercatcher	*Haematopus ostralegus*	8
pw	Pied wagtail	*Motacilla alba yarrellii*	4
r.	Robin	*Erithacus rubecula*	27
rb	Reed bunting	*Emberiza schoeniclus*	2

sh	Sparrowhawk	*Accipiter nisus*	1
st	Song thrush	*Turdus philomelos*	17
wh	Whitethroat	*Sylvia communis*	5
wp	Woodpigeon	*Columba palumbus*	40
wr	Wren	*Troglodytes troglodytes*	46
ww	Willow warbler	*Phylloscopus trochilus*	13

C5 Territory Map

A3

Legend

Initial Survey Area

Potential kingfisher nest burrow

Issue	Date	By	Chkd	Appd
P1	19.10.2016	CM	ZW	FM

Metres

0 50 100 200

ARUP

Scotstoun House, South Queensferry
EH30 9SE
+44 131 331 1999
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Client

MVV Environmental Baldovie Ltd

Job Title

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Breeding Bird Survey: Territory Map

Scale at A3

1:4,000

Job No	Drawing Status
245510-05	**For Issue**

Drawing No	Issue
001	**P1**

MXD Location

MVV Environment Services Ltd

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Otter and Water Vole Survey Report

Issue | 27 October 2016

Job number 245510-05

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ARUP

Contents

Executive Summary

The purpose of this report is to provide the results of otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) surveys at the MVV Environment Services Ltd Energy from Waste Combined Heat and Power (EfW CHP) site in Dundee.

Otter and water vole habitat assessments found that the Fithie Burn and Dighty Water, which flow along the eastern and southern boundaries respectively of the initial survey area, possessed suitable habitat for both species, albeit limited for water vole. During the field surveys, a moderate level of otter activity on the Fithie Burn and Dighty Water was recorded. No signs indicating water vole presence were recorded.

Therefore, it is considered that water vole are not present along the sections of watercourse assessed. However, as one water vole survey was undertaken, it is recommended that a second water vole survey is conducted between April and June 2017.

Although otters are present along the Fithie Burn and Dighty Water, it is considered that construction and operational activities from the Proposed Scheme will not impact this species as no works are proposed along or immediately adjacent to either watercourse.

It is recommended that any construction related lighting during sensitive otter times (i.e. from sunset to sunrise) should be avoided. If lighting is necessary during these times, it should be directed and positioned so as to be orientated away from the watercourses.

It is also recommended that if any works are to occur adjacent to either the Fithie Burn or Dighty Water, a pre-works check is undertaken by a suitably qualified ecologist (SQE) to determine the level of otter activity and to confirm that no fresh signs of water vole are present.

In line with national and Scottish planning policy, the Fithie Burn and Dighty Water should be enhanced to provide improved habitat for otter and water vole. This includes native vegetation planting and removal of rubbish from the waterways.

1 Introduction

1.1 Background

Ove Arup and Partners Ltd (Arup) was commissioned by MVV Environment Services Ltd to undertake ecological surveys at their proposed development site in Dundee to inform an Environmental Statement (ES).

The site covers approximately 69.5 hectares (ha) and is located in the north east of Dundee City. The site is bound by the Fithie Burn to the east, the Dighty Water to the south and west, and residential housing to the north. The initial survey area is illustrated in Appendix A.

1.2 Aim of this Report

This is a species specific report. The aim of this document it to:

- Assess the baseline ecological features of relevance to otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) within the initial survey area;
- Identify and describe all potential effects to otter and water vole from the Proposed Scheme;
- Detail general mitigation measures required to ensure compliance with nature conservation legislation and to address any potential effects of the Proposed Scheme to otter and water vole; and
- Identify how mitigation measures could be implemented.

1.3 Report Structure

This report includes:

- Section 2: Legislation Planning Policy and Guidance;
- Section 3: Methodology;
- Section 4: Results; and
- Section 5: Conclusions and Recommendations.

2 Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. Much of this legislation exists within, and also independently of, the planning process.

Detailed information on all relevant legislation and guidance is presented in Appendix B.

Legislation and policy relevant to this species report comprises:

- Nature Conservation (Scotland) Act 2004;
- Wildlife and Countryside Act 1981 (WCA 1981) (as amended); and
- Scottish Planning Policy.

Guidance relevant to this species report comprises:

- UK Post-2010 Biodiversity Framework[1];
- Scottish Biodiversity Strategy[2, 3;] and
- Tayside Local Biodiversity Action Plan[4].

Species-specific and survey methodology guidance comprises:

- Habitats and scoping:
    - The Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Preliminary Ecological Appraisal[5] (PEA); and
    - CIEEM Guidelines for Ecological Impact Assessment[6].
- Otter Field Surveys:
    - Chanin P (2003) *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10. English Nature, Peterborough.
- Water vole Field Surveys:

[1] Defra (2012) UK Post-2010 Biodiversity Framework. Available at: http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf (Accessed 23 September 2016)
[2] Scottish Executive (2004) Scotland's Biodiversity: It's in Your Hands. Scottish Executive, Edinburgh
[3] The Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity: A strategy for the conservation and enhancement of biodiversity in Scotland. The Scottish Government, Edinburgh.
[4] Tayside Local Biodiversity Action Plan http://www.taysidebiodiversity.co.uk/action-plan/action-plan-new-lbap-2015/ (Accessed 23 September 2016)
[5] Chartered Institute for Ecology and Environmental Management (2011) Guidelines for Preliminary Ecological Assessment Appraisal. CIEEM, Winchester.
[6] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

- Strachan, R., Moorhouse, T. and Gelling, M. (2011). *Water Vole Conservation Handbook.* Third Edition. Wildlife Conservation Research Unit, Oxford.

3 Methodology

3.1 Desk Study

A search of the following sources of information was carried out to identify historic otter and water vole records within a 2km buffer of the initial survey area of the Proposed Scheme:

- The 2015 Ecological Survey Report on 'Michelin Baldovie Road, Dundee' produced by ECOS Countryside Services[7]; and
- The McManus Museum Biological Records (contacted on 16th September 2015).

3.2 Field Survey

The surveys were led by Arup Ecologist Chris Mellor. Chris has over four years' experience, specialising in protected species surveys and riverine systems.

All waterbodies within the initial survey area were assessed (Appendix A). These comprised the Dighty Water between NO 45257 32452 and NO 43848 32752 and Fithie Burn between NO 45064 33288 and NO 45257 32452.

3.2.1 Habitat Assessment

On the 9th September 2015 the waterbodies within the initial survey area were assessed for their potential to support otter, in accordance with the CIEEM PEA guidance[5], and their potential to support water vole, in accordance with Dean et al. (2016)[8].

3.2.2 Otter Surveys

Otter surveys were conducted on the 19th November 2015, 16th December 2015, 14th January 2016, 17th February 2016 and 13th October 2016. During every survey, both banks of the Dighty Water and the Fithie Burn were surveyed for signs of otter activity and shelters in accordance with standard methodology and guidance from SNH, 2003[9].

Signs that were searched for included:

- Spraints;
- Food remains;
- Rolling places;
- Slides down river banks;

[7] ECOS (2015) Ecological Survey Report on Michelin Baldovie Road, Dundee.
[8] Dean, M., Strachan, R., Gow. & Andrews, R. (2016) *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.
[9] Chanin P (2003) *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10. English Nature, Peterborough.

- Footprints or paths; and
- Shelters (either holts or couches).

Water levels were monitored to ensure surveys were not undertaken after periods of high river levels which would wash away signs of otter activity.

3.2.3 Water Vole Survey

A water vole survey was undertaken on 13th October 2016. Both banks of the Dighty Water and the Fithie Burn were surveyed for signs of water vole activity in accordance with best practice guidance[10] (Appendix A). This included identifying features such as:

- Droppings and latrines;
- Feeding remains of grasses and sedges;
- Burrows; and
- Footprints.

Water levels were monitored to ensure the survey was not undertaken after a period of high river levels which would wash away signs of water vole activity.

3.3 Assumptions and Limitations

Ecological surveys are limited by factors which affect the presence of animals such as the time of year, dispersal patterns and behaviour. Therefore, the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

One water vole survey has been undertaken which is not in accordance with best practice guidance. Recommendations are made in Section 5.2 for a further survey to be carried out and suitable mitigation to be incorporated into the Proposed Scheme. However, given the limited potential of the Dighty Water and Fithie Burn to support water vole, it is considered that this limitation does not adversely impact the results.

[10] Strachan, R., Moorhouse, T. and Gelling, M. (2011). *Water Vole Conservation Handbook*. Third Edition. Wildlife Conservation Research Unit, Oxford.

4 Results

4.1 Desk Study

4.1.1 Otter

The review of the ECOS report indicated that no otter evidence was recorded during surveys conducted on the Dighty Water and Firhie Burn in 2014. This report also indicated that record databases had no previous signs of otters within 2km of the Proposed Scheme after 1995.

Records provided by the McManus Museum Biological Records centre included a record from 1984-1985 and a second one from 1992. Due to the date of these records, it was considered that they do not provide an accurate assessment of the current otter population in the area, although they are useful to gain an insight into the historic context.

4.1.2 Water vole

The review of the ECOS report indicated that no water vole evidence was recorded post 1980 within 2km of the Proposed Scheme.

The records provided by the McManus Museum Biological Records centre included a 1980 sighting of a water vole on the Burnside of Duntrune which lies along the Fithie Burn upstream of the Proposed Scheme. As this record is older than 5 years, it is not considered to be an accurate representation of the current water vole population in the area.

4.2 Field Surveys

4.2.1 Habitat Assessment

4.2.1.1 Otter

The habitat present along the Dighty Water and the Fithie Burn consisted of moderate to slow moving water with areas of deep pools and shallow rapids. There were areas of broad-leaved woodland and scrub along both banks of the watercourses. There were also areas where the banks were undercut, providing potential shelter areas. As a result both the Dighty Water and Fithie Burn were considered to be suitable for otter and surveys undertaken. Photographs of the waterbodies can be seen in Appendix C.

4.2.1.2 Water vole

The slow moving water of the Dighty Water and Fithie Burn is suitable for water vole presence. However, due to the rocky nature of the banks of the Fithie Burn, there were limited areas suitable for water vole burrowing and a lack of suitable vegetation cover. The Dighty Water consisted of more areas with bank substrate suitable for water vole burrows. Photographs of the waterbodies can be seen in Appendix C.

Both the Dighty Water and Fithie Burn provided limited herbaceous vegetation suitable for water vole foraging. As a result of these surveys, both the Dighty Water and Fithie Burn were assessed as having limited potential to support water vole.

4.2.2 Field Surveys

4.2.3 Otter

Field signs indicating the presence of otter were recorded on all surveys along the Dighty Water and the Fithie Burn, with the exception of the survey on 13th October 2016, when no evidence was recorded on the Fithie Burn. Table 4.1 details the location and type of the otter signs recorded.

4.2.4 Water vole

No field signs indicating the presence of water vole were recorded during the water vole survey on 13th October 2016. Furthermore, it was identified that the habitat within the initial survey area had degraded since the habitat assessment was undertaken in September 2015, to an extent which made it unsuitable for water voles. This was because no flora species suitable for water vole feeding were present, no signs of feeding were recorded and there was a high level of human disturbance along the banks of both watercourses, particularly from dog walkers.

Therefore, it is believed that water vole are not present along the Dighty Water or the Fithie Burn.

Table 4.1: Results of otter surveys

Date	Waterbody	Grid reference	Right-hand bank (RHB) or left-hand bank (LHB)[11]	Details
19/11/2015	Fithie Burn	NO 45141 32904	RHB	Spraint on old log
16/12/2015	Fithie Burn	NO 45070 33138	LHB	Two spraints on hollow underhung by tree roots and ivy
		NO 45141 32904	RHB	Spraint on old cherry tree log
	Dighty Water	NO 45123 33019	RHB	One spraint on stump on the upside of bridge
		NO 45237 32564	LHB	Spraint under a tree
14/01/2016	Dighty Water	NO 44159 32762	RHB	Otter print and potential couch
		NO 44371 32673	RHB	Otter spraint on outflow
		NO 44523 32683	RHB	Potential otter tail drag
		NO 44563 32684	RHB	Otter spraint and potential couch
		NO 44920 32530	RHB	Otter spraint and potential couch
		NO 44997 32520	RHB	Otter spraint
		NO 45190 32474	RHB	Otter print
		NO 45264 32447	RHB	Otter print and potential couch
		NO 44225 32731	LHB	Otter print
		NO 44347 32673	LHB	Otter print and potential couch
		NO 44587 32690	LHB	Otter spraint
17/02/2016	Dighty Water	NO 44097 32769	LHB	Otter spraint under bridge
		NO 44157 32763	RHB	Otter spraint found under willow tree
		NO 44188 32749	RHB	Otter spraint found in willow with an eroded notch.

[11] RHB and LHB are determined by the direction of water flow along the stream.

		NO 44309 32691	RHB	Otter spraint and potential couch
		NO 44372 32671	RHB	Otter spraint
		NO 44381 32674	RHB	Otter spraint and claw marks in eroded cliff
		NO 44450 32675	RHB	Otter spraints around collapsed bank, several spraints on sofa cushion on the tree and surrounding ground.
		NO 44503 32634	LHB	Spraint
		NO 44527 32632	RHB	Spraint next to concreted section of bank
		NO 44562 32636	RHB	Spraint on willow tree and potential couch
		NO 44587 32634	LHB	Spraint
		NO 44808 32557	LHB	Spraint
		NO 44820 32555	RHB	Spraint and potential couch
		NO 44915 32529	RHB	Spraint and potential couch under area of collapsed wall
		NO 44986 32523	RHB	Spraint and potential couch under area of collapsed wall near to birch tree
		NO 44996 32522	RHB	Potential couch under arch in wall
		NO 45000 32518	RHB	Spraint and potential couch
	Fithie Burn	NO 45060 33268	RHB	Spraint and potential couch
		NO 45074 33148	LHB	Three spraints in potential couch.
		NO 45173 32797	LHB	Spraint on rock
		NO 45135 32576	LHB	Two spraints around alder tree
13/10/2016	Dighty Water	NO 44343 32689	LHB	Spraint on rock
		NO 44996 32522	RHB	Spraints found under arch in wall where they have been previously recorded

5 Conclusions and Recommendations

5.1 Otter

A moderate level of otter activity was recorded along the Fithie Burn and Dighty Water, although no confirmed or potential holts were identified.

It is understood that no construction works are to be conducted along or immediately adjacent to either watercourse. However, associated construction activities have the potential to disturb otters that are active along the Fithie Burn and Dighty Water. Construction lighting may be required at sensitive times for otter activity (i.e. from sunset to sunrise). Should lighting be required at these times, it should be designed and located so as to minimise disturbance to otters by using methods such as light hoods to reduce light spill and the use of directional lighting so as to point away from the watercourse.

If works are to be conducted within 100m of either watercourse, a pre-works check should be conducted by a suitably qualified ecologist (SQE) (such as those who are members of CIEEM) to ensure that no sites of breeding or resting are adversely impacted by works.

Current proposals for the Proposed Scheme indicate that the Fithie Burn and Dighty Water are to remain unimpeded to otter movements during and following construction of the Proposed Scheme. This will allow otter to maintain passage through the area to the wider water system within the Dundee area. It is recommended that the waterbodies on site should be cleaned so as to improve the overall water quality. Currently the Dighty Water and Fithie Burn both possess stretches which contain large amounts of rubbish. An improvement in their water quality would benefit otters known to be present along the watercourses, as well as the wider ecological status of the site.

5.2 Water vole

No field signs indicating the presence of water vole were found during the survey undertaken. Furthermore it was considered that the habitat, particularly along the Fithie Burn, had degraded since the habitat assessment was undertaken and is now unsuitable for water vole. In addition, the desk study revealed limited historic records of water vole within a 2km radius of the initial survey area. It is therefore believed that construction and operational activities will not impact on this species.

However, as one water vole survey was undertaken, it is recommended that one further survey is completed between April and June 2017 (inclusive). Should construction start prior to this time period, a pre-works check by a SQE should be undertaken.

Appendix A

Initial Survey Area

A3

Legend

Initial Survey Area

Issue	Date	By	Chkd	Appd
P1	19.10.2016	CM	ZW	FM

Metres

0 50 100 200

ARUP

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Client

MVV Environmental Baldovie Ltd

Job Title

Energy from Waste Combined Heat and Power Facility, Forties Road, Dundee

Initial Survey Area

Scale at A3

1:4,000

Job No	Drawing Status
245510-05	**For Issue**

Drawing No	Issue
001	**P1**

MXD Location

Appendix B

Legislation, Planning Policy and Guidance

B1 Relevant Legislation, Planning Policy and Guidance

There is a comprehensive system of legislation, both domestic and international, which aims to protect biodiversity at the landscape, habitat and species level. There is also a range of policy documents relating to biodiversity that apply to developments requiring planning permission. These are briefly outlined below.

B1.1 Legislation

B1.1.1 Nature Conservation (Scotland) Act 2004

This Act introduces a range of protection and enforcement measures to safeguard and enhance Scotland's natural heritage. It affords a greater level of protection to SSSIs. This Act has also amended the Wildlife and Countryside Act by the addition of the term 'recklessly' to Section 1(5) and Section 9 (4) which has resulted in additional obligations with respect to protected species. As such, it is now an offence to intentionally or recklessly disturb protected species listed on the relevant Schedules of the Act, such as otter and water vole. Furthermore, as a result of this Act, all public bodies including local planning authorities are also required to consider habitats and species of Principal Importance listed in Section 2(4) of the Act.

B1.1.2 Wildlife and Countryside Act 1981 (WCA 1981) (as amended)

This is the primary legislation covering endangered species in Scotland and sets out the framework for the designation of Sites of Special Scientific Interest (SSSI). It confers differing levels of protection on species themselves, their habitats or both depending on their conservation status. Species offered protection by the Act are listed in a series of schedules and includes otter and water vole which are both listed under Schedule 5.

B1.2 Policy

B1.2.1 Scottish Planning Policy

The Scottish Planning Policy (SPP) was published in June 2014. The policies in the Framework took immediate effect and previous planning guidance has been revoked and replaced by SPP. Therefore, SPP is a material consideration in all planning decisions from June 2014. SPP refers the responsibilities of the local authorities to conserve the natural environment. All public bodies including local planning authorities are required to consider habitats and species of Principal Importance listed in Section 2(4) of the Nature Conservation (Scotland) Act 2004 and Priority Species/Habitats within Biodiversity Action Plans when considering a planning application.

The SPP requires developments to "seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats".

B1.2.2 'UK Post-2010 Biodiversity Framework'

The 'UK Post-2010 Biodiversity Framework' (July 2012) supersedes the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the Convention on Biological Diversity's (CBD), 'Strategic Plan for Biodiversity 2011–2020' and its 20 'Aichi targets', at Nagoya, Japan in October 2010, and the launch of the new EU Biodiversity Strategy (EUBS) in May 2011. The framework demonstrates how the UK contributes to achieving the 'Aichi targets', and identifies the activities required to complement the country biodiversity strategies in achieving the targets.

This framework supersedes the UK Biodiversity Action Plan (BAP), first published in 1994, which set out a list of Habitat Action Plans (HAPs) and Species Action Plans (SAPs). The UK BAP lists of priority species and habitats remain, and are an important and valuable reference source to provide statutory lists of species (e.g. Scottish Biodiversity List in Scotland) of local and nationally priority in England, Scotland, Wales and Northern Ireland. These nationwide plans are implemented on a local level through local biodiversity action plans, which are drawn up by individual Local Authorities.

B1.2.3 Scottish Biodiversity Strategy

The Scottish Biodiversity Strategy consists of two documents; '2020 Challenge for Scotland's Biodiversity' and 'Scotland's Biodiversity: It's in Your Hands'. Together, these documents focus on Scotland's response to the European Biodiversity Strategy for 2020 and the United Nations (UN) 'Aichi' targets, as well as setting out how the Scottish Government will conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future.

B1.2.4 Tayside LBAP

Tayside Biodiversity Partnership has produced a Local Biodiversity Action Plan (LBAP) for the Borough. It sets out habitats of regional, national and international importance within Dundee and is intended to take forward the UK BAP at a regional level. Key species, those of UK Priority or UK Conservation Concern are identified when threats to preferred habitats are identified. The primary aim of the plan is to enable the conservation and enhancement of biodiversity within Dundee and therefore contribute to the maintenance of national and global biodiversity. It identifies where action needs to be taken to implement national targets for species and identifies the appropriate mechanisms to ensure delivery.

Key species set out in the Tayside LBAP include:

- Otter; and
- Water vole.

Appendix C

Site Photographs

Photograph 1: Dighty Water. Banks with a lack of suitable vegetation for water vole cover, shelter or foraging.

Photograph 2: Dighty Water. Area with suitable vegetation for water vole shelter, however limited vegetation for water vole foraging.

Photograph 3: Example of an otter spraint found along the Dighty Water.

Photograph 4: Suitable otter habitat along Dighty Water

Photograph 5: Example of an otter spraint on an old log along Fithie Burn

Appendix D

Ground Conditions and Contamination

MVV Environmental Services Ltd.

Proposed Energy from Waste Plant, Dundee

Geotechnical and Geo-environmental Desk Study Report

245510-06

Issue | 4 April 2016

Job number 245510-06

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Contents

Figures

Appendices

1 Introduction

1.1 Introduction and Scope

An Energy from Waste (EfW) plant has been proposed in Baldovie, Dundee, at National Grid Reference NO 446 328 (***Figures 1 and 2***). The new development is part of the existing Baldovie Industrial Estate and is situated south of the existing Dundee Energy Recycling Ltd (DERL) site.

Arup (as part of a wider commission) have been instructed by MVV Environmental Services Ltd (MVV) to provide a Geo-technical and Geo-environmental and Desk Study for the site.

The objectives of the desk study are to identify any potential geotechnical and geo-environmental issues present on the site and confirm the scope of the intrusive ground investigation.

1.2 Approach

The approach to carrying out the desk study was generally in accordance with the following documents:

- Scottish Enterprise: How to approach Contaminated Land, A Framework for the Assessment of Contaminated Land Options, 1994.
- DEFRA and Environmental Agency: Model Procedures for the Management of Land Contamination (CLR 11). 2004.

The desk study was based on a review and interpretation of information from the following sources:

- Landmark Envirocheck Report (containing current and historic Ordnance Survey Maps dating back to 1865);
- Readily available geological and hydrogeological information for the area;
- Search of online databases (SNH, RCAHMS, PASTMAP and SEPA);
- Previous ground investigation information;
- Proposed development information forwarded by the Client.

This report presents the findings of the desk study and makes recommendations for ground investigation where applicable.

1.3 Limitations

No site walkover, intrusive investigation or testing of the ground was undertaken during the desk study. Conclusions and recommendations are made on the basis of the information reviewed and may require to be re-assessed following site investigations.

2 The Site

2.1 Location and Description

The proposed development is located to the south of the existing Dundee Energy Recycling Ltd (DERL) within the Baldovie Industrial Estate at National Grid Reference NO 446 328.

The topography of the site is relatively flat. It is understood an area of open ground with some small areas used for the stockpiling of materials. The ground surface is anticipated to comprise compacted granular material with some areas of concrete hardstanding.

The site is of rectangular shape, with approximate dimensions of 75m x 150m.

It is bound to the west by Forties Road, to the north by the existing DERL plant, to the east by open ground covered with vegetation and to the south by a metal scrap yard. A watercourse known as the 'Dighty Water' passes approximately 100m to the south of the site. Recent GoogleEarth images indicate that the site has recently been used for the storage of scrap cars.

Drive on access to the site can be gained from Forties Road.

2.2 Proposed Development

The proposed development comprises the construction of a new Energy from Waste (EfW) plant. A plan of the proposed development is shown in ***Figure 3***, with an illustration of the proposed development (courtesy of MVV Umwelt) shown in ***Image 1***. As shown, in addition to paved and car parking areas, it is envisaged that the development will comprise of a number of buildings, namely: storage areas; tipping hall; bunker; boiler house, administration building; ash bunker; machine house; chimney stacks; reactor and flue gas cleaning building.

As part of the proposal, MVV will take on the management of the existing DERL recycling centre in addition to the operation of the new EfW plant. As part of this study MVV are keen to understand any potential contamination risks associated with the existing DERL site in addition to the proposed development site and the need for any further investigations to characterise geo-environmental risks further. A plan demarking these areas is shown in ***Figure 2***.

Image 1: The proposed Energy from Waste development (image: MVV Umwelt)

2.3 Site History

To assess the changing land use through time, historical maps were obtained from Landmark Information Group[1]. A review of the historical maps obtained is outlined in ***Table 1*** below, with 'on site' referring to the proposed development area. Copies of the referenced historical maps are included in ***Appendix A*** of this report.

Table 1: Site History

Map Name (Scale)	On Site	Off Site
1865 Forfarshire (1:10,560) 1885 Forfarshire (1:2,500)	The site is open ground with some non-coniferous trees.	Most of the surrounding area is open ground. There is a nursery to the north of the site. The Dighty Water flows in an easterly direction approximately 120m to the south of the site. There is a bleachfield south of the river. To the north-west there is an area with some buildings and non-coniferous trees. Further north, there is a school and recreational cottages. The Drumgeith road to the north of the site is already present. A smithy is noted approximately 140m north-east of the site.

Map Name (Scale)	On Site	Off Site
1903 Forfarshire (1:10,560 & 1:2,500)	The site all is open ground.	The nursery north of the site is no longer present. A gravel pit is identified to be present to the south of the Dighty Water.
1922 Forfarshire, 1938 Forfarshire (1:2,500) 1923 Forfarshire, 1938 Forfarshire (1:10,560) 1948 Historical Aerial Photography (1:10,560)	No significant change.	No significant change.
1957 – 1965, 1969 (1: 2,500) 1960, 1960 – 1969, 1968 (1:10,000)	No change.	Residential developments to the south, south-west and north-west of the site. Gravel pit to the south no longer identified.
1973 Supply of Unpublished Survey Information, 1958 – 1974 (1:1,250) 1974 - 1975 (1:10,000)	No change.	Tyre factory located approximately 180m east of the site. The bleachfield is no longer present. There is a depot instead.
1956 – 1982 (1:1,250)	A large incinerator structure is located to the north of the site. Two chimneys, hoppers and an incinerator plant are present within the incinerator site. The Forties Road is constructed at the western site boundary. The proposed EfW site is separated from the	To the north and north-west of the incinerator site are two buildings labelled “works”.
1980 – 1992 Additional SIMs, 1988 – 1992 Additional SIMs (1:1,250) 1984, 1992 Dundee (1:10,000)	The Forties Road is constructed at the western site boundary. The proposed EfW site is separated from the larger incinerator site by Claymore Street.	The Baldovie Industrial Estate has been constructed to the north-west of the site. A further “works” building is located to the west of the site beyond Forties Road. Electricity sub-station present to the north-west of the site beyond Forties Road.

Map Name (Scale)	On Site	Off Site
1994 Large-Scale National Grid Data, 1994 - 1995 (1:1,250) 1994 - 1995 (1:10,000)	A public refuse tip is identified approximately 15m to the north of Claymore Street.	A scrap yard is identified approximately 5m to the south of the site. More residential and community buildings are constructed.
2006 10k Raster Map (1:10,000)	Dundee Energy Recycling (DERL) is present immediately to the north of the proposed EfW site.	Refuse tip no longer identified. Presumed to be infilled. More residential and community buildings are constructed.
2015 VectorMap Local (1:10,000)	No change.	Football ground is present to the north-east of the site.

No significant changes have occurred on site since the most recent historical map record.

2.4 Site Geology

The geological map sheet[2] indicates that the superficial deposits beneath the proposed EfW site comprises of 'alluvium'. Beneath the northern section of the DERL site there is a drift geological boundary shown, whereby the superficial deposits are noted as '*glacial meltwater deposits'* of '*moundy sand and gravel'* to the north. No information on the thickness of the drift deposits is provided.

The solid geology beneath the proposed EfW and existing DERL site consists of undifferentiated sedimentary units, mainly sandstone, of the Lower Old Red Sandstone Group. Immediately north of the DERL site, an igneous intrusion is identified where the solid geology changes to 'tuff and agglomerate'.

Below the southern site boundary an east to west trending geological fault is identified, with the downthrow shown to the south (no distance of downthrow is presented).

An extract from the geological map is presented on ***Figure 4.***

2.5 BGS Boreholes

A review of the open geoscience function of the BGS[3] website indicates that the following borehole scans are available within the site area or within close proximity to the site boundary. The locations of the exploratory holes are shown in ***Figure 5***. It should be noted that there are no historical BGS boreholes identified beneath the proposed EfW development site.

Table 2: Available BGS Borehole Logs

BGS Borehole ID	Year	Depth (m)	Location	Additional Information
NO43SW153 (BH3)	1972	6.2	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW154 (BH13)	1972	11	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW155 (BH 16)	1972	6.3	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW156 (BH17)	1972	7.9	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW157 (BH18)	1972	7.0	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW158 (BH19)	1972	13.75	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW159 (BH22)	1972	6.9	DERL site	Borehole, Drungeith Incinerator Plant
NO43SW6877/8 (BH8)	1979	6.5	To the south-east of the proposed development site	Borehole, Dighty Sewer, Dundee
NO43SW6877/9 (BH9)	1979	6.5	To the south-west of the proposed development site	Borehole, Dighty Sewer, Dundee
NO43SW6877/10 (BH10)	1979	10.0	To the south-west of the proposed development site	Borehole, Dighty Sewer, Dundee

The exploratory holes undertaken within the surrounding area of the site encountered the following geological conditions:

- Made ground was encountered in NO43SW6877/9 (BH9) to a depth of 0.45mbgl, comprising clay with gravel. Top soil was encountered in NO43SW6877/8 (BH8) to a depth of 0.6mbgl.
- The underlying superficial deposits encountered during the Dighty Sewer investigation comprise predominantly of soft clay, underlain by peat, which is underlain by sand with gravel deposits. Rockhead was not reached in the boreholes which were undertaken during this investigation.
- Bedrock was encountered during the Drungeith Incinerator Plant investigation. The boreholes identified "surface" deposits to a maximum depth of 3.27m in NO43SW158 underlain by bedrock (The rock was noted as sandstone in boreholes NO43SW153 (BH3) and NO43SW158 (BH19); siltstone in borehole NO43SW159 (BH22) and grey igneous rock (Tuff) in boreholes NO43SW157 (BH16) and NO43SW157 (BH18). Bedrock was encountered at a depth between 3mbgl and 10.75mbgl.

2.6 Mining and Quarrying

The historical maps obtained by Envirocheck and the BGS geological map do not indicate that the site is located in an area with previous mining activity. The online interactive map viewer from Coal Authority[4] indicates that the area is unlikely to be affected by previous mining activities.

On this basis and combined with the geology of the site, it is not considered necessary to further investigate the possibility of mining on the site.

2.7 Hydrology and Hydrogeology

The most recent groundwater vulnerability map produced by BGS[5] shows that the area in which the site is located is classified as vulnerability class 4. Using the text accompanying the map, the site can be characterised as being "vulnerable to those pollutants not readily adsorbed or transformed".

BGS have also produced a report which contains maps of the superficial and bedrock aquifer productivity[6]. From the superficial aquifer productivity map, the site appears to be located within an area of no productivity and high productivity. From the solid aquifer productivity map, the site appears to be located in an area of high productivity where the flow is inter-granular and through fractures.

A groundwater vulnerability map[7] has been received as part of the Envirocheck report[1] shows that the areas is underlain by highly permeable strata. The vulnerability map represents the vertical pathway of groundwater through strata overlaying an aquifer. Groundwater vulnerability is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface. The most recent vulnerability map indicates that the highly permeable strata. The map states that the aquifer is "highly permeable strata usually with a known or probable presence of significant fracturing". According to the map, the soils have intermediate leaching potential: "Soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer".

The nearest watercourse is the Dighty Water, which is located along the southern boundary of the site. The SEPA River and Coastal Flood Map[8] indicates that there is a moderate to high risk of river flooding. A river flood data (Scotland) map[9], received as part of the Envirocheck report[1] indicates that the expected flood depth at the 100 year flood is between 1m and 2m. The hydraulic gradient at the site is anticipated to have a southward flow towards the Dighty Water.

2.8 Radon Gas

A review of the document HPA-CRCE-023 'Indicative Atlas of Radon in Scotland'[10] indicates that the site is located in an intermediate radon probability area where 1 – 3% of homes are at or above the action level.

Therefore, a radon risk report was obtained for the site. The report indicates that the property is not situated in a radon affected area and that radon protection measures are not required. The full report is included in ***Appendix B***.

2.9 Search of Scottish Natural Heritage Database

Arup undertook a search of Scottish Natural Heritage's (SNH) online database[11]. The search identified no protected areas within the vicinity of the site. The nearest

protected area is a Special Area of Conservation (SAC) – Firth of Tay and Eden estuary, located to the south of the site

2.10 Search of RCAHMS PASTMAP Database

Arup undertook a search of the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) PASTMAP database[12]. The search did not identify any listed buildings or scheduled monuments within the boundary of, or in close vicinity to, the site.

2.11 Envirocheck Database Search

2.11.1 General

On behalf of MVV Environmental Services Ltd, Arup commissioned Landmark Information Group Ltd to prepare an Envirocheck Report[1] for the site. This comprises a regulatory database search from organisations including Local Authority, SEPA, Coal Authority, Scottish Natural Heritage, British Geological Survey and the Centre of Hydrology and Ecology. The Envirocheck report contains information on relevant activities within a 1km radius, the results of which indicate the environmental setting of the site. The information provided includes the following:

- Licensed discharge consents and abstraction points
- Integrated pollution control processes
- Pollution incidents relating to controlled waters
- Planning applications of potentially contaminative uses and trade directory entries
- Landfill, waste treatment and waste transfer operations
- River quality data
- Sites of special scientific interest (SSSI)
- Radioactive substances authorisations
- Hazardous substances consents
- Potentially contaminative uses

2.11.2 Summary of Envirocheck Report

The Envirocheck summary sheets and the site sensitivity maps are enclosed within ***Appendix C*** and discussed below.

The database search identified the following within the vicinity of the site:

- There are no contaminated land register entries or notices on or within 1km of the site.
- There are no discharge consents within 1km of the site.
- The site is located at a Nitrate Vulnerable zone.
- There are no source protection zones within 1km of the site.
- There is one integrated pollution control process at the location of the site and one within 1km of the site. Details are provided in ***Table 3*** below.

Table 3: Integrated Pollution Control Processes

Name and Address	Location	Permit Reference	Process Type and Description	Date Issued	Status
City Of Dundee District Council, Baldovie Incineration Plant, Forties Road, Dundee, DD4 0NS	On site	n/a	6.1 Paper and Pulp manufacturing processes within Miscellaneous Industries	30th October 1992	Authorised
Michelin Tyre Plc, Baldovie Road, Dundee, DD4 8UQ	510m SE	Ipc/E/0000082	Not Supplied	8th October 1999	Not Supplied

- There are four local authority pollution prevention and control processes within 250m of the site and five within 1km. Details of these processes are provided in ***Table 4*** below.

Table 4: Local Authority Pollution and Prevention Control Processes

Name and Address	Location	Permit Reference	Process Type and Description	Date Issued	Status
DDC, Baldovie Incineration Plant, Forties Road, DUNDEE, Angus, DD4 0NS	DERL site	HMIPI/3/92	Local Authority Air Pollution Control, Part B process (no specific reference)	9th Nov 1992	Authorised
Pioneer Concrete, Baldovie Industrial Estate, Piper Street, DUNDEE, Angus, DD4 0NT	74 m NW	EPA/13/92	Local Authority Air Pollution Control, PG3/1Blending, packing, loading and use of bulk cement	20th October 1992	Authorised
British Fuels Ltd, Baldovie Industrial Estate, Piper Street,	134m NW	APC/E/339	Local Authority Air Pollution Control, Part B process (no specific reference)	20th March 1996	Not Supplied

Name and Address	Location	Permit Reference	Process Type and Description	Date Issued	Status
DUNDEE, Angus, DDT 0NT					
Hanson Quarry Products Europe Ltd, Piper Street, Dundee, DD4 0NT	187m NW	Apc/E/0000334	Local Authority Air Pollution Control	4th October 1993	Not Supplied
Michelin Tyre Plc, Baldovie Road, Baldovie Industrial Estate, DUNDEE, Angus, DD4 8UQ	510m SE	Apc/E/350	Local Authority Air Pollution Control, PG6/32 Adhesive coating	26th Sept 1994	Not Supplied
Mctavish Ramsay & Co, Fowler Road, West Pitkerro Industrial Estate, Broughty Ferry, DUNDEE, Angus, DD5 3RN	586m NE	Apc/E/346	Local Authority Air Pollution Control, Part B - General Wood Process (No Specific Reference)	19th Oct 1993	Not Supplied
Fowler Road, Fowler Road, West Pitkerro Road, DUNDEE, Angus, DD5 3RU	620m NE	Apc/E/0000386	Local Authority Air Pollution Control	1st Oct 1995	Not Supplied
BRE Ltd, Fowler Road, West Pitkerro Industrial Estate, DUNDEE, Angus, DD5 3RU	621m NE	EPA/6/95	Local Authority Air Pollution Control, Part B process (no specific reference)	8th Sept 1995	Authorised
Brown & Tawse, Fowler Road West, West Pitkerro Industrial Estate, Dundee, Dd53yn	831m NE	Apc/E/363	Local Authority Air Pollution Control, Part B - General Coating Process (No Specific Reference)	21st April 1994	Not Supplied

- The area is shown to be underlain by a major or highly permeable aquifer.
- There is one integrated pollution control registered waste site at the location of the site and one located between 0-250m from the site. The details of these sites are summarised in ***Table 5***.

Table 5: Integrated Pollution Control Registered Waste Site

Name and Address	Location	Permit Reference	Process Type and Description	Date Issued	Status
Dundee Council, Baldovie Incineration Plant, Forties Road, DUNDEE, Dundee City, DD4 0NS	On site	Ipc/E/75	5.1 Incineration within the Waste Disposal Industry	2nd Oct 1995	Revoked
Dundee Energy Recycling Ltd, Forties Road,, Baldovie Industrial Estate, Dundee	DERL site	Ipc/E/0020018	Integrated Pollution Control (Part A Processes)	27th Feb 2001	Not Supplied

- There have been no pollution incidents to controlled waters or any prosecutions relating to controlled waters.
- There are no water abstractions within 1km of the site.
- There are three registered waste transfer sites at the location of the site, and one within 1km. Details are provided in ***Table 6***.

Table 6: Registered Waste Transfer Sites

Name and Address	Location	Licence Status	Maximum Input rate	Dated	Authorised Waste
Dundee City Council, Baldovie Autoclave/Transfer, Forties Road, Dundee, Angus	On Site	Operational	Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year)	7th April 2000	Anatomical Parts/Animal Carcasses And Flesh/Civic Amenity Waste/Clinical Wastes/Commercial & Industrial Waste/Highly Infectious Wastes/Household Waste/Maximum Storage In Licence/Maximum Waste To C.A.Site/Maximum Waste To Transfer Station/Overall Maximum Waste Permitted By Licence Pharmaceutical Waste/Special Waste (As In Epa 1990:S62 Of 1996 Regs)/Substances In Control Of Radioactive Substances Act 1960
Dundee City Council, Baldovie Autoclave/Transfer,	On Site	Superseded	Medium (Equal to or greater than	11th March 1998	Animal Carcasses/Clinical - As In Control Waste Regs'92; Clinical Waste; Com. & Ind. Waste; Household Waste;

Name and Address	Location	Licence Status	Maximum Input rate	Dated	Authorised Waste
Forties Road, Dundee, Angus			25,000 and less than 75,000 tonnes per year)		Liquid Wastes; Max Waste At Transfer St'N; Max Waste To Autoclave; Max Waste To C.A.Site; Max Waste To Transfer St'N; Overall Max Waste Permitted By Lic. Sludge Wastes; Special Wastes (As In '96 Regs); Sub'S Control. Radioactive Subs Act'60
Dundee City Council, Baldovie Autoclave/Transfer, Forties Road, Dundee, Angus	On Site	Surrendered	Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)	1st June 1997	Commercial Waste (S75 Epa'90); Household Waste (May Incl.); Lead/Acid Batteries; Max Waste Permitted By Licence; Waste Oil
Archibald Banks T/A Pyot Reclaim, Pyot Reclaim Transfer Station, Pearce Avenue, West Pitkerro Industrial Estate, Dundee, Angus	823m SE	Operational	Very Small (Less than 10,000 tonnes per year)	25th May 2002	Acid In Lead/Acid Batteries From Householders; Household & Commercial Waste; Inactive Waste; Maximum Waste Permitted By Licence; Waste Oil From Householders

- There are three registered waste treatment or disposal sites at the location of the site and three within 250m of it. Details of these sites are provided in ***Table 7***.

Table 7: Registered Waste Treatment or Disposal Sites

Name and Address	Location	Licence Status	Maximum Input rate	Dated	Authorised Waste
Eddie Dunn Autobreakers Ltd, 5 Beryl Street, Baldovie Industrial Estate, Dundeee, Angus, Dd4 0hx	On Site	Operational	Very Small (Less than 10,000 tonnes per year)	15th Oct 2004	Maximum Storage In Licence;Maximum Waste Permitted By Licence; Waste Motor Vehicles

Name and Address	Location	Licence Status	Maximum Input rate	Dated	Authorised Waste
Mr & Mrs C Mc Callum (As Partners Of Csr), 1 Beryl Street, Baldovie Industrial Estate, Dundeee, Angus, Dd4 0hx	On Site	Operational	Very Small (Less than 10,000 tonnes per year)	24th Sept 2004	Maximum Storage In Licence; Maximum Waste Permitted By Licence; Waste Motor Vehicles
Dundee City Council, Baldovie Transfer/Treatment Plant, Forties Road, Dundee, Angus	On Site	Superseded	Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year)	11th Sept 1996	Animal Carcasses; Clinical Waste; Clinical Wastes; Household/Com./Ind. Waste; Liquid Wastes; Max.Waste Permitted By Licence; Sludge Wastes; Special Wastes (As In '96 Regs); Sub'S Control. Radioactive Subs Act'60
City Of Dundee D.C., Baldovie Incinerator Plant, Forties Road, DUNDEE, Angus, DD4 0NS	On Site	Superseded	Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year)	1st Jan 1985	Animal Carcasses; Clinical Wastes; Confidential Waste; Domestic & Commercial Waste; Hospital Wastes Incl.; Max. Waste Permitted By Licence; Medical Wastes; Modif'N Wastes Not To Hand Pharmaceutical Waste; Selected Industrial Wastes; Selected Special Wastes
Dundee Alloys, Forties Road, Baldovie Industrial Estate, Dundee, Angus	5m NW	Cancelled	Undefined	1st Nov 1991	Aluminium Slag
A M Tolan T/A A M T Motors, Beryl Street, Baldovie Industrial Estate, Dundeee, Angus	66m S	Operational	Very Small Less than 10,000 tonnes/year	8th Oct 2004	Maximum Storage In Licence; Maximum Waste Permitted By Licence; Waste Motor Vehicles
Dundee & Ferry Skiphire & Recycling, Site 5 Piper Street, Baldovie Industrial Estate, Dundee, Angus	94 W	Operational	Very Small (Less than 10,000 tonnes per year)	8th July 2003	Acid In Lead/Acid Batteries From Households; Commercial Waste; Household Waste; Inactive Waste; Industrial Waste; Maximum Waste Permitted By Licence; Waste Oil From Households

The following ground stability information was provided:

- Potential for collapsible ground stability hazards – no hazard to very low.
- Potential for compressible ground stability hazards –no hazard to moderate.
- Potential for ground dissolution stability hazards – no hazard.
- Potential for landslide ground stability hazards – very low.
- Potential for running sand ground stability hazards –very low to low.
- Potential for shrinking or swelling clay ground stability hazards – no hazard to very low.
- Radon potential – the property is in an intermediate probability radon area, as between 1 and 3% of homes are above the action level. Stage 1 radon protective measures are necessary in the construction of new dwellings or extensions.
- There are 75 contemporary trade directory entries located within 1km of the site, 34 of these entries are indicated to be active. The entries include waste disposal service, water coolers sales, car breakers and dismantlers, concrete and mortar supply services, hardware suppliers, door manufacturers, cleaning materials and equipment suppliers, garage services, commercial dealing services, tyre manufacturers & distributors, road haulage services, central heating supplies and equipment sales, manufacturers of paper and cardboard products and packaging, pest and vermin control services, office furniture & equipment providers, precision engineering services, ironing and home laundry services, wallpaper and wall coverage services, air compressors sales, cable and wire equipment manufacturers, joinery manufacturers, adhesives, glues and sealants suppliers, marine engineering services, asphalt and coated macadam laying contractors, oven cleaning services, washing machines - servicing & repairs and timber preservation services.
- There is one open fuel station within 1km of the site. This is the Sainsbury's service station located 942m SE of the site.

2.12 Previous Investigations

This information was obtained from a third party source, and as such, may not be warranted beyond the client responsible for commissioning the works. Therefore, the data cannot be relied upon and is presented for information purposes only.

2.12.1 Geotechnical Engineering Ltd, 2015 Investigation

Seven boreholes and six trial pits were undertaken during a recent ground investigation by Geotechnical Engineering Ltd[13] at Dundee Energy Recycling Ltd. This investigation included two boreholes (BH6 &7) and six trial pits (TP01 -05) on the proposed EfW site. The locations of these exploratory holes can be found in ***Figure 5***. The Geotechnical Engineering Ltd report includes a site location plan

which identifies a number of chimneys and storage tanks to be present within the DERL site.

Made ground comprising black and grey tarmacadam was present in boreholes BH1, BH2, BH5 and BH7. Sandstone and quartzite gravel made ground was encountered in boreholes BH4, BH6 and BH7. At BH8, the made ground comprised light concrete.

The boreholes indicate that the depth of the superficial deposits range from 4.85mbgl from approximately 210m to the north of the site (BH1) to 24.55mbgl at the south-east end of the site (BH7) (proposed EfW site). The presence of interbedded layers and the description of the superficial deposits suggests that they have glacial meltwater/alluvial origins. They comprise of layers of sandy, silty, peaty or gravelly clay, fibrous peat, fine and medium or fine to coarse sand and fine to coarse gravel.

Rockhead was not encountered in boreholes BH4 and BH6, which terminated at 15m and 15.45m depth respectively. The bedrock is predominantly sandstone (BH1, BH5, BH7 and BH8), but siltstone (BH2) and mudstone (BH1) were also encountered. A geological cross-section showing the anticipated ground conditions across the site is presented on ***Figure 6***.

The trial pits varied in depth from 1.7m to 3.3mbgl. Made ground in the trial pits comprised predominantly dark, fine to coarse crystalline, sandstone gravel with fragments of brick and mortar and reached depth between 2.1m and 3.2m. Metal bars, plastic tape, fragments of geo-membrane and roots have been found in the ground. Sulphurous (TP03A) and hydrocarbon (TP04) odours were encountered, suggesting olfactory evidence contamination of the made ground. The underlying soil was organish brown clay with frequent black and brown rootlets. Asbestos (Chrysotile) was encountered in TP03A which is discussed further in Section 2.13 of this report.

Dynamic cone penetrometer tests were performed in the made ground up to a depth of 1.94m. However, it is considered that this test is not appropriate for the ground conditions and therefore are considered of little value.

2.12.2 SLR Factual Environmental Report 2015

During the Geotechnical Engineering Ltd. investigation, environmental samples were collected from the boreholes and trial pits. Analyses were scheduled and performed on soils and groundwater samples under the instruction of SLR Consulting and were reported in a factual report[14] dated November 2015. In addition, four rounds of groundwater and gas monitoring was performed post investigation. ***Table 8*** presents a summary of the groundwater levels measured during the period of groundwater monitoring.

Table 8: Summary of Groundwater Levels

Borehole Ref.	Ground Level (mOD)	Response Zone (mbgl)	Depth of Water (mbgl)	Level of Water (mOD)
BH1	+28.70	11.00 - 5.00	2.770 - 2.800	+25.91 to +25.88
BH2	+28.65	10.00 - 4.00	2.210 - 2.375	+26.46 to +26.295
BH4	+27.85	3.20 - 1.00	1.480 - 1.715	+26.38 to +26.295
BH5	+27.90	8.00 - 4.00	1.530 - 1.745	+26.39 to +26.175
BH6	+28.65	12.00 - 3.00	2.300 - 2.355	+26.37 to +26.315
BH7	+28.55	14.00 - 4.00	2.100 - 2.362	+26.44 to +26.178
BH8	+28.90	11.00 - 6.50	2.480 - 2.664	+26.43 to +26.246

A total of twenty two samples were analysed for the presence of contamination in soils from both the made ground and natural deposits present at the site as shown in ***Table 9***.

Table 9: Soil Geo-environmental Tests from SLR Investigation 2015

Determinands/Suite	No. of Samples Tested
Speciated Total Petroleum Hydrocarbons	22
BTEX & MTBE	22
Heavy Metals (CLEA)	22
pH Value	22
Asbestos Screen	16
Asbestos Quantification	1
Moisture Content	20
Soil Organic Matter	21
Volatile Organic Compounds (VOC's) + TIC's	22
Semi - Volatile Organic Compounds (VOC's) incl PAH's + TIC's	22
Polychlorinated Biphenyls (PCB's 7 & 12)	22
Free Cyanide	21
Total Cyanide	21
Sulphate	22

Groundwater testing was conducted on seven samples obtained from groundwater monitoring standpipes installed during the 2015 investigation. The testing performed is presented in ***Table 10***.

Table 10: Groundwater Geo-environmental Tests from SLR Investigation 2015

Determinands/Suite	No. of Samples Tested
Speciated Total Petroleum Hydrocarbons	7
BTEX & MTBE	7
Polycyclic Aromatic Hydrocarbons	7
Heavy Metals (CLEA)	7
Dissolved Mercury by CVAF	7
pH Value	7
Volatile Organic Compounds (VOC's) + TIC's	7
Semi - Volatile Organic Compounds (SVOC's) + TIC's	7
Free Cyanide	7
Total Cyanide	7
Ammoniacal Nitrogen as N	7
Sulphate	7
Chloride	7
Dissolved Organic Carbon	7

No interpretation or assessment of the geo-environmental testing was performed. Arup has performed an assessment of the contamination testing performed in Section 2.13 of this report in line with current best practice and guidance.

2.12.3 Michelin Tyres Preliminary Risk Assessment

KDC Contractors Ltd were commissioned by Michelin Tyres Plc to undertake a preliminary risk assessment[15] for a proposed new development at the Michelin Plc tyre factory which is located to the south-east of the DERL and proposed EfW site.

The preliminary risk assessment performed did not include any intrusive investigations and identified from historic investigations two sources of contamination associated with free phase product identified in two boreholes located in the southern area of the Michelin site.

The risk assessment recommended further geo-environmental investigations to be performed at the site to fully characterise contamination risks present at the site and in relation to the proposed building extension development and planned sewer diversion to fully understand potential contamination risks to deeper aquifers and the surface water (Dighty Water).

It is not clear if additional investigations have been performed at the Michelin Tyres site. It is not considered that contamination present at the Michelin site would pose a significant risk to the EfW or DERL sites due to its location down hydraulic gradient. There could however potentially be a risk posed during flooding events where contaminants could be mobilised and transported up hydraulic gradient and deposited on the development sites.

2.13 Geo-environmental Assessment (SLR test data 2015)

This section provides an initial geo-environmental assessment of the contamination testing performed in 2015 by SLR to allow the conceptual site model to be developed. It should be highlighted that the investigations performed did not include any exploratory positions within the DERL structures and therefore potential contamination risks associated with the existing operations within the building could be present but as yet remain unidentified.

The proposed development comprises the construction of a new Energy from Waste (EfW) centre to be located directly to the south of the existing DERL site ***(Figure 3)***. It is proposed also that MVV will take over the management of the existing DERL site. It is considered that the key risks with regards to human health are primarily focussed on construction workers who may have direct contact with contaminated materials during construction activities and the surface water quality of the Dighty Water to the south of the site. For the purpose of this assessment the chemical testing results from samples of soil and groundwater obtained during the 2015 SLR investigation have been assessed to determine contamination risks, develop the conceptual site model (CSM) and to allow the recommendation of further investigations.

2.13.1 Rationale for Assessment

The potential risks posed by soil contaminant levels have been considered in terms of:

- Risk to human health (employees and site visitors)
- Risk to human health (construction and maintenance workers)
- Risk to human health (adjacent site users)
- Risk to buried concrete
- Risk to the water environment (surface water – Dighty Water)
- Risk to water environment – (groundwater)

The basis for the above assessments are discussed below. The Initial Screening Levels (ISLs) adopted for this project, based upon the above, are presented with the results of the chemical testing in ***Appendix D*** as appropriate.

2.13.2 Risk to Human Health

To simplify the assessment of ground contamination risks, the Statutory Guidance suggests that generic soil quality guideline values may be used for initial screening of soil contamination testing results, provided that such guideline values are available and are appropriate to the site circumstances and the potential pollutant linkages in question. If the results from an adequate ground investigation are below such scientific and appropriate guidelines, then the site can be regarded as suitable for use. If the results exceed the screening guidelines then more detailed

investigation and/or risk assessment is required to determine whether or not there is a need for remediation.

In line with the above principles, DEFRA, in conjunction with the Environment Agency, have developed the Contaminated Land Exposure Assessment (CLEA) Framework[16]. The adoption of the CLEA Framework in Scotland is supported by SEPA. CLEA provides a risk assessment basis for developing both generic and site specific assessment criteria, and also provides risk assessment software to enable their derivation.

Arup have developed a series of generic assessment criteria (GACs), using the latest version of the CLEA model (v.1.071). The GACs have been developed where possible using toxicological and physiochemical properties derived by authoritative sources, such as the Environment Agency TOX reports, and from independently peer reviewed sources such as those prepared by LQM-CIEH and CL:AIRE.

A number of standard land-uses have been developed under the CLEA Framework, for which Arup have developed GACs. These include a **commercial land-use** which is considered the most appropriate end use scenario based on the fact the new development comprises a new Energy from Waste centre. These values, conservatively based upon a 2.5% soil organic matter (measured average site SOM average 1.8%) have therefore been used as Initial Screening Levels (ISLs) for the current investigation.

In 2015, LQM and CIEH published a series of screening values referred to as Suitable for Use Screening Levels (S4ULs)[17]. These are intended to represent a level that does not represent a risk of "significant harm" as identified by Part IIA of the EPA (1990), and have been developed for use as part of the contaminated land assessment framework.

Where no appropriate screening values exist, for example for some volatile organic compounds, the detection limit has been taken to be the ISL.

It is recommended that the adopted ISLs be reviewed as part of future assessments to confirm applicability, in line with the proposed end use.

The results of the assessment based on the above are summarised in section 2.13.5.1 below and presented in full within ***Appendix D***.

2.13.3 Risk to Buried Concrete

Contaminants such as sulphates and acidic conditions generally present a low risk to human health, but can result in aggressive ground conditions that may result in the degradation of buried concrete.

The levels of such contaminants have been assessed in accordance with BRE Special Digest 1[18]. Based upon a review of the site history, geology and ground conditions, the site has been categorised as a non-pyritic "brownfield" site for the purposes of the assessment.

The results of this assessment are summarised in Section 2.13.5.2.

2.13.4 Risk to the Water Environment

2.13.4.1 Leachate

No leachate testing was performed as part of the SLR investigation; therefore, it is not possible at this stage to understand whether soil contaminants (Metals and PAH's) are in a mobile and leachable form and impacting on groundwater or surface water quality.

2.13.4.2 Groundwater

The potential risks posed by groundwater contamination to the water environment have been assessed by comparison of the results of the groundwater testing with ISLs, to assess whether contamination is present.

Groundwater monitoring undertaken as part of the Geotechnical Engineering Ltd / SLR Investigation has encountered a relatively shallow groundwater table across the site (1.48m to 2.80mbgl). A possible perched groundwater table within the made ground appears to be present with a deeper groundwater body within the alluvium deposits. Groundwater monitoring performed in standpipes with response zones in the bedrock recorded very shallow readings which is suggestive of weak artesian conditions.

There are no groundwater abstractions at the site or within 1km and it is not considered that groundwater at the site would be abstracted for drinking water purposes. Therefore, the principal receptor for contamination of groundwater at the site is considered to be the Dighty Water located approximately 120m to the south of the site and therefore the groundwater results have been compared with the Environmental Quality Standards (EQS) values for fresh waters outlined within in SEPA's guidance document *(WAT-SG-53) "Environmental Standards for Discharges to Surface Waters"*[19] to assess whether contamination is present and posing a risk to this receptor.

Where no freshwater EQS is available, the results have been compared to marine EQS values[19] or to the Resource Protection Values (RPV's) within SEPA guidance document (WAT-PS-10-01) "*Assigning Groundwater Assessment Criteria for Pollutant Inputs*"[20]. There is no current UK drinking water standard or EQS for petroleum hydrocarbons, so the TPH results have been compared to the WHO Guideline values for petroleum hydrocarbons[21].

The results of the chemical testing on the groundwater are presented in full within SLR's Factual Report[14].

No groundwater or surface water abstractions are indicated in the vicinity of the site. Based on this and the site's environmental setting it is considered that the above ISLs are appropriately conservative.

The results of this assessment are summarised in Section 2.13.5.3 and presented in full within ***Appendix D***.

2.13.4.3 Soil Gas

The results from the ground gas monitoring have been assessed using the criteria set-out in BS:8485[22], CIRIA C665[23] and the requirements of the Building Regulations, 2000[24].

2.13.5 Contamination Assessment

2.13.5.1 Assessment of Risk to Human Health

The results of the soil geochemical testing have been compared to the ISL's which are protective of human health. All of the contaminants with the exception of asbestos have been recorded at concentrations below the commercial / industrial screening levels indicating that they do not pose unacceptable risks to human health for the proposed commercial / industrial end use.

The following contaminants were recorded as elevated within the soils:

Table 11: Elevated Contaminants in Soils

Determinand	No. Samples	Units	Range (µg/l)	ISL (µg/l)	No.> ISL
Asbestos	16	%	0.001%	-	-

One sample of made ground from TP3A at 1.5mbgl confirmed the presence of Chrysotile asbestos fibres. A further quantitative analysis of the soils was undertaken and the percentage of Asbestos Containing Material present was <0.001%. The full screening assessment is summarised in ***Appendix D***. It is recommended that a delineation exercise is performed as part of any further investigations to investigate the extent of this asbestos contamination at the site to allow recommendations for its management to be made.

2.13.5.2 Assessment of Risk to Buried Concrete

The site investigation results have been assessed in accordance with BRE Special Digest 1 (2005) [18] to provide an indication of the appropriate Aggressive Chemical Environment for Concrete (ACEC) class that will be required to protect subsurface concrete structures from chemical attack. As part of this investigation thirty samples of soil were tested.

The results showed sulphate contents of between <0.01g/l to 0.32g/l. The pH analyses gave results ranging from 7.3 to 11.

Where there are more than 10 sulphate results, the mean of the highest 20% of the results should be taken as the characteristic value. This gives a characteristic sulphate value of 0.22g/l.

Where there are more than a small number of pH results, the mean of the lowest 20% of the pH results should be taken as the characteristic value. This gives a characteristic pH value of 7.4.

The above results place the site in a Design Sulphate Class of DS-1. Assuming "mobile" ground water due to the presence permeable granular deposits on the site, an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 should be adopted for the site when selecting a class of concrete.

It should be noted that no pH or sulphate was performed on samples of the bedrock. It is recommended that samples of the bedrock are tested from any further investigations performed at the site should piled foundations in rock be considered an appropriate foundation solution.

2.13.5.3 Assessment of Risk to the Water Environment

The results of the groundwater testing have been compared to the ISLs designed to be protective of water quality. Where elevated concentrations have been recorded these are presented in ***Table 12***. The full screening assessment is summarised in ***Appendix D***.

Table 12: Elevated Groundwater Contaminants

Determinand	No. of Samples	Units	Range	ISL	No. > ISL	Locations > ISL
Cadmium	7	mg/l	0.00016 – 0.00075	0.00008	7	BH1, 2,4,5,6,7,8
Chromium	7	mg/l	<0.0002 – 0.0062	0.0047	1	BH2
Copper	7	mg/l	<0.003 – 0.004	0.001	2	BH7, 8
Lead	7	mg/l	0.0024 – 0.0082	0.0072	2	BH6,7
Zinc	7	mg/l	<0.0015 – 0.019	0.0119	1	BH8
TPH (C21-35) Aromatic	7	mg/l	<0.01 – 0.17	0.09	1	BH2
Sulphate	7	mg/l	26 – 500	400	1	BH6
Chloride	7	mg/l	12 – 1200	250	2	BH2, 6
Chloroform (VOC)	7	mg/l	<0.002 – 0.006	0.0025	4	BH1, 5, 7, 8

The results of the groundwater testing generally indicate very low levels of groundwater contamination, with the majority of analytes recorded below their ISLs.

However, a number of contaminants including metals, TPH fraction (C21-35) aromatic, sulphate, chloride and chloroform have been recorded at levels greater than the EQS values.

Metals

With no leachate testing performed on samples of soils collected it is difficult to understand if contaminants in the soils are mobile and leaching causing the raised levels of these contaminants when compared to the EQS's. It is recommended that leachate testing be performed during further investigations to understand if this source – pathway – receptor linkage exists.

TPH (aromatic C21-35)

One sample from BH2 recorded an elevated concentration of 0.17mg/l for this aromatic fraction compared to a WHO guideline of 0.09mg/l. Soils tests performed on samples from BH2 did not record any elevated concentrations of hydrocarbon contaminants above the method detection limits for each fraction. It is recommended that further groundwater testing be performed to determine if hydrocarbon contamination is present at this location.

Sulphate

Sulphate contamination is primarily a risk to building materials (e.g. concrete) therefore appropriate specification of construction materials will be required as detailed in Section 2.13.5.2 to mitigate risks of aggressive contaminants.

Chloride

Elevated chloride was recorded in 2 of the 7 groundwater samples tested (BH2 and BH6). Elevated chloride can be an indicator of saline intrusion however the site is considered to be in a location that is not influenced by intrusion from the brackish River Tay. Further testing of groundwater should be performed to assess if construction materials would require any protection from high chloride levels within the groundwater.

Chloroform

Four of the seven groundwater samples tested recorded elevated concentrations of the volatile organic compound chloroform (BH1, 5, 7 and 8). A total of twenty two soil samples were tested for VOC's and all recorded chloroform at below the method detection level of <0.005mg/kg. It is not clear what the source of chloroform within the groundwater is and this should be considered further following additional investigations.

A number of tests performed as part of the groundwater analyses have method of detection levels that are greater than the SEPA EQS values. Typically, all of the contaminants with method of detection levels greater than the EQS were recorded at a level less than the method detection eg <0.001mg/l). The contaminants are presented in ***Table 13*** below:

Table 13 Groundwater Contaminants (LOD > EQS)

Determinand	No. of Samples	Units	Range	ISL	No. > ISL	Loc > ISL
Pentachlorophenol	7	mg/l	<0.001	0.0004	-	-
Benzo(b/k)flouranthene	7	mg/l	<0.001	0.00003	-	-
Benzo(a)pyrene	7	mg/l	<0.001	0.00005	-	-
Indeno(123cd)pyrene	7	mg/l	<0.001	0.000002	-	-
Benzo(ghi)perylene	7	mg/l	<0.0005	0.000002	-	-
Hexachlorobenzene	7	mg/l	<0.001	0.00001	-	-
1,2,4 Trichlorobenzene	7	mg/l	<0.003	0.0004	-	-

It is considered that further groundwater testing should be undertaken to allow the potential risks posed by elevated contaminants present in the groundwater to be assessed appropriately.

2.13.5.4 Assessment of Ground Gas Risk

Potential sources and pathways

The problems associated with ground gas generation and migration is varied. Methane is flammable in air at concentrations between 5% and 15% by volume, where as carbon dioxide is an asphxyiant when present in confined spaces at levels of 1.5% by volume and greater.

Any material having an organic or biodegradable content, e.g. pits backfilled with degradable materials or naturally organic rich deposits such as peat or silts, will have the potential to produce landfill gases including methane, carbon dioxide and hydrogen sulphide and for the depletion of oxygen, with associated hazards of explosion or asphyxiation.

Radon is also a potential source of gas which can be produced naturally through rock such as granite.

Potential receptors

The principal receptors from potential gas migration and accumulation are future users of the buildings, i.e. staff and visitors, as well as construction/maintenance workers, particularly in any isolated areas where there could be a potential for gas accumulation.

Gas monitoring data

Seven standpipes were monitored on four occasions over a three week period only. The ground gas monitoring was undertaken between 23rd October and 13th November 2015.

Atmospheric pressure was recorded between 993 and 1029mb, which included two rounds during periods of low or falling pressure (999mb and below). A summary of the gas results to date are presented in ***Table 14*** below.

Table 14: Assessment of Monitored gas results

BH	Atmos Press (mbars)	No. visits	Methane		Carbon Dioxide			Oxygen		Gas Flow (l/h)
			Range %v/v	No >1% v/v	Range %v/v	No exceed		Range %v/v	No below 18% v/v	
						1.5 % v/v	5% v/v			
BH1	995 - 1019	4	0.0	0	0.1 – 0.2	0	0	19.5 – 21.4	0	0.0 – 0.2
BH2	995 – 1019	4	0.0	0	0.1 – 1.7	1	0	12.3 – 17.5	4	0.1 – 0.2
BH4	995 – 1020	4	0.0	0	0.1 – 0.5	0	0	17.1 – 21.5	1	0.0 – 0.2
BH5	995 – 1020	4	0.0 – 0.3	0	0.1 – 0.3	0	0	18.7 – 21.7	0	0.1

BH	Atmos Press (mbars)	No. visits	Methane		Carbon Dioxide			Oxygen		Gas Flow (l/h)
			Range %v/v	No >1% v/v	Range %v/v	No exceed		Range %v/v	No below 18% v/v	
						1.5 % v/v	5% v/v			
BH6	995 – 1020	4	0.0 – 4.1	2	0.0 – 0.4	0	0	19.3 – 21.6	0	-0.1 – 0.1
BH7	995 – 1020	4	0.4 – 9.2	3	0.1 – 1.4	0	0	13.4 – 22.2	3	0.1 – 1.5
BH8	995 - 1020	4	0.0 – 0.2	0	0.2 – 0.4	0	0	19.2 – 21.3	0	0.1 – 0.2

The gas monitoring has recorded a maximum methane (CH4) concentration of 9.2% in BH7. It should be noted that the standpipe response zone was located within natural peat deposits within BH7 and this is the likely source of the elevated CH4. A concentration of 1.7% carbon dioxide (CO2) was recorded above the guideline value of 1.5% v/v within BH2. Depleted oxygen concentrations have been recorded on one or more occasions in three of the boreholes with depleted oxygen recorded on four occasions within BH2.

Flow rates have been monitored in all boreholes with a maximum flow rate of 1.5l/h recorded in BH7. Typically flow rates have been recorded between 0 – 0.2l/h.

BS:8485[22] and CIRIA C665[23] provide guidance on the assessment of gas risk by developing a characteristic gas situation through site characterisation. A method widely used by regulators and consultants to assess the risk posed by gases was developed by Wilson and Card (1999)[25] and is the basis for the gas assessment described in CIRIA guidance C665 – Assessing risks posed by hazardous ground gases to buildings and in BS8485 – Code of Practice for the characterisation and remediation from ground gas in affected developments.

Both gas concentrations and borehole flow rates measured in the field are used to calculate the limiting borehole gas volume flow, or Gas Screening Value (GSV) for gases presenting high levels. The GSV is equal to the maximum borehole flow rate (l/h) multiplied by the maximum gas concentrations (%v/v). The calculated GSV is then compared to the classification system described in C665 to determine the characteristic situation defining the general scope of gas protective measures required.

Methane was recorded at 9.2% within BH7 and the maximum carbon dioxide concentration recorded was 1.7%, and was recorded in borehole BH2. The maximum flow rate recorded was 1.5l/h in BH7. The calculated GSV for methane and carbon dioxide is presented below in ***Table 15*** below.

Table 15: Calculation of GSV

Gas	Max conc (%)	Gas Screening Value (GSV) l/hr
Methane	9.2	0.138
Carbon Dioxide	1.7	0.026

In accordance with CIRIA C665, the gas screening values place the site within Characteristic Situation 2.

A potential pollutant linkage exists between ground gas generating soils and future site users, if gas can flow or permeate through building envelopes and accumulate within enclosed spaces in the new development buildings. Gas monitoring undertaken at the site indicates that the gas regime at the site would be classified as CS2 "low hazard potential" for which some gas protection measures in new buildings would be required.

It is considered that with only three weeks of ground gas monitoring data that the number of monitoring visits performed and the length of monitoring period are both insufficient to fully understand the ground gas regime at the site. It is recommended that as part of additional investigations that further ground gas monitoring of existing standpipes and new standpipes is performed over a minimum 8 week period. Following this exercise the ground gas risk assessment should be revisited to determine fully ground gas risk to receptors and appropriate mitigation for the proposed development.

2.13.6 Waste

As part of the SLR investigation one Waste Acceptance Criteria (WAC) test was performed on a sample of "composite soils" from trial pits performed in the proposed EfW development site. It is not clear if the material tested was from the made ground or natural deposits (or both). The test performed indicated that the material would be below the criteria for acceptance at an inert waste landfill. It is not considered that a composite conforms with best practice in determining the classification of material for off-site disposal. It is recommended that as part of further investigations that samples of the made ground are sampled and tested to allow assessment and waste classification to be performed.

2.13.7 Summary of Geo-environmental Assessment

The geo-environmental assessment performed has identified that typically the levels of contamination within soil and groundwater are relatively low. However, the previous investigations performed are considered to be incomplete and further investigations are considered to be required to permit a full geo-environmental assessment of the site to be undertaken. Recommendations for further investigations include:

1. As no access was available within the existing DERL structures where there are known to be boiler rooms and other potentially contaminative land uses, further intrusive investigations should be performed in these localities.
2. Delineation investigation to understand the extent of asbestos contamination identified in TP3A.
3. Leachate testing of soil should be performed to understand if contaminants within the soils (metals and pH) are mobile and impacting on groundwater quality which could pose a potential risk to the Dighty Water.
4. Further groundwater sampling and testing from existing and new groundwater standpipes to permit full assessment of groundwater quality

beneath the site, tests to be performed at a laboratory that can meet SEPA EQS requirements.

5. Soil and pH testing of rock to permit concrete classification to be determined for piled foundations.
6. Additional ground gas monitoring of existing and new standpipes (6 rounds over a minimum 2 month period) to permit ground gas regime at the site to be fully understood and a full risk assessment to be undertaken.
7. Additional testing and assessment to confirm the waste classification of the made ground material.
8. Soil Resistivity testing of soils.
9. UKWIR testing to permit potable water pipe classification.

2.14 Conceptual Site Model

2.14.1 General

The following section sets out a conceptual site model (CSM) of the site, as recommended in current good practice guidelines and the Environmental Protection Act Part IIA. The model identifies potential sources of contamination, possible receptors and contaminants pathways. The purpose of this model is to identify all potential pollutant linkages considering both on and off site sources of contamination.

2.14.2 Legislation

Current UK Legislation on contaminated land is principally contained in Part IIA of the Environmental Act 1990, which is given effect through Section 57 of the Environment Act 1995. The Contaminated Land (Scotland) Regulations 2005 has since been introduced and provides an amendment of Part IIA of the Environmental Protection Act 1990 and the Contaminated Land (Scotland) Regulations 2000 (S.S.I. 2000/178) to take into account of the Environment and Water Services (Scotland) Act 2003 (asp.3).

The legislation introduces the concept of a 'suitable for use' approach to the re-use of contaminated land, requiring remedial action where unacceptable risks to health or the environment are identified, considering both the use of the land and its environmental setting, endorsing the principle of site specific risk assessment

The legislation provides a definition of 'contaminated land' as:

'any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) *significant harm* is being caused or there is a *significant possibility* of such harm being caused; or

(b) *significant pollution* of the water environment is being caused or there is a *significant possibility* of such pollution being caused'.

In order to prove that significant harm is being caused, a significant pollutant linkage must be established, using a source-pathway-receptor model. This model comprises three elements:

- Source – the key pollutant hazards associated with the site
- Receptor – the key targets at risk from the sources
- Pathway – the means by which the contaminant can cause harm to the receptor

If a significant pollutant linkage is to be established, all three elements must be present, with a contaminant capable of causing harm, a receptor sensitive to that contaminant and a pathway linking them.

The redevelopment of Brownfield land is principally controlled through the planning process and the Scottish Executive has issued the following guidance document:

- Planning Advice Note PAN 33 revised 2000: Development of Contaminated Land

This document provides advice on the development of contaminated land and in particular the implications of the contaminated land legislation on the planning process. The document endorses a "suitable for use" approach based on site specific risk assessment.

2.14.3 Potential Contamination Sources

2.14.3.1 Onsite

DERL site

The DERL site to the north of the proposed EfW site is an active recycling centre and active incinerator plant with a number of chimneys, storage tanks and cooling towers. The DERL site is host to an authorised integrated pollution prevention and control process and a Local Authority Pollution and Prevention and Control Process (incinerator) and is a registered waste transfer and disposal site and has authorisation for the transfer of Anatomical Parts/Animal Carcasses and Flesh/Civic Amenity Waste/Clinical Wastes/Commercial & Industrial Waste/Highly Infectious Wastes/Household Waste/Maximum Storage In Licence/Maximum Waste To C.A.Site/Maximum Waste To Transfer Station/Overall Maximum Waste Permitted By Licence Pharmaceutical Waste/Special Waste (As In Epa 1990:S62 Of 1996 Regs)/Substances In Control Of Radioactive Substances Act 1960. The site also has two operational waste treatment / disposal registrations associated with the storage of waste motor vehicles.

No investigations have been performed within the vicinity of the DERL structures at the site and therefore unknown contaminants may be present in this locality. The south-east of the DERL site is located on a former public refuse tip.

EfW site

In the past, the site has been used for the storage of scrap cars as part of an autobreakers. The desk study researches on the proposed EfW site with the exception of the presence of made ground on site which has been identified (SLR TP3A) to contain Asbestos Containing materials (ACM's).

Contaminants present within the made ground could (predominantly metals and hydrocarbons) be impacting on groundwater and potentially surface water quality.

Elevated ground gases have been identified in natural deposits (peat containing) in SLR BH6 and BH7 performed on the proposed EfW site.

2.14.3.2 Offsite

Off-site potential sources of contaminants are identified predominantly to the west (Baldovie Industrial Estate), south-east (Michelin tyre factory – known hydrocarbon contamination) and south (scrapyard) of the site. The scrapyard operations to the south of the site (66m) has an active waste treatment / disposal licence for the storage of waste motor vehicles.

Dundee & Ferry Skiphire have an operational waste treatment / disposal licence for Acid In Lead/Acid Batteries From Households; Commercial Waste; Household Waste; Inactive Waste; Industrial Waste; Maximum Waste Permitted By Licence; Waste Oil From Households.

2.14.4 Potential Receptors

The proposed development comprises the construction of a new Energy from Waste (EfW) plant. The potential receptors for this proposed end-use are as follows:

- Construction and maintenance workers;
- Site Users (Staff and Visitors)
- Adjacent Site Users (off site)
- Surface Water (via groundwater); and
- Structures and services.

2.14.5 Potential Pathways

The key pollutant linkages associated with the proposed development are shown in ***Table 16***:

Table 16: Potential Pollution Linkages

Sources	Pathways	Receptors
On-site ***DERL site*** DERL recycling and incinerator site (waste storage), tanks, chimneys, refuse tip, scrap vehicle storage on the site, made ground (various). Contaminants and leachates beneath DERL structures. ***EfW site*** Former use as a scrap yard car storage site. Made ground containing ACM's, metals and hydrocarbons potentially impacting groundwater quality and possible surface water quality. Ground gases in natural deposits (peat). **Off-Site** Surrounding land uses have included and include tanks, electricity sub-station, works, tyre factory (with known free phase hydrocarbon contamination), waste storage and transfer sites.	Inhalation of dust derived from contaminated soil Inhalation of vapours from contaminated soil or groundwater Ingestion of contaminated soil or dust Dermal absorption of contaminants in soil Ingress of soil gas into enclosed spaces	**Human Health** Construction workers Staff and Visitors Adjacent site users (off site) Maintenance workers
	Infiltration and percolation through contaminated soils Vertical leaching into aquifers Lateral migration onto on or off site sources	**Water Environment** Groundwater impacting on quality of Dighty Water
	Chemical attack when in direct contact with soils or groundwater	**Structures and Services** Buried concrete structures

2.14.6 Summary

From the desk study it is apparent that there are a number of uncertainties regarding potential contaminant pathways at the site. Further intrusive investigations are considered to be required to:

- Confirm the nature of the underlying soils and bedrock, in particular the geotechnical properties of the natural soils and rock;
- Determine the nature and extent of any contaminants in the soil and groundwater;
- Determine potential contamination pathways;
- Assess the risk associated with any contaminants present at the site.

A preliminary Conceptual Site Model (CSM) is presented in ***Figure 7***. This CSM will be revisited following the completion of additional ground investigations.

3 Development Considerations

3.1 General

Research carried out and described in this report has resulted in the identification of ground related issues that may form constraints for the proposed development. The constraints and initial recommendations for foundations are discussed below.

The current development plan involves the construction of a new Energy from Waste (EfW) plant and associated infrastructure within the Baldovie Industrial Estate (access road), to the south of the existing Dundee Energy Recycling Ltd. (DERL) plant. The development also includes MVV taking over the management of the existing DERL site activities.

3.2 Geotechnical

3.2.1 Anticipated Ground Conditions

Based on the review of the BGS geological maps and the findings in previous site investigations discussed in Sections 2.4, 2.5 and 2.12 of this report, it is expected that the following ground conditions will be encountered on the EfW site. A geological cross-section showing the anticipated ground conditions across the site is presented on ***Figure 6***.

3.2.1.1 Made Ground

Made ground is anticipated to be present from ground level over the area of the proposed EfW plant with a thickness between 2.10m (TP02, TP04 and BH06) and 3.20m (TP03A) being previously encountered on the site area.

Previous ground investigations indicate this material as construction demolition material, typically comprising sandstone and quartzite gravel with fragments of tarmacadam, concrete, brick and mortar. Occasional metal bars, yellow plastic tape and geomembrane have also been encountered. TP03A noted a "strong sulphurous odour" in the strata from 1.60mbgl and TP04 noted a "slight hydrocarbon odour" in the strata from 1.30mbgl to 2.10mbgl.

Typical descriptions of this strata from the 2015 Geotechnical Engineering Limited investigation include:

"*Black, dark brown and brown very sandy angular and subangular fine to coarse crystalline, brick, slate, concrete and sandstone GRAVEL with a high angular and subangular brick, slate and concrete sandstone content*." (TP02), and;

"*Black, dark brown and dark grey sandy angular to subrounded fine to coarse crystalline, brick, mortar, sandstone and rare quartz GRAVEL with a high angular and subangular brick cobble content*." (TP05).

All trial pits on the site described the presence of rare to frequent brown rootlets at depths ranging between 1.7mbgl (+26.90mOD) and 3.2mbgl (+25.25mOD), thus indicating original ground level.

SPT 'N' values for the made ground ranged between 6 and 41, indicating the high variability of the material.

3.2.1.2 Natural Superficial Deposits

- **Clay and Silt**

Underlying the made ground, there is anticipated to be a layer of clay of thickness 0.80m to 1.20m, before encountering granular material, and then a thicker layer of clay of thickness 5.55m (BH06) to 6.95m (BH7). These deposits were previously encountered up to a depth of nearly 16mbgl.

Typical descriptions of the clay and silt deposits are:

"*Very stiff fissured reddish brown very gravelly CLAY.*" (BH1), and;

"*Soft dark brown gravelly CLAY with rare pockets (up to 20mm) of organish brown sand.*" (BH7), and;

"*Firm fissured bluish grey locally mottled light grey SILT with a slight organic odour and rare black organic material*" (BH7).

The strength of the clay and silt is generally soft or firm. SPT 'N' values for clay range between 4 and 26, corresponding with undrained shear strengths between 20kPa and 130kPa. This would suggest strengths of very low to high as per BS5390:2015. However, as shown within the borehole logs, most of the clay appears to be soft to firm, with some layers at depth exhibiting stiff to very stiff strength.

- **Sand and Gravel**

It is anticipated that an upper and lower layer of sand and gravel are within the site area.

The upper layer was encountered at depths of 3.5mbgl (BH6) and 4.2mbgl (BH7), with thickness of 3.1m (BH6) and 4.8m (BH7). The lower layer was encountered at depths of 15.1mbgl (BH6) and approximately 16mbgl (BH7) and with a thickness of 8.6m in BH07. The thickness was not proved in BH06.

In both upper and lower layers, the relative density was described as loose to very dense, but generally described as medium dense. This is confirmed by the SPT'N' values which ranged between 6 and 41 (typically around 25) with some in the gravel deposits exceeding 50. This would correspond to loose to very dense, typically medium dense.

Typical descriptions of the sand and gravel deposits are:

"*Medium dense brown slightly gravelly clayey fine to coarse SAND with pockets of firm brown clay*" (BH6), and;

"*Medium dense dark greyish brown slightly clayey very sandy GRAVEL. Gravel is subangular and rounded fine to coarse sandstone and quartzite*" (BH7).

Given the description of the gravel shape as typically subrounded to rounded, this would suggest that the sand and gravel deposits are of glacial meltwater/alluvial origin. The presence of fibrous peat and organic material also confirms this hypothesis.

- **Peat**

Peat has previously been encountered in three exploratory holes, but of limited thickness. Borehole BH4 encountered "spongy dark brown fibrous PEAT" from a depth of 1.90m to 2.15mbgl. Within BH6 a "*dark brown clayey fibrous PEAT*" was recorded between 3.1 – 3.15mbgl with a "*brown fibrous PEAT"* recorded between 6.6 – 6.7mbgl. Description of the allucvial deposits within BH6 included references to "*peaty CLAY*" and "*peaty SAND*" with references to the presence of "*organic matter*" and "*decomposed roots*" at depths of 6.6m and 7.8mbgl respectively. Borehole BH7 encountered "*firm dark brown sandy fibrous PEAT*" from a depth of 3.85m to 4.20mbgl.

3.2.1.3 Bedrock

Bedrock is likely to be encountered at a depth of approximately 25mbgl on the EfW and will likely comprise of strong grey fine and medium grained sandstone.

The strength of the sandstone is likely to vary between very weak (BH1) to strong (BH2, BH5, BH7 and BH8). The joint orientation is expected to be predominantly random or sub-horizontal to 20°. Fractures are expected to be closely spaced, planar and smooth. They are likely to be locally in-filled with quartz or clay infill (2mm-4mm).

If mudstone is encountered it is expected to be weak, thinly laminated to very thinly bedded, with randomly oriented, closely spaced fractures, locally with a veneer of clay.

3.2.1.4 Groundwater

It is anticipated that groundwater will be encountered at a depth between 1.48m and 2.80m below existing ground level; corresponding to upper and lower levels of +26.44mOD and +25.88mOD, respectively. This is based on seepage observed within trial pits as part of the Geotechnical Engineering Limited 2015 ground investigation and groundwater monitoring results reported in the SLR Consulting factual report.

In light of the groundwater levels with respect to the proposed development, it may be necessary to employ an active dewatering system to temporarily lower the groundwater table for the construction of the bunkers. Ground investigation should confirm the permeability of the strata in the proposed area of excavation to advise the required temporary works design.

3.2.2 Foundation Options

At this stage of the design the structure, specific building loadings are not known. Although in light of the proposed development, it is anticipated that the foundation scheme will be required to support considerable loads. In addition, it is envisaged that areas of the building, such as the boiler and machine houses, will contain plant with low movement tolerances.

The made ground is not considered to be a suitable bearing horizon for foundations due to the potential for differential settlement of the strata under load. Also, given the composition of the made ground and the anticipated loading to be exerted by the proposed structure, it is unlikely that the allowable bearing capacity would be satisfied.

Shallow foundations, such as pads, strips and rafts, bearing onto the underlying natural superficial deposits will require significant excavation of the made ground. Off-site disposal of this material could result in significant costs; particularly if identified as contaminated waste and being sent to a non-hazardous landfill. Given the considerable loading, it is unlikely that such a foundation scheme will meet the serviceability requirements of the structure and/or plant.

Therefore, to satisfy the loading and differential settlement requirements, it is envisaged that a piled foundation scheme will be required. With two boreholes on the site showing a high degree of geological variance, specific details regarding the recommended pile type can be confirmed pending completion of the additional ground investigation.

3.3 Site Infrastructure

The proposed development is likely to utilise the existing road access from the Forties Road and extend through the layout of the site. Intrusive investigations will need to include CBR tests in order to assess the strength of the sub-grade material to allow any future make-up to be designed.

3.4 Drainage

In accordance with current best practice and in compliance with Sewers for Scotland 3rd Edition[27], the development will require to be served by separate foul and surface water drainage systems. To comply with The Water Environment (Controlled Activities) (Scotland) Regulations[28], surface water from the development must be treated by a Sustainable Drainage System (SuDs) before being discharged into the water environment.

In some situations, it may be possible to connect into an existing drainage system. Whether this is possible or not will depend on available capacity, which is generally established through the Pre-Development Enquiry (PDE) process with Scottish Water.

3.5 Flood Risk

The Interactive Flood Map provided by SEPA has indicated that there is a moderate to high risk of river flooding. It is understood that the risks associated with flooding are being considered under a separate Arup report.

3.6 Contamination

The desk study researches and assessment of existing geochemical data which has been performed in line with current best practice has identified the presence of a contaminants at the site which poses a risk to human health and potentially the water environment. Additional investigations are recommended to permit a full geo-environmental assessment to be performed.

4 Proposed Ground Investigations

4.1 Proposed Ground Investigations

The proposed development comprises the construction of a new Energy from Waste (EfW) Centre on the site to the south of the existing DERL recycling centre at Baldovie Industrial Estate. In addition to the new structure MVV Environmental Services are keen to understand any potential contamination liabilities that could be associated with the adjacent DERL site for which they will also take over the management responsibility.

The review of existing ground investigation information and contamination test data has identified the need for further investigations to permit geotechnical design and to allow a thorough geo-environmental assessment of the whole site to be performed. The recommended scope of investigations to be performed is presented below:

- 5 no. cable percussive boreholes to rockhead (approx. 24mbgl) with a further 15m of follow-on rotary coring into bedrock on the proposed EfW site. All boring, drilling and sampling of the superficial deposits and rock must be performed in accordance with Eurocode 7 in order to obtain Category A and Category A1 samples for laboratory testing.
- 13 no. cable percussive boreholes to 15mbgl or rockhead (whichever is encountered first). All boring, drilling and sampling of the superficial deposits and rock must be performed in accordance with EC7 in order to obtain Category A and Category A1 samples for laboratory testing. (Includes allowance for three boreholes within the existing DERL structure to investigate internal contamination below the buildings.
- 8 no. machine excavated trial pits excavated to a depth of 4.5mbgl.
- 4 no. delineation trial pits to determine extent of asbestos contamination identified in previous investigation (TP3A) to 4.5mbgl. Additional delineation trial pits may be required should further asbestos contamination of soils be encountered in these investigations.
- In-situ CBR and soakaway infiltration testing (undertaken in accordance with BRE365) to be performed at 3 no. trial pit locations.
- Soil resistivity testing of the soil to be performed at each exploratory location.
- Geotechnical and geo-environmental sampling and testing of the soil and groundwater. Including testing to UKWIR Potable Water Pipe test standards for pipe material selection.
- Further sampling and analysis to be undertaken to allow waste classification exercise to be undertaken.
- Geotechnical testing of the rock cores (including measuring the pH and sulphate of selected rock cores).

- 6 rounds of groundwater and ground gas monitoring visits over a 2 month period (**Note: All standpipes to be monitored - including monitoring of previously installed standpipes**).

* It should be noted that asbestos has been previously identified at the site in the made ground, therefore the GI contractor performing the investigations should ensure that appropriate method statements, risk assessments and subsequent PPE are appropriate for the site.*

The proposed exploratory hole location plan is shown in ***Figure 8***.

5 Conclusions

A new Energy from Waste (EfW) plant has been proposed in Baldovie, Dundee. The new development is part of the existing Baldovie Industrial Estate and is situated south of the existing Dundee Energy Recycling Ltd (DERL) site.

The historical maps indicate that the DERL site was occupied by a nursery in 1865, the date of the earliest historical map of the site. The nursery was no longer existing between 1903 and 1975, and the site was open ground. Between 1975 and 1982 an incinerator was constructed at the site, to the north of the proposed development. Between 1994 and 1995, the section between the incinerator and the proposed EfW plant location was occupied by a public refuse tip. The site is at its current layout and use since 2006.

The historical maps show that the area surrounding the site has been previously used for agricultural purposes. Currently, there is a tyre factory to the south-east of the site and a number of industrial sites to the north-west.

Previous site investigations undertaken on and in the vicinity of the site indicate that the ground conditions at the location of the proposed EfW plant comprise made ground of up to 3m and deep alluvial deposits overlying sandstone and mudstone bedrock. Superficial deposits have been encountered up to 25m depth below existing ground level. Groundwater is anticipated at depths between 1.48m and 2.80m below existing ground level.

The previous ground investigation has identified sulphurous and hydrocarbon contamination within the made ground. At the northern part of the site, north of the proposed EfW, made ground reaches a depth of up to 3.2 m. Glacial deposits up to a depth of 12.6m are found below the made ground, overlying sandstone and siltstone bedrock.

Given the anticipated loading associated with the development and the tolerance for differential movement, it is envisaged that a piled foundation scheme will be required. Specific details regarding the recommended pile type are to be confirmed on completion of the additional ground investigation. It may be necessary to adopt an active dewatering system to temporarily lower the groundwater table for the construction of the bunkers. Further ground investigation can provide information to advise the required temporary works design.

The previous geo-environmental investigation performed on the site has identified the presence of potential source – pathway – receptor linkages that require further investigation to permit a full assessment of the risks to human health, the water environment, buried structures and services to be performed.

It is recommended that prior to the site development, additional ground investigation is carried out to confirm the ground conditions below the site area, to

provide additional information on the rockhead profile and rock strength and to confirm the extent and nature of any contamination. Proposals for this investigation, including the anticipated scope of work, are given in Section 4 of this report.

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Figures

Figures

A4

ARUP

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www.arup.com

Job Title
Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Site Location Plan

Scale at A4 1:100,000

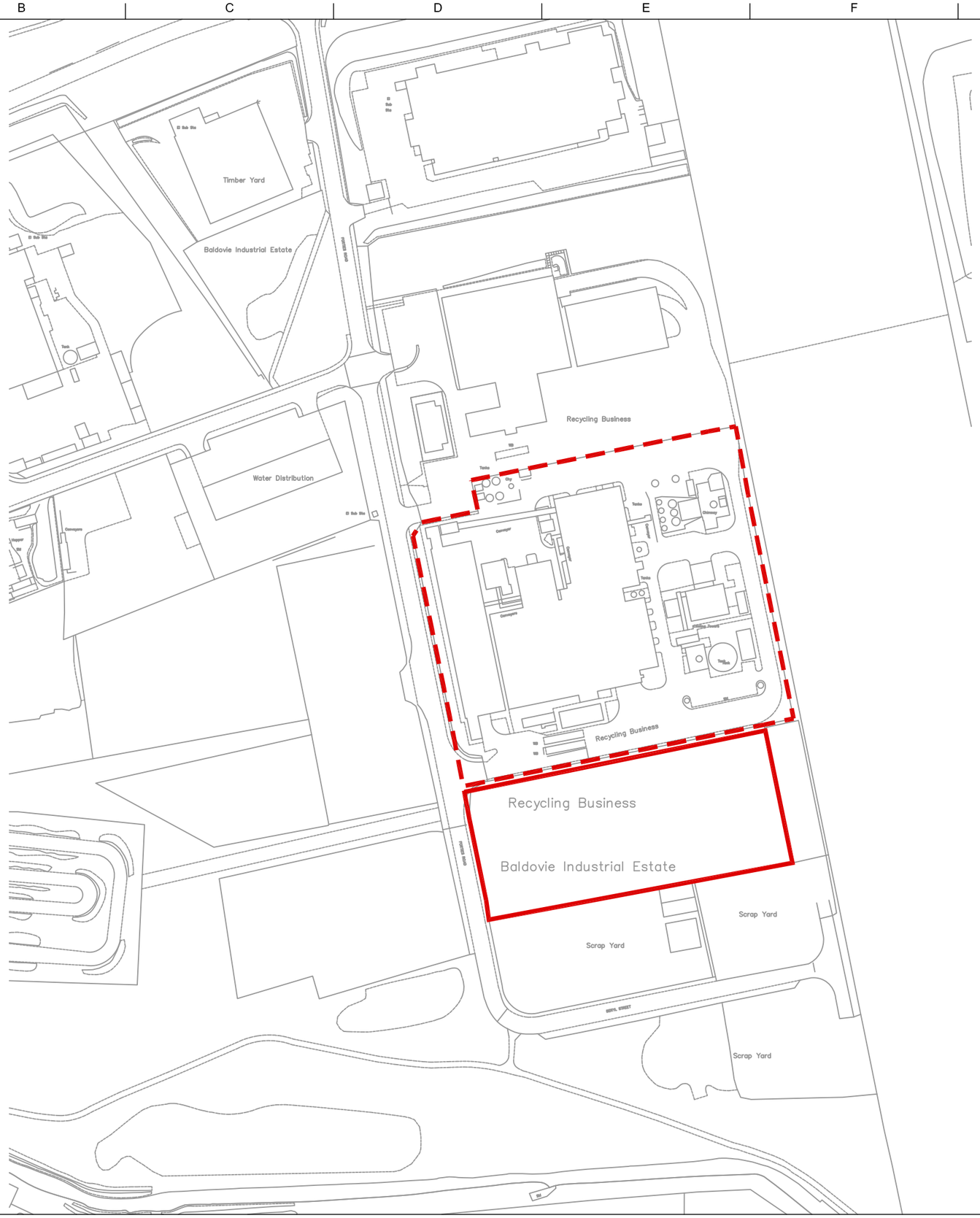
Discipline Geotechnical

Drawing Status
Report

Job No	Drawing No	Issue
245510-06	**Figure 1**	**I1**

Do not scale

A3



Legend

- Proposed Development Area
- Existing DERL Site

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
Issue Report				

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Project Title
Proposed Energy from Waste Plant, Dundee
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Drawing Title
Site Layout Plan

Scale at A3 1:2000

Role Geotechnical

Suitability **Issue Report**

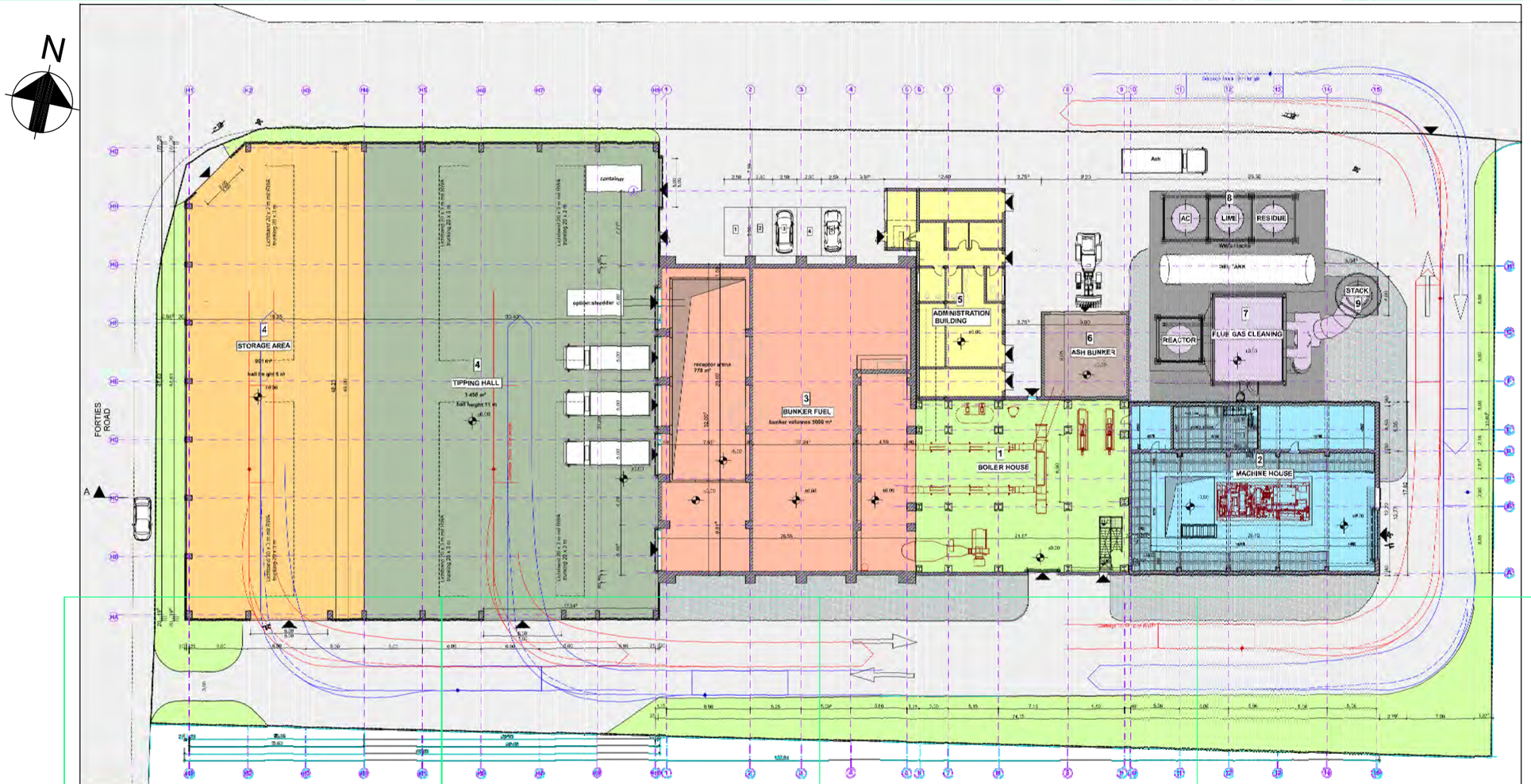
Arup Job No **245510-06**

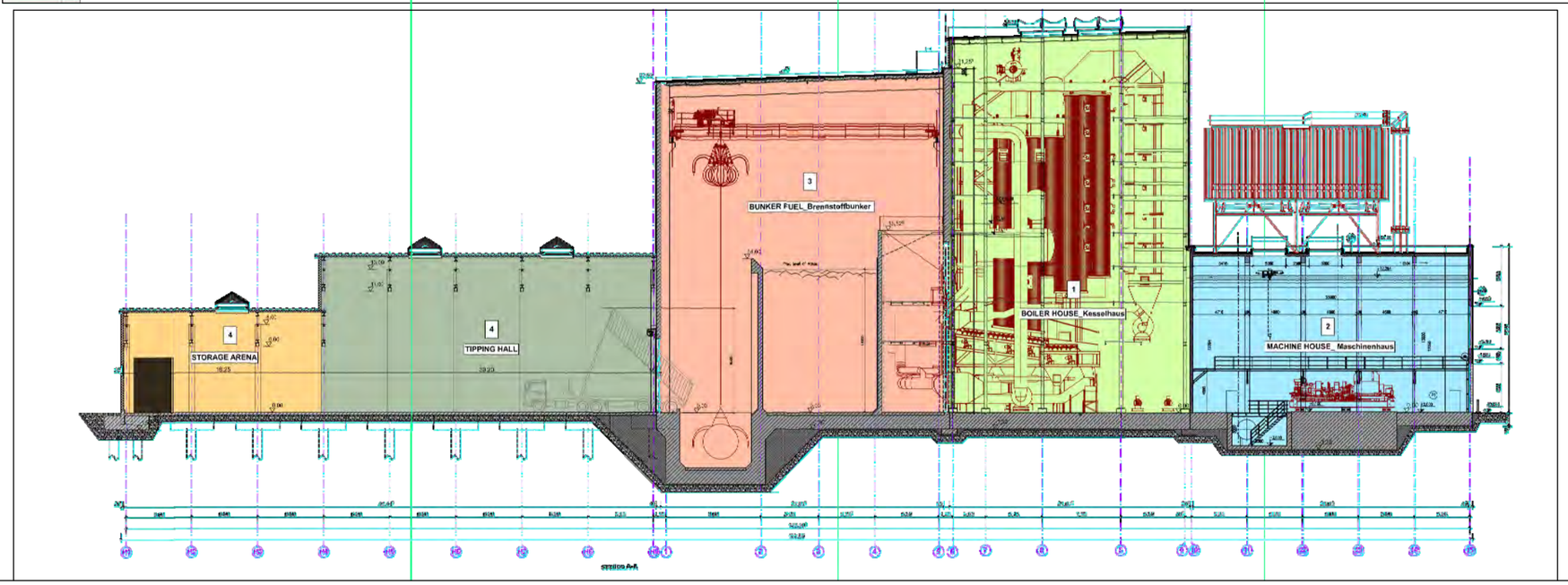
Rev **I1**

Name
Figure 2

Do not scale

A3





Note

1. Figure extracted from drawings "300-00-100 Axis Plan" &"300-00-120 Section A-A". Received from Ingenieurburo Neubau / sanierung Schneider. Dated: 09.02.2016.

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
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Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Proposed Site Layout Plan

Scale at A3 1:500

Role Geotechnical

Suitability **Issue Report**

Arup Job No **245510-06**

Rev **I1**

Name
Figure 3

Do not scale

Do not scale

Note

1. C08/007-CLSCSL British Geological Survey ©NERC. All rights reserved.

2. Mapping Sheet - NO 43 SW.

Legend

Proposed Development Area

Existing DERL Site

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
	Issue Report			

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Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Geological Map Extracts

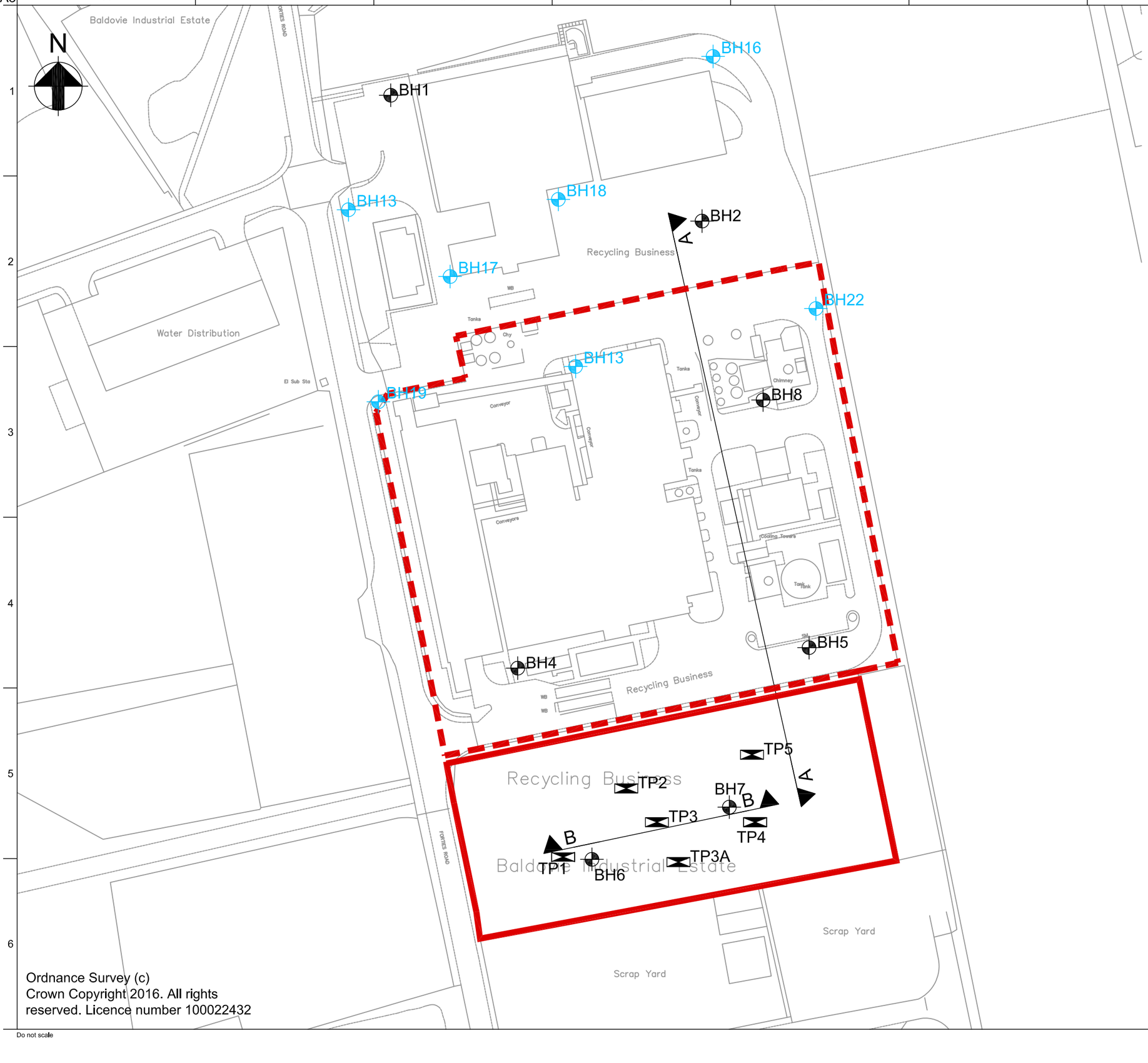
Scale at A3: 1:10,000

Role: Geotechnical

Suitability: **Issue Report**

Arup Job No: **245510-06** | Rev: **I1**

Name
Figure 4



Note

1. This figure has been based upon the existing ground investigation drawing undertaken by Geotechnical Engineering Limited dated 25 September 2015.
2. Refer to Figure 6 for cross section details.

Legend

Proposed Development Area

Existing DERL Site

GI information provided by the client

BHXX Borehole location

TPXX Trial Pit location

Borehole information obtained from the BGS

BHXX Dundee Incinerator Plant (1972)

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
Issue Report				

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Project Title
Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Previous Site Investigation

Scale at A3 1:1250

Role Geotechnical

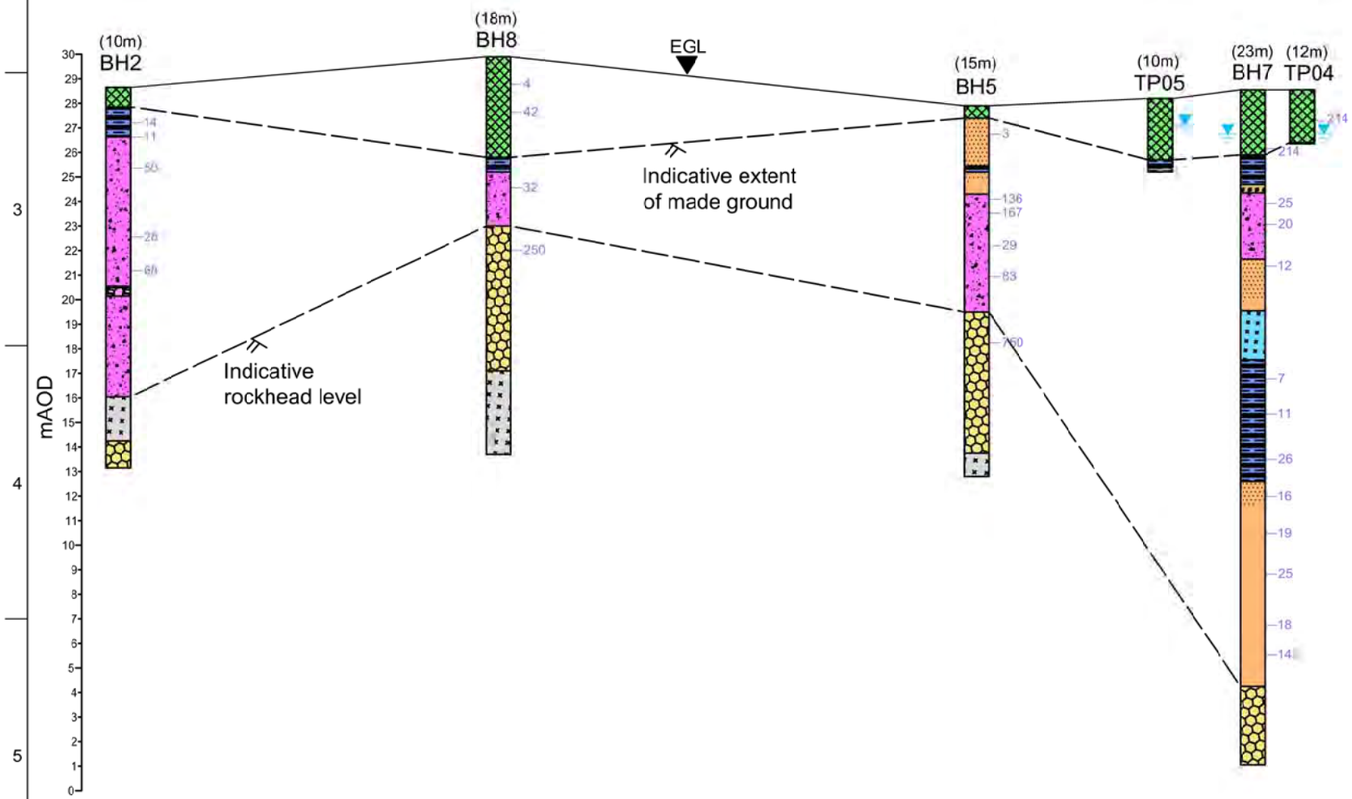
Suitability **Issue Report**

Arup Job No **245510-06** | Rev **I1**

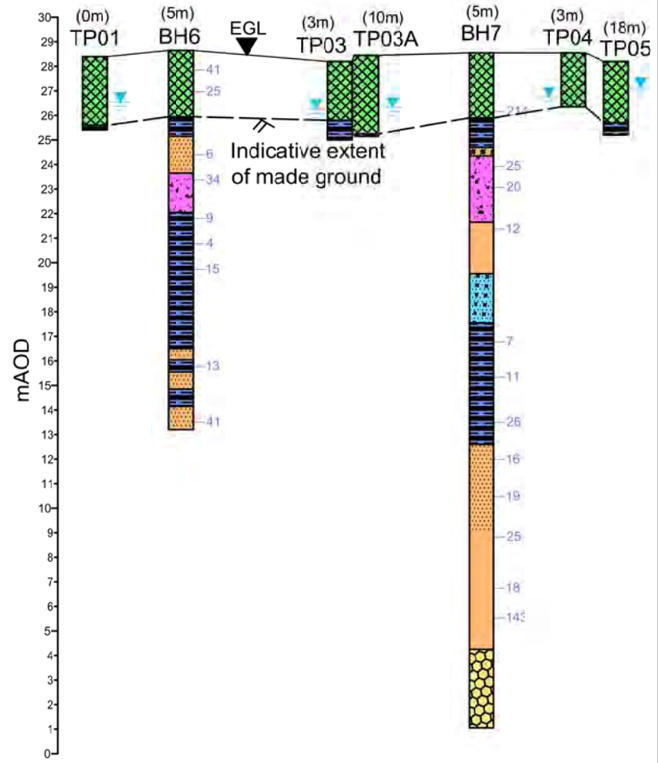
Name
Figure 5

Do not scale

Cross Section A-A



Cross Section B-B



Note

1. Refer to Figure 5 for cross section locations.

Legend

- Made Ground
- Clay
- Sand
- Gravel
- Silt
- Boulders
- Peat
- Siltstone
- Sandstone
- EGL — Existing ground level
- Ground water level
- XX — SPT N Results
- (XX) — Offset from cross section line

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
Issue Report				

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Client
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Project Title
Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Indicative Geological Cross Sections A-A & B-B

Scale at A3: Horizontal 1:1000, Vertical 1:250

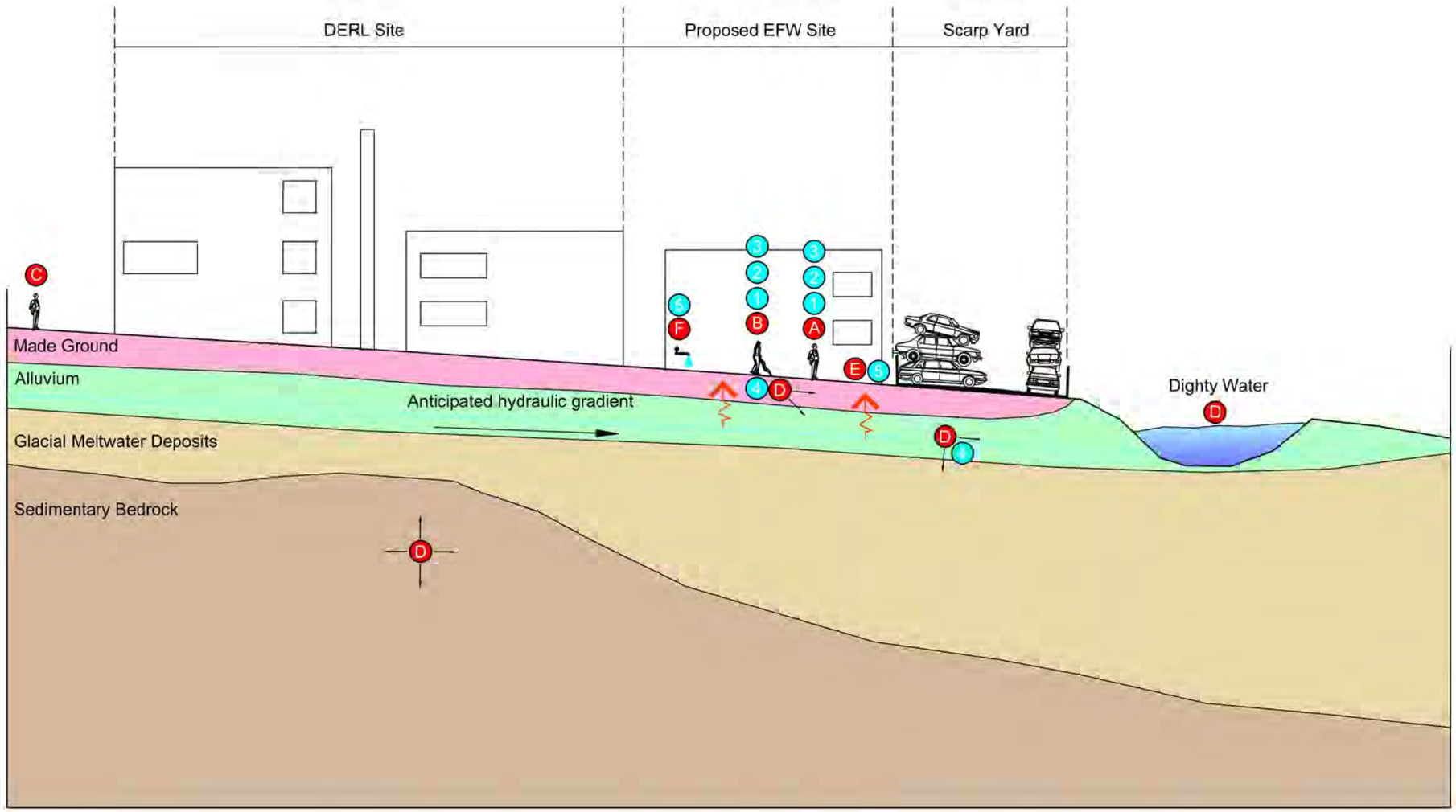
Role: Geotechnical

Suitability: **Issue Report**

Arup Job No: **245510-06**

Rev: **I1**

Name
Figure 6



Sources of Contamination

- Potential for made ground at site to contain asbestos.
- Potential for contaminants in the underlying soils and groundwater within the vicinity of EFW site.
- Potential for contaminants to be present beneath exiting DERL site.
- Elevated ground gases in peat beneath site.

Receptors

A Humans on-site (staff / visitors).
B Humans on-site (construction / maintenance workers).
C Humans off-site.
D Surface water (Dighty water) via groundwater
E Building materials
F Potable water pipes

Pollutant - Linkages

1 Dermal contact
2 Inhalation
3 Ingestion
4 Leaching/migration
5 Chemical attack

Mitigation Measures

- To be finalised following completion of additional investigation.

Legend

Made Ground
Alluvium
Glacial Meltwater Deposits
Sedimentary Bedrock
Ground Gas
Groundwater

Rev	Date	By	Chkd	Appd
I1	21/03/16	DM	MC	JG
Issue Report				

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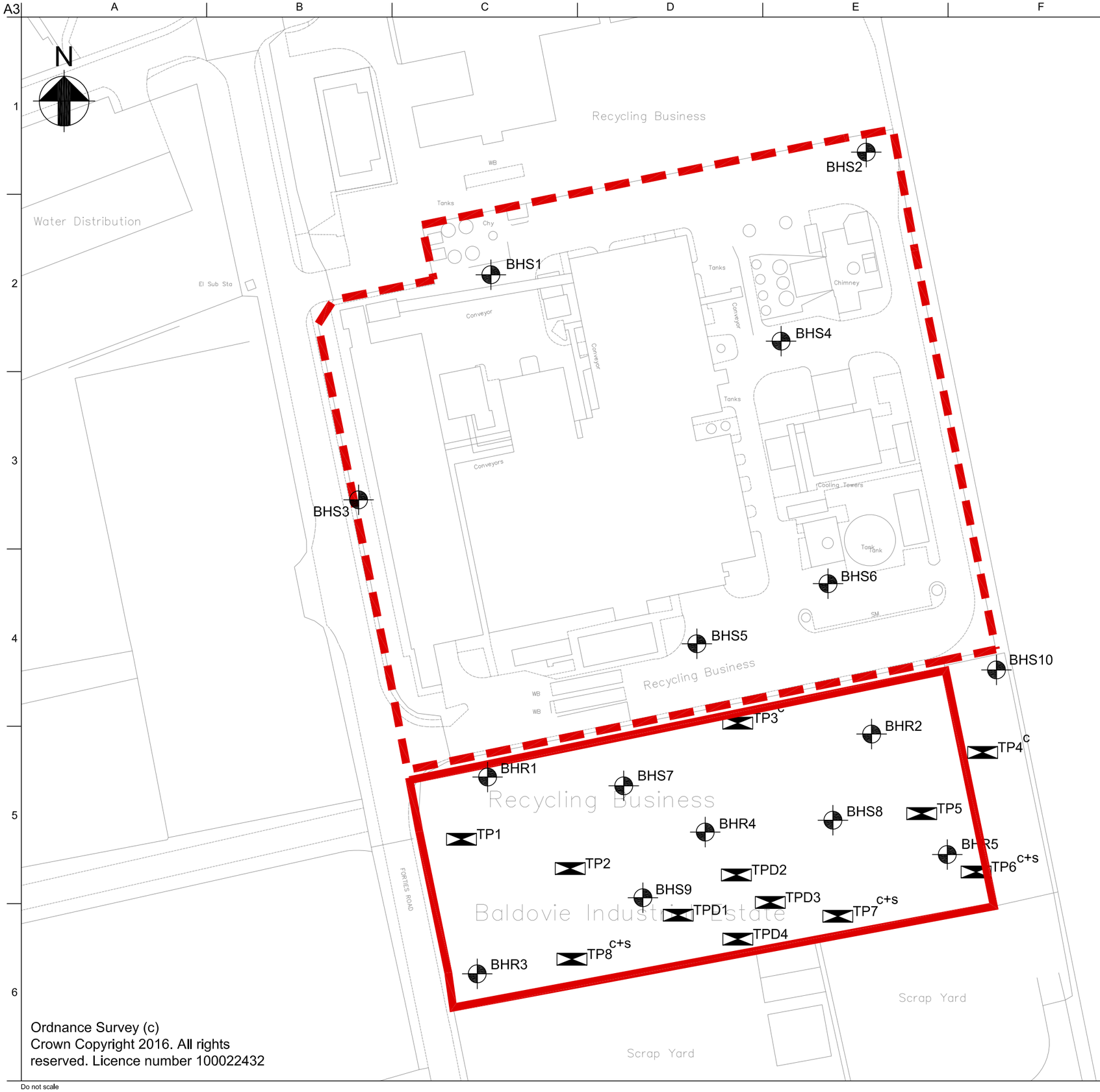
Project Title
Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report
Client
MVV Environmental Services Ltd

Drawing Title
Preliminary Conceptual Site Model

Scale at A3 N.T.S
Role Geotechnical
Suitability **Issue Report**
Arup Job No **245510-06**
Rev **I1**
Name **Figure 7**

Do not scale



Legend

- Proposed Development Area
- Existing DERL Site
- BHR — Cable Percussive Borehole with Rotary Cored Continuation
- BHS — Cable Percussive Borehole Only
- TP — Trial Pit
- TPD — Trial Pit - Delineation (Asbestos)
- C — CBR Test
- S — Soakaway Test

Rev	Date	By	Chkd	Appd
I1	22/03/16	DM	DJ	JG
Issue Report				

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Client
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Project Title
Proposed Energy from Waste Plant, Dundee
Geotechnical and Geo-environmental Desk Study Report

Drawing Title
Proposed Exploratory Hole Plan

Scale at A3 1:1000

Role Geotechnical

Suitability **Issue Report**

Arup Job No **245510-06** | Rev **I1**

Name
Figure 8

Appendix A

Historical Maps

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Electricity Transmission Line
Pole
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

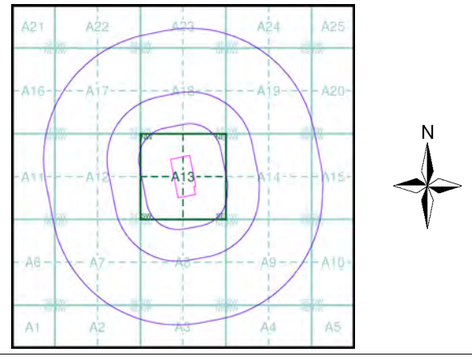
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

Envirocheck®

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:10,560	1865	3
Forfarshire	1:10,560	1903	4
Forfarshire	1:10,560	1923	5
Forfarshire	1:10,560	1923	6
Forfarshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1948	8
Ordnance Survey Plan	1:10,000	1960	9
Ordnance Survey Plan	1:10,000	1960 - 1969	10
Ordnance Survey Plan	1:10,000	1968	11
Ordnance Survey Plan	1:10,000	1974 - 1975	12
Ordnance Survey Plan	1:10,000	1984	13
Dundee	1:10,000	1992	14
Ordnance Survey Plan	1:10,000	1994 - 1995	15
10K Raster Mapping	1:10,000	2006	16
VectorMap Local	1:10,000	2015	17

Historical Map - Slice A



Order Details

Order Number: 78681553_1_1
Customer Ref: Baldovie Industrial Estate
National Grid Reference: 344570, 732980
Slice: A
Site Area (Ha): 4.7
Search Buffer (m): 1000

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Fireproof Building
- Prominent Fireproof Building
- Non-fireproof Building
- Non-fireproof Building (non-dwelling)
- Factory, mill, and flour mill, with chimneys
- Factory, mill, and flour mill, without chimneys
- Power Station, drawn to scale
- Hydroelectric Power Station
- Radio Station, drawn to scale
- Telephone Station, drawn to scale
- Abandoned Open-pit Mine or Quarry
- Open-pit Salt Mine
- Pit
- Oil Deposit or Well
- Oil Seepage
- Tailings Pile
- Fuel Storage Tanks
- Natural Gas Tank
- Bench Mark
- Drill Hole
- Burial Mound
- Triangulation Point on Burial Mound
- Single-track Railroad
- Double-track Railroad and Station Building
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Lawns
- Citrus Orchard
- Wet Ground
- Scattered Vegetation

243,8 — Values for prominent elevations

186.0 — Numbers for spot elevations, depth soundings, contour lines, etc.

0,2 — Velocity of the current, width of river bed, depth of river

Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	ъ (–)
Д д (D)	Л л (L)	У у (U)	ы (Y)
Е е (E)	М м (M)	Ф ф (F)	ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Partly Demolished Buildings
- Demolished Buildings
- Built-Up Area with Fireproof Buildings Predominant
- Built-Up Area with Non-Fireproof Buildings Predominant
- Individual Fireproof Building
- Prominent Industrial Building
- Individual Dwelling, Fireproof
- Ruins of an Individual Dwelling
- Factory or Mill Chimney
- Factory or Mill with Chimney
- Factory or Mill without Chimney
- Mine or Open Pit Mine
- Operating Shaft or Mine
- Non-Operating Shaft or Mine
- Salt Mine
- Tailings Pile
- Pit
- Stone Quarry
- Gas Pump or Service Station
- Fuel Storage or Natural Gas Tank
- Oil or Natural Gas Derrick
- Small Hydroelectric Power Station
- Power Station
- Transformer Station
- Cemetery
- Burial Mound (height in metres)
- Triangulation Point on Burial Mound
- Triangulation Point
- Bench Mark
- Bench Mark (monumented)
- Telegraph Office
- Telephone Station
- Radio Station
- Radio Tower
- Airfield or Seaplane Base
- Landing Strip
- Main Highway
- Highway under Construction
- Improved Dirt Road (former truck road)
- Double-track Railroad with First Class Station
- Dismantled Railroad
- Railroad Under Construction
- Shore Embankment
- River or Ditch with Embankment
- Well
- Water Reservoir or Rain Water Pit
- Spring
- Isobath with value
- Heavy (Index) Contour Line
- Contour Line and Value
- Half Contour Line
- Spot Elevation Value
- Coniferous
- Deciduous
- Mixed
- Scrub

Key to Numbers on Mapping

NO43SW_Dundee

No.	Description
29	Factory (Tyres)

Envirocheck®

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:10,560	1865	3
Forfarshire	1:10,560	1903	4
Forfarshire	1:10,560	1923	5
Forfarshire	1:10,560	1923	6
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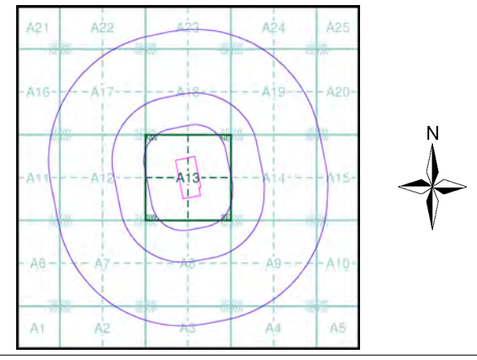
10K Raster Mapping	1:10,000	2006	16
VectorMap Local	1:10,000	2015	17

Russian Map - Slice A



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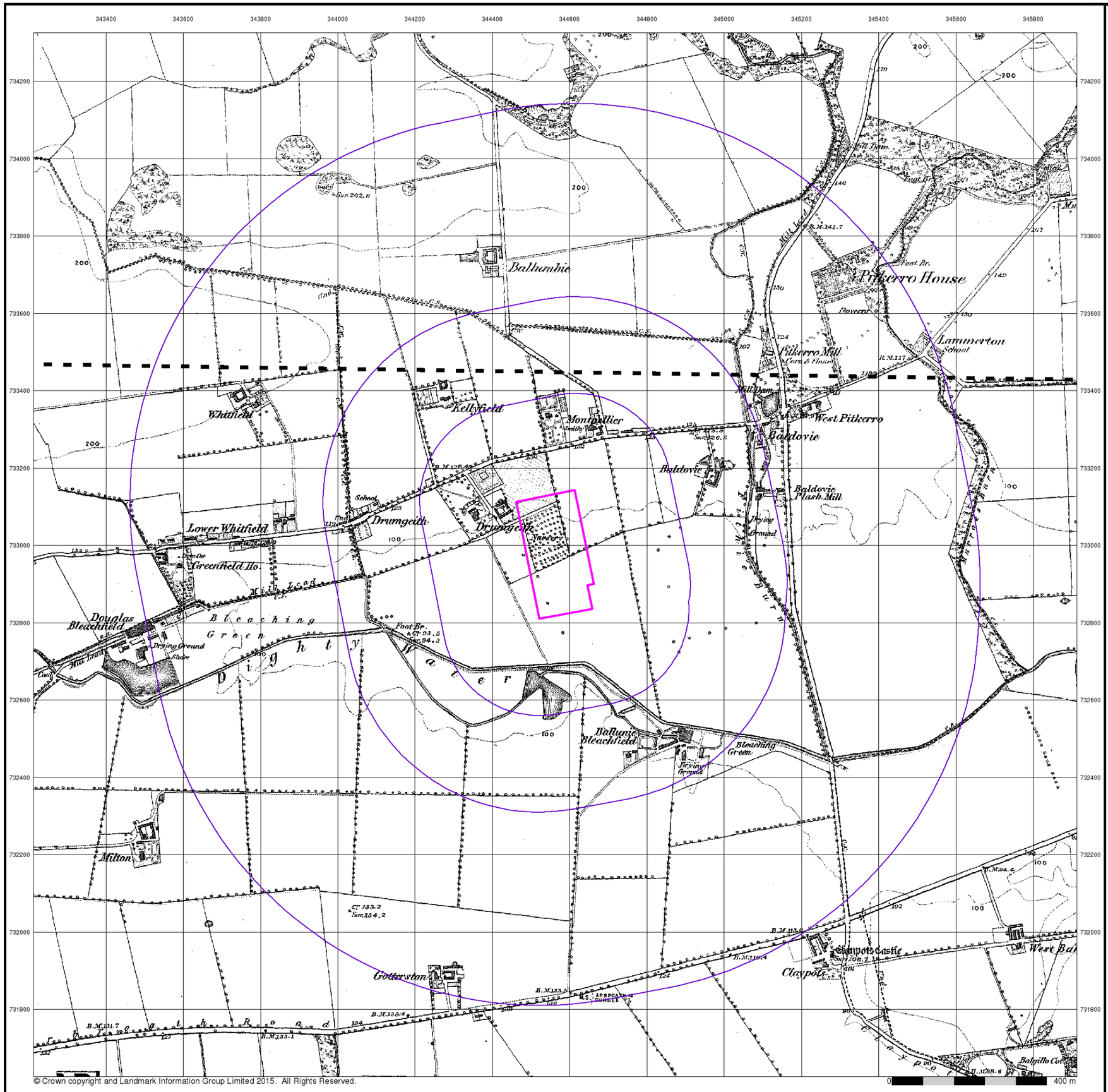

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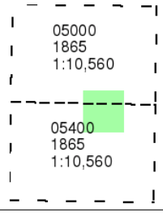
Forfarshire

Published 1865

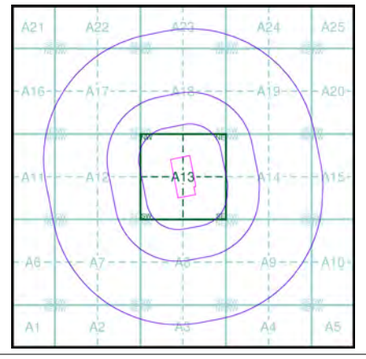
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

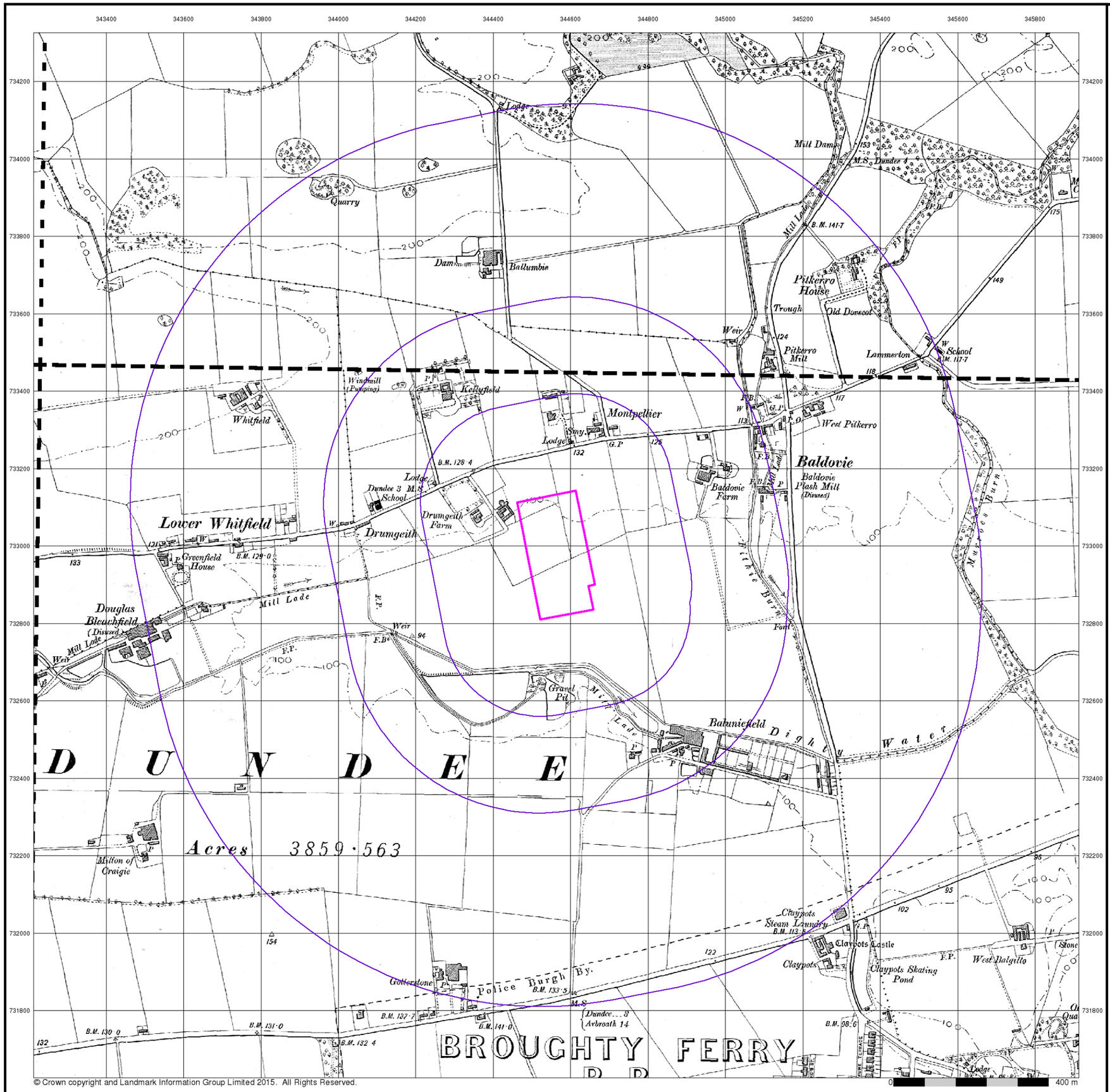
Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Forfarshire

Published 1903

Source map scale - 1:10,560

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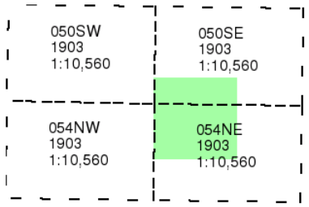
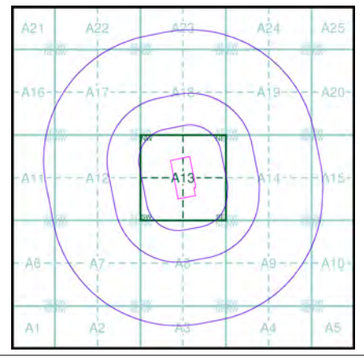


Historical Map - Slice A



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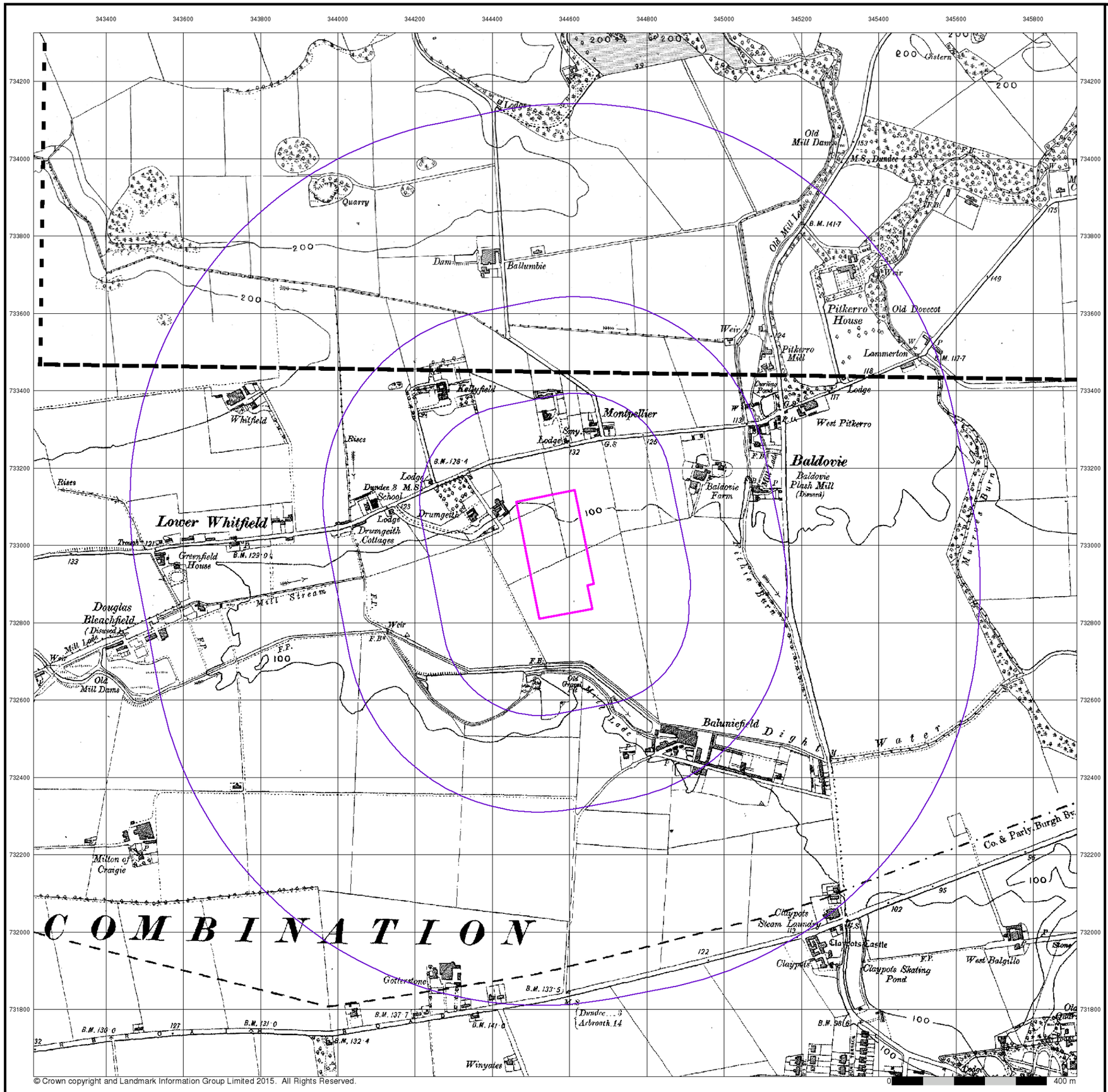

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Forfarshire

Published 1923

Source map scale - 1:10,560

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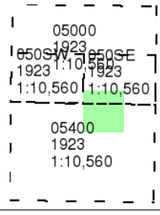
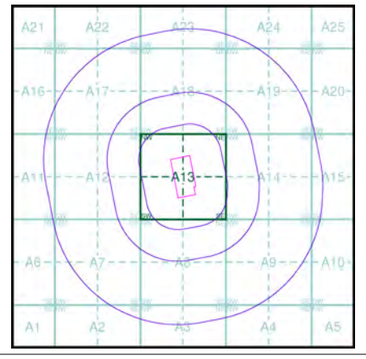


Historical Map - Slice A



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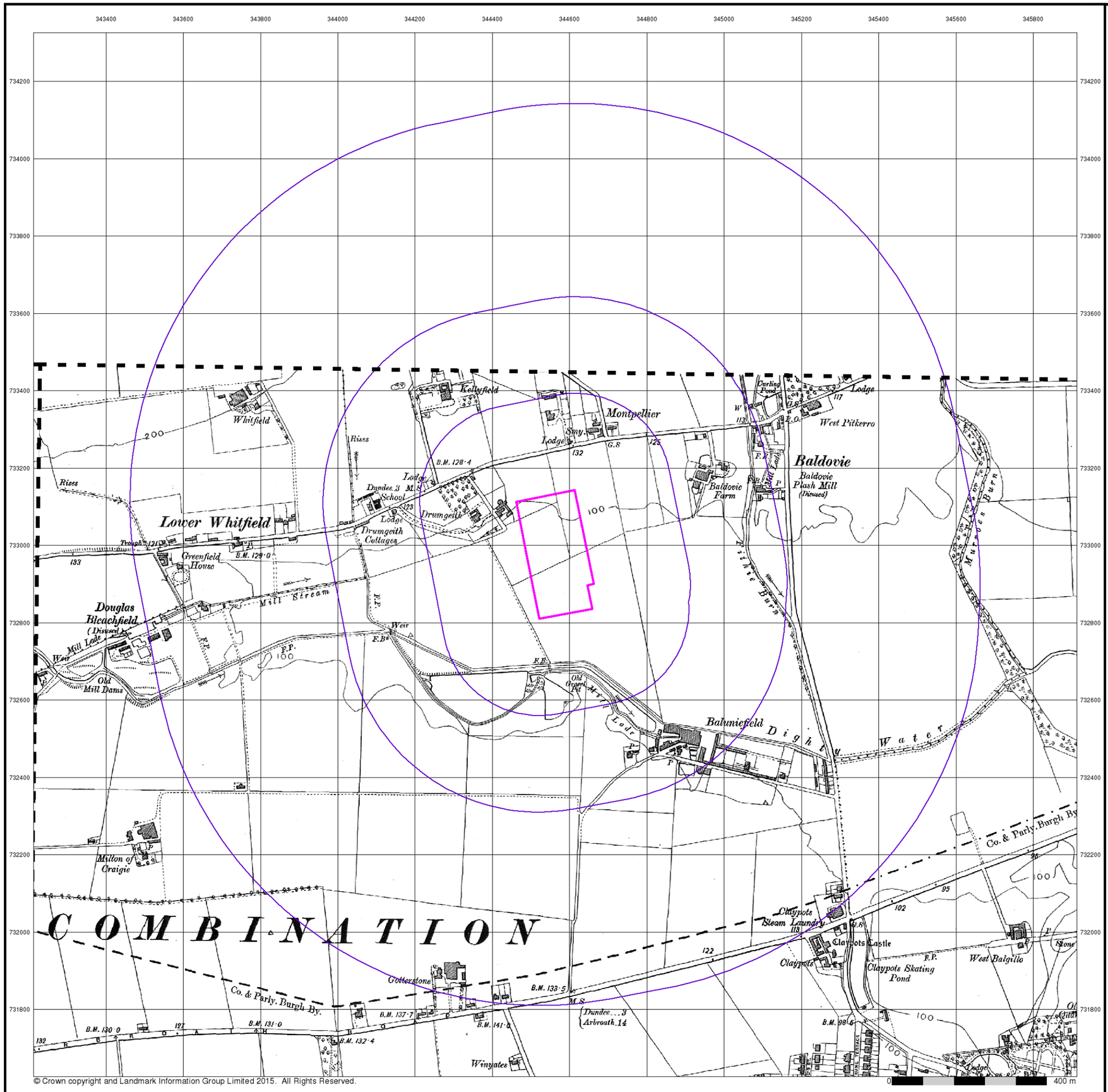

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Forfarshire

Published 1923

Source map scale - 1:10,560

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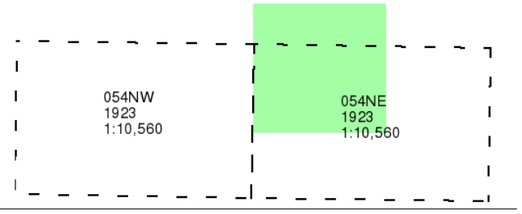
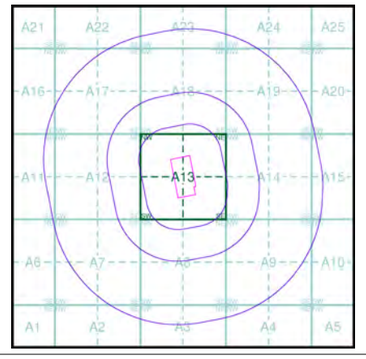


Historical Map - Slice A



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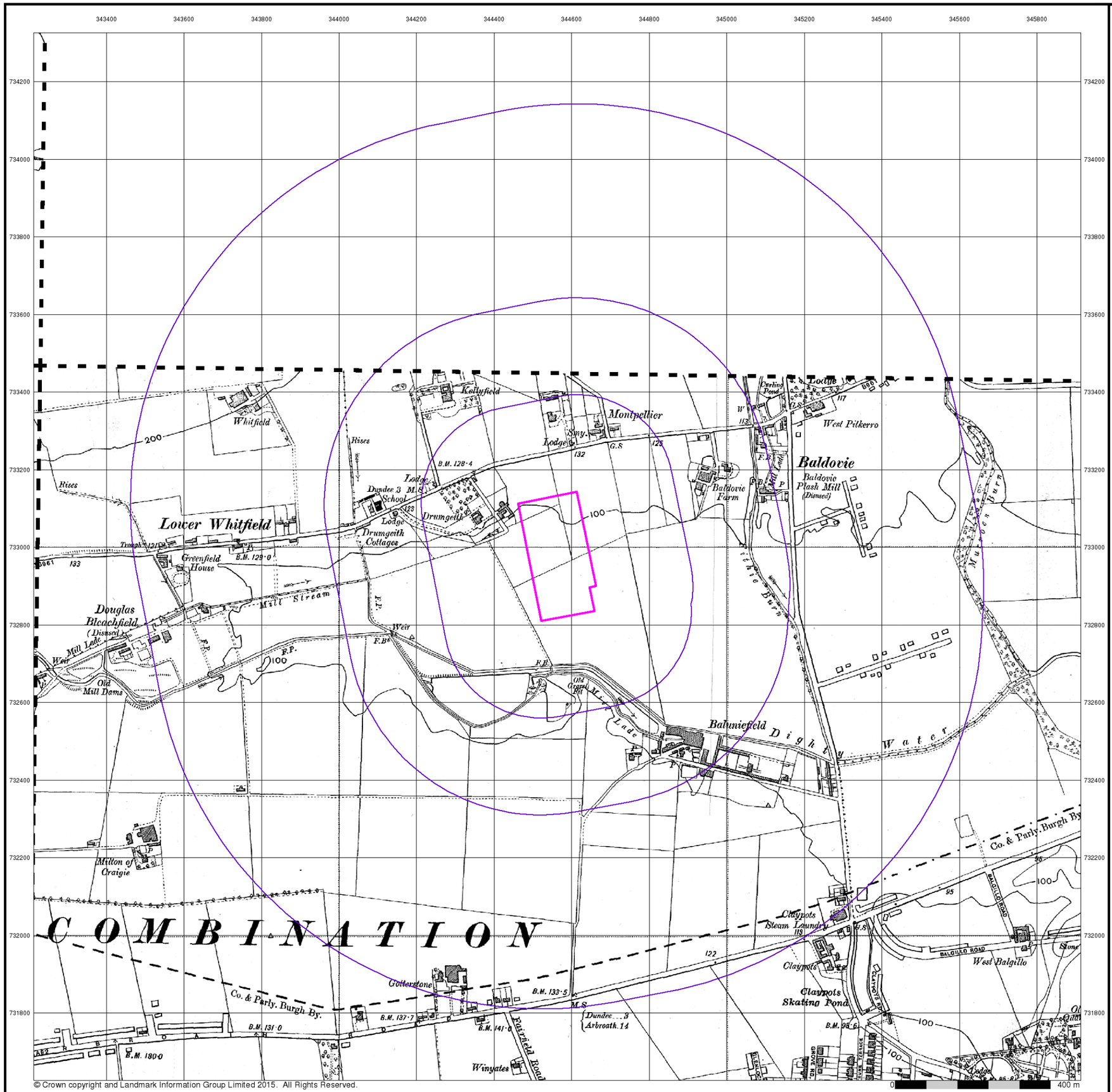

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Forfarshire

Published 1938

Source map scale - 1:10,560

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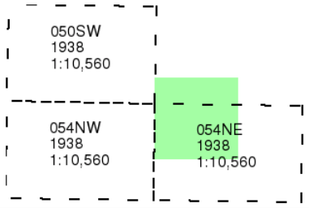
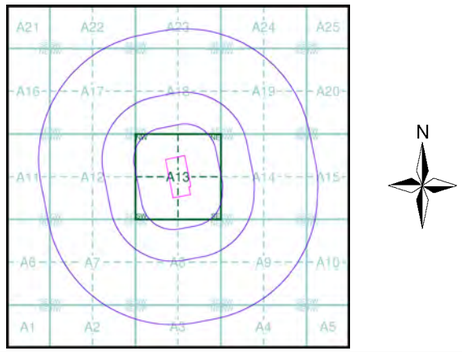


Historical Map - Slice A



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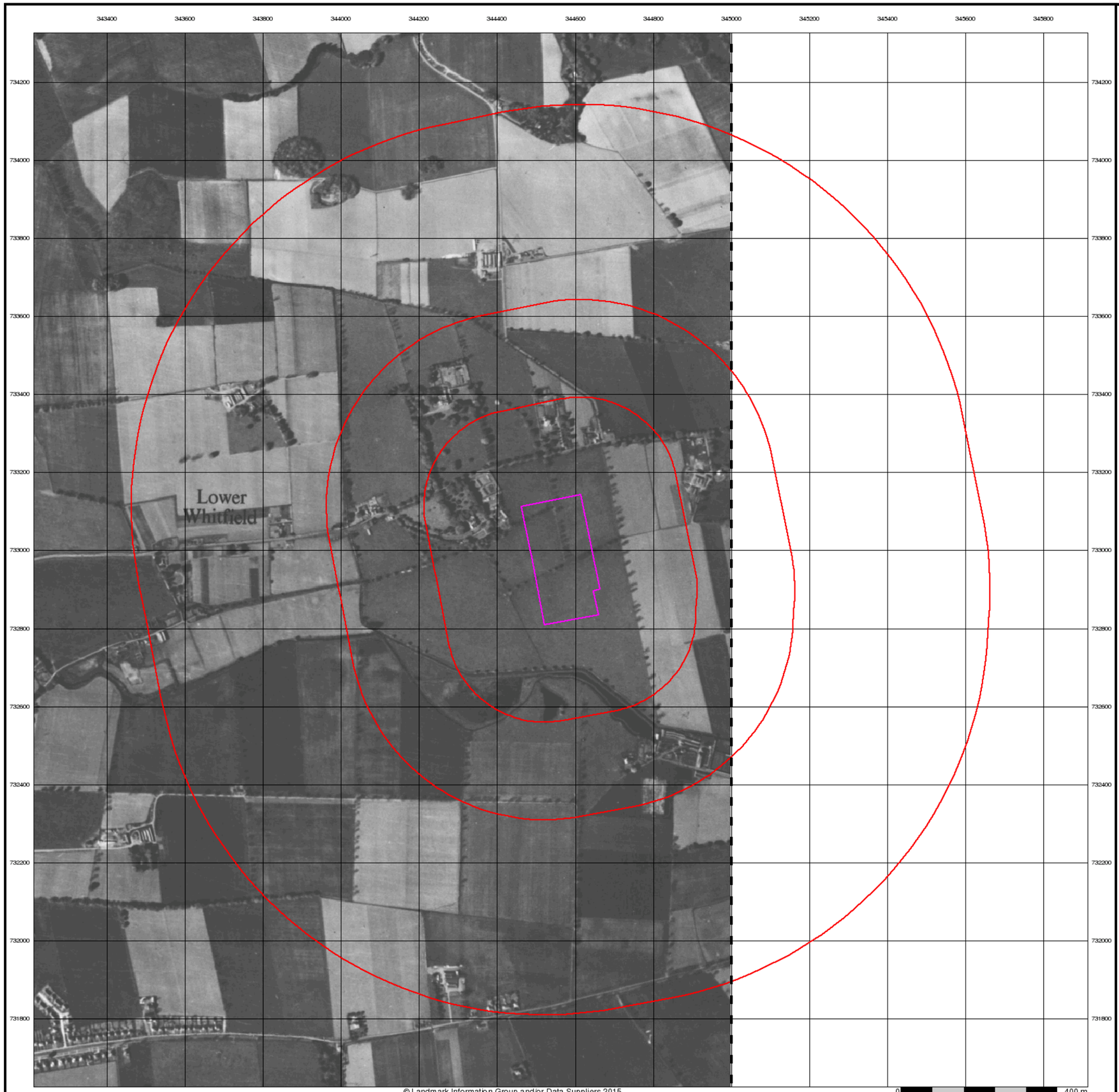


Envirocheck®

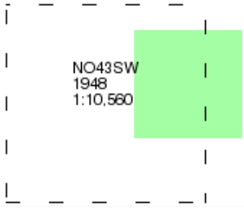
Historical Aerial Photography

Published 1948

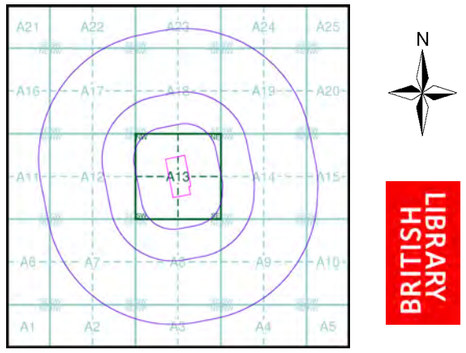
Source map scale - 1:10,560

The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



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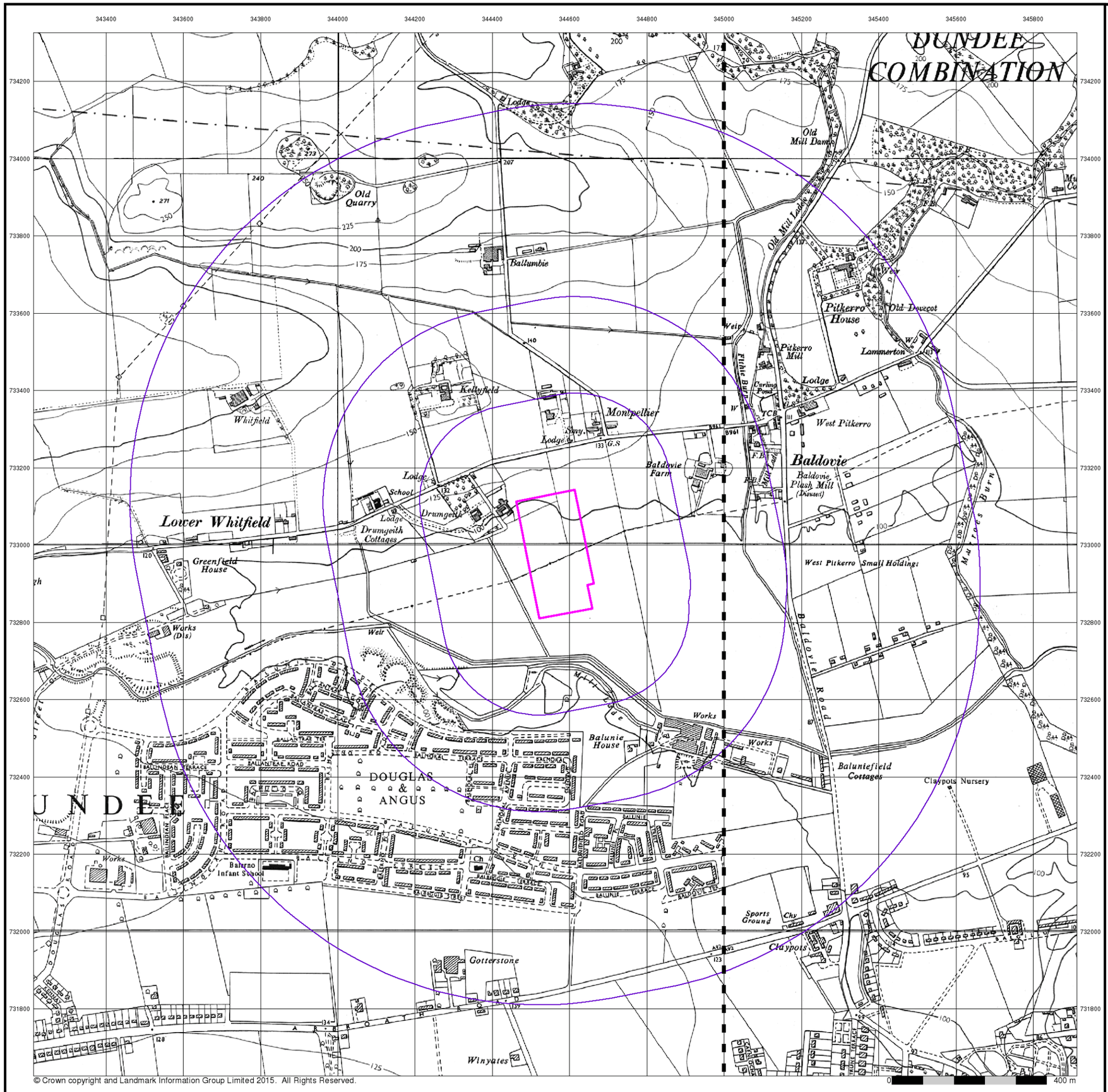

Envirocheck®

Ordnance Survey Plan

Published 1960

Source map scale - 1:10,000

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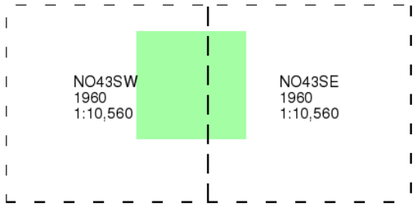
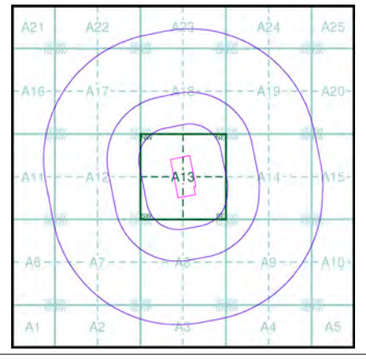


Historical Map - Slice A



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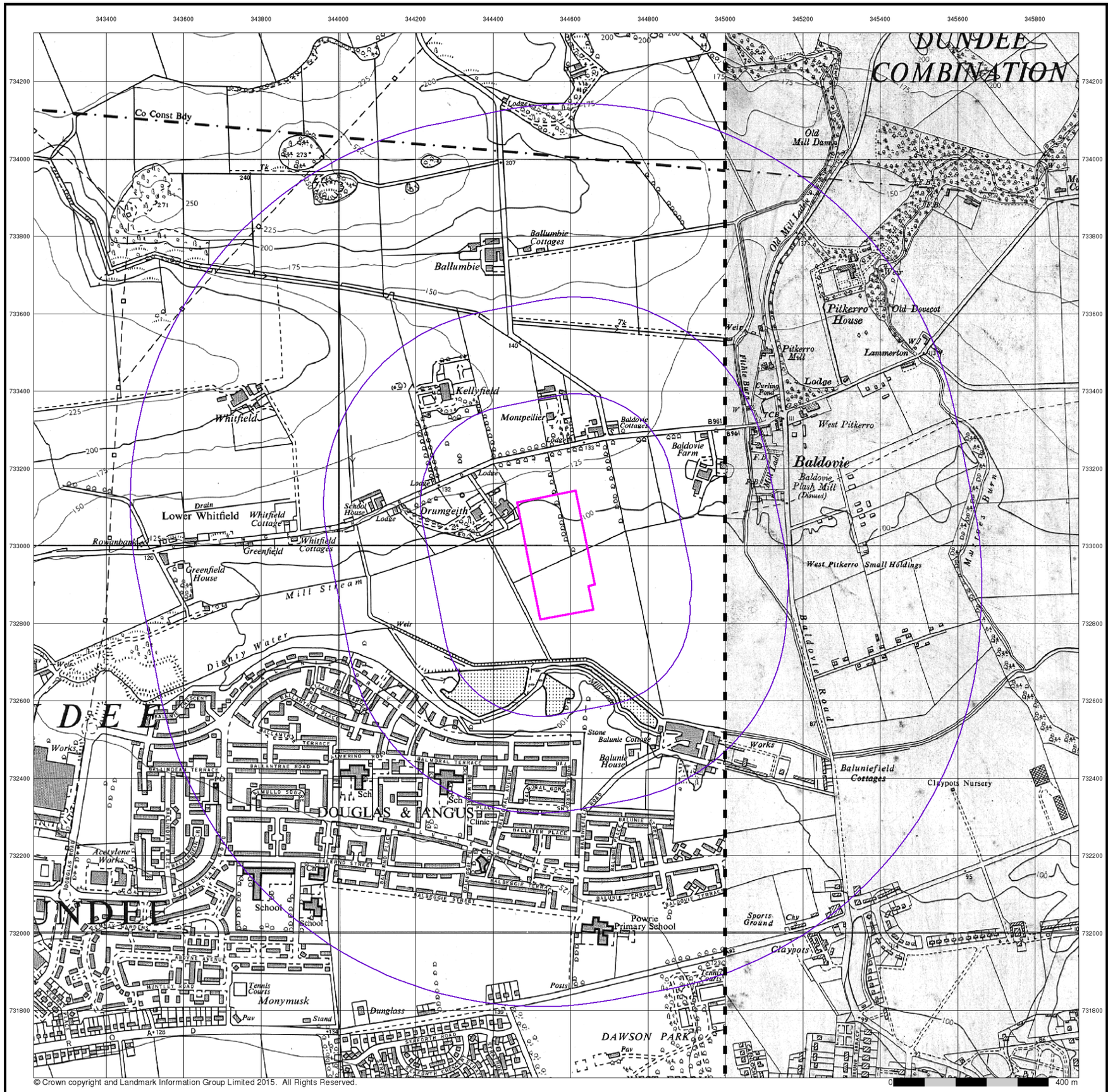

Envirocheck®

Ordnance Survey Plan

Published 1960 - 1969

Source map scale - 1:10,000

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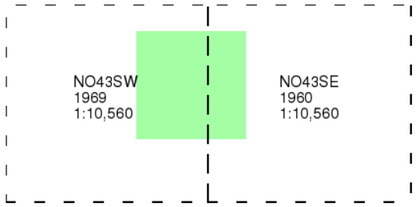
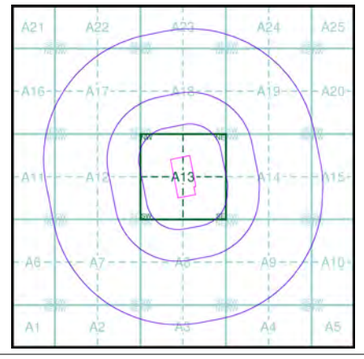


Historical Map - Slice A



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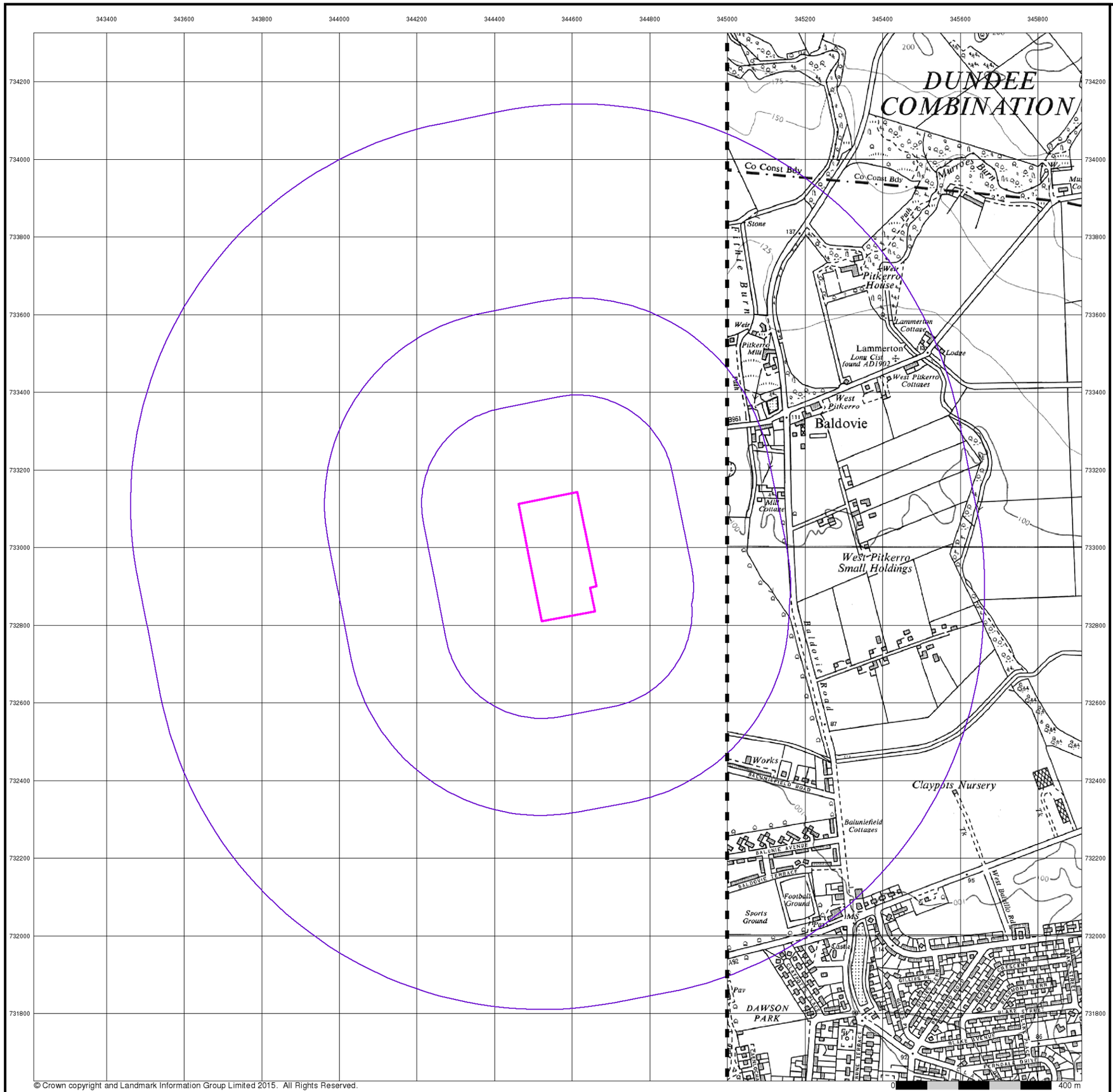

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Ordnance Survey Plan

Published 1968

Source map scale - 1:10,000

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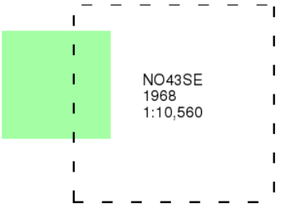
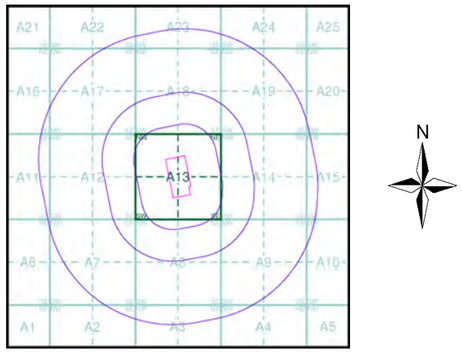


Historical Map - Slice A



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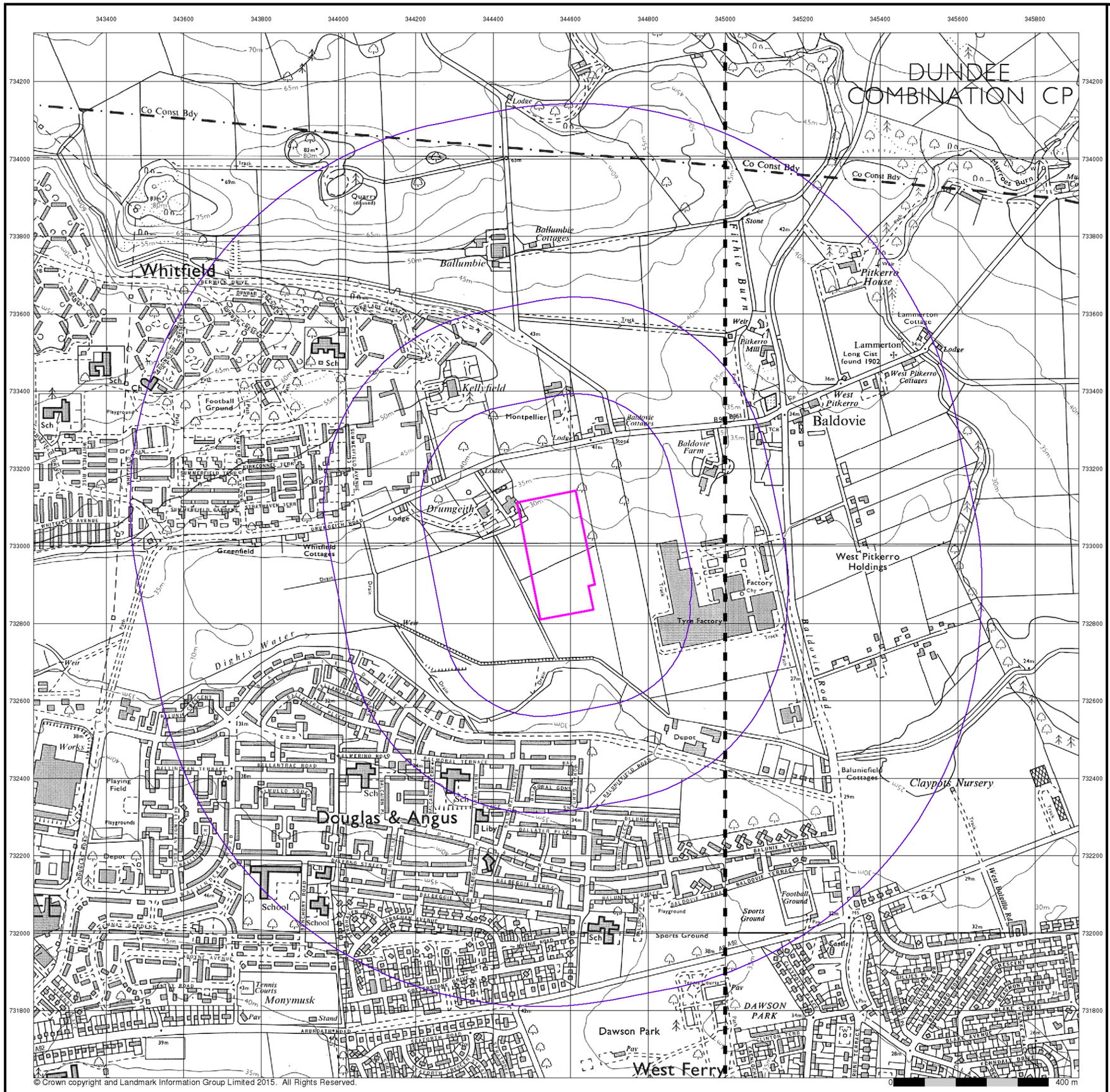

0 400 m

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Ordnance Survey Plan

Published 1974 - 1975

Source map scale - 1:10,000

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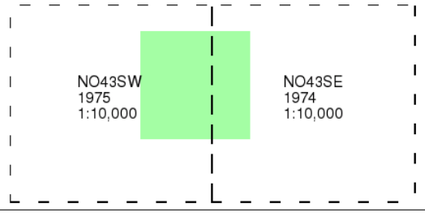
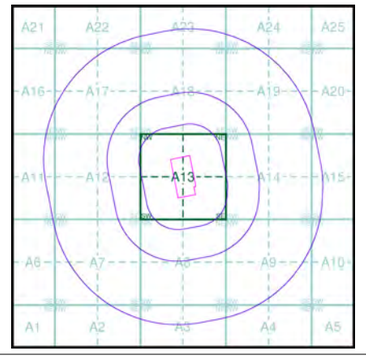


Historical Map - Slice A



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Ordnance Survey Plan

Published 1984

Source map scale - 1:10,000

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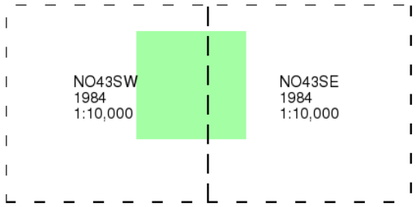
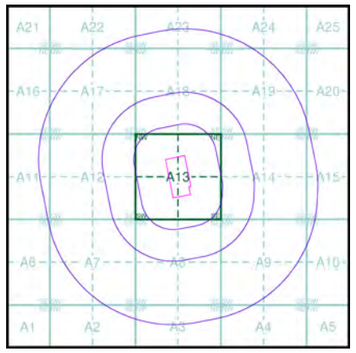


Historical Map - Slice A



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

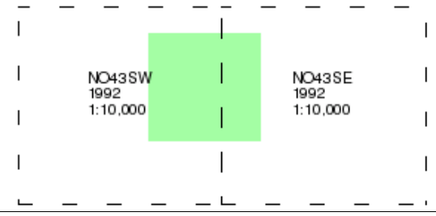
Dundee

Published 1992

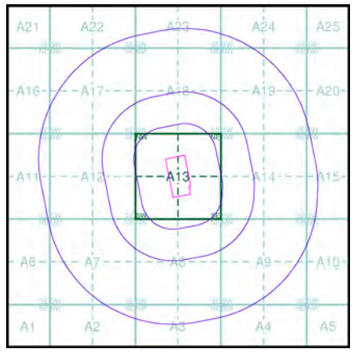
Source map scale - 1:10,000

These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use.
They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)



Russian Map - Slice A



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

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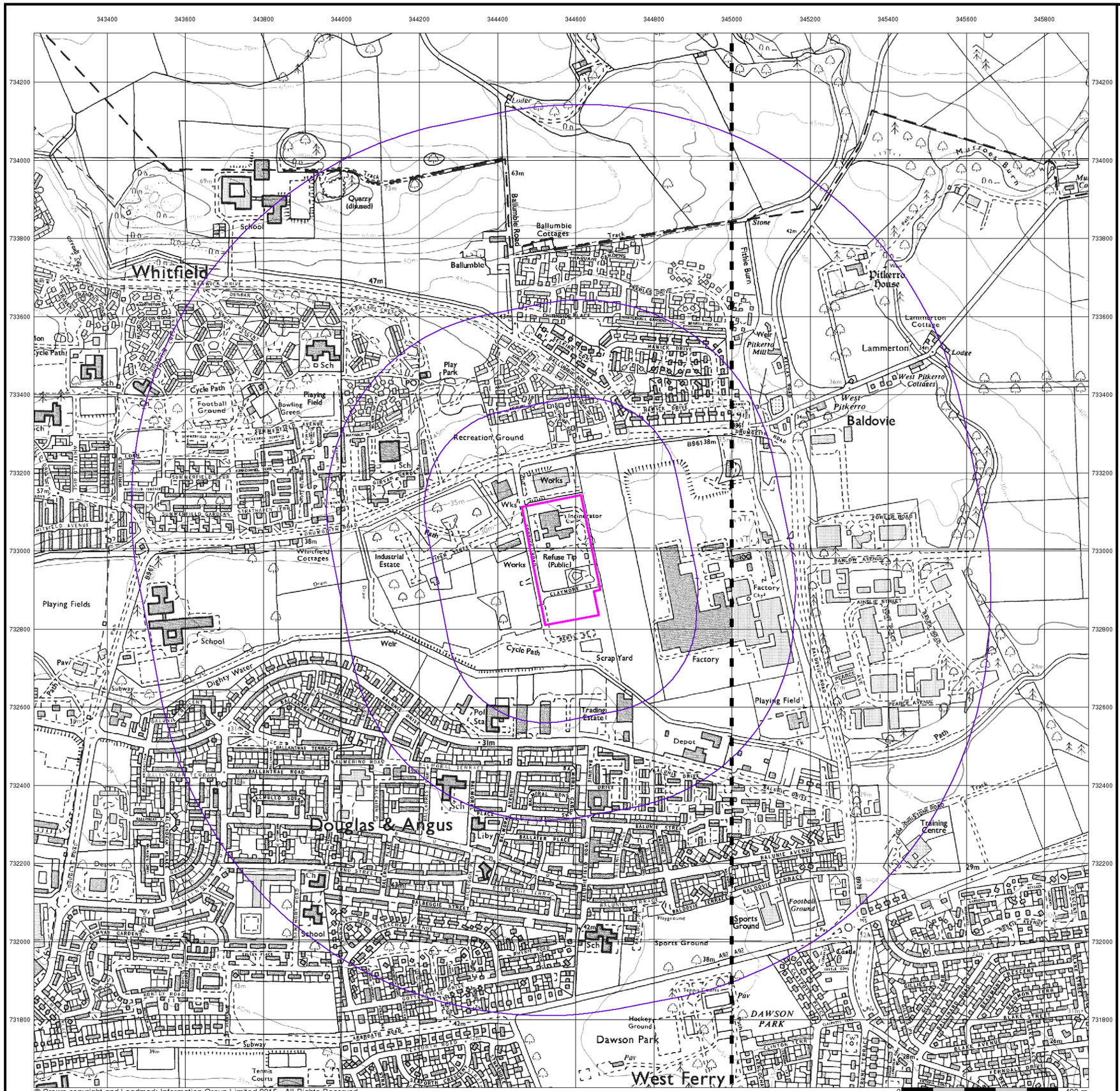


Envirocheck®

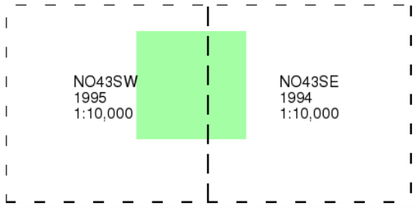
Ordnance Survey Plan

Published 1994 - 1995

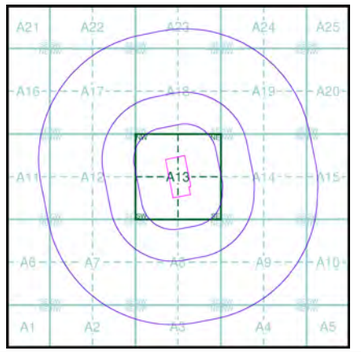
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	78681553_1_1
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Slice:	A
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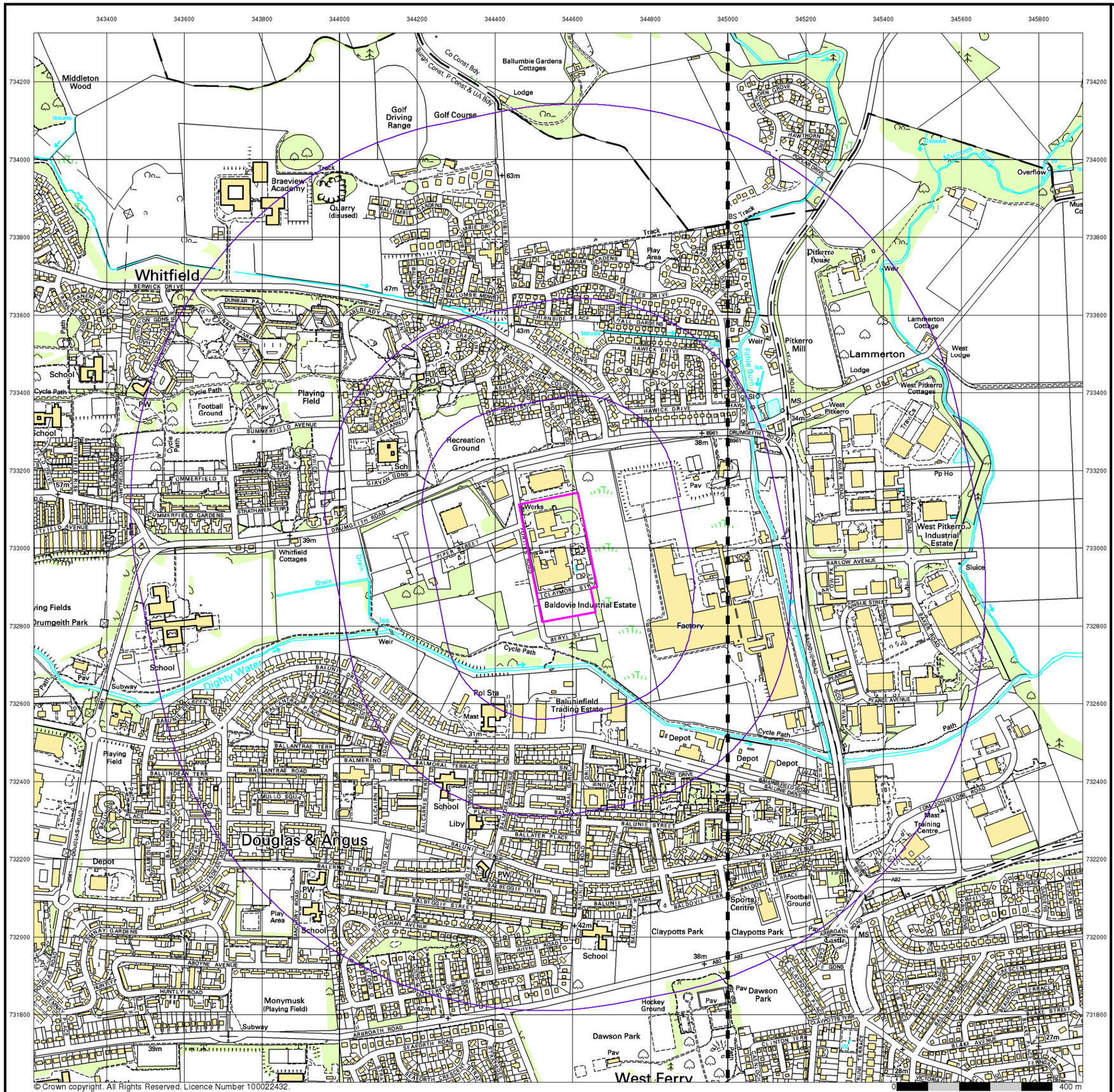


Envirocheck®

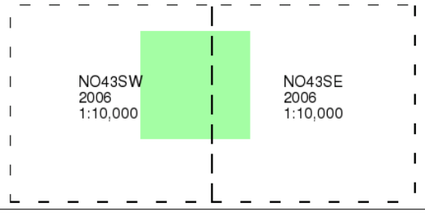
10k Raster Mapping

Published 2006

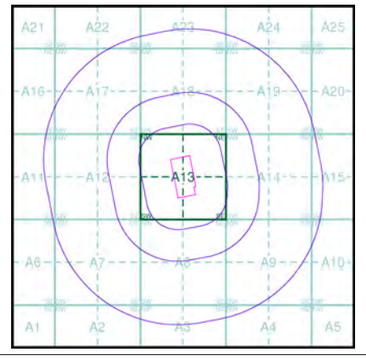
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
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Site Details

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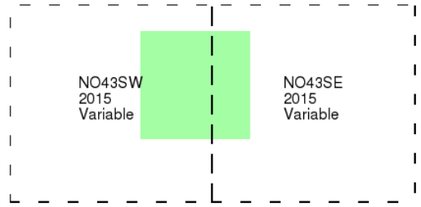
VectorMap Local

Published 2015

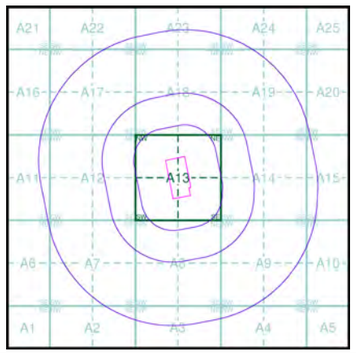
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)



Historical Map - Slice A



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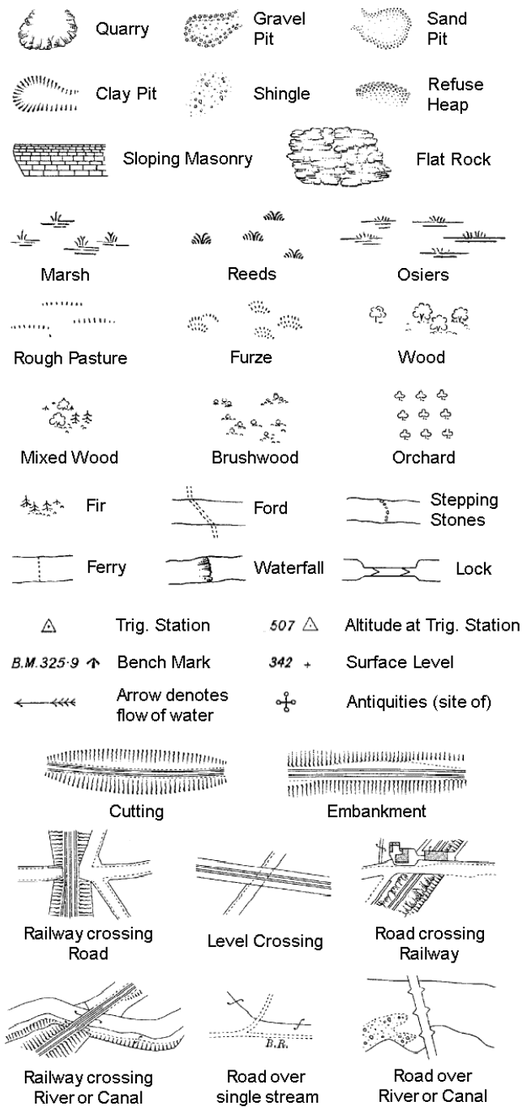
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



County Boundary (Geographical)

County & Civil Parish Boundary

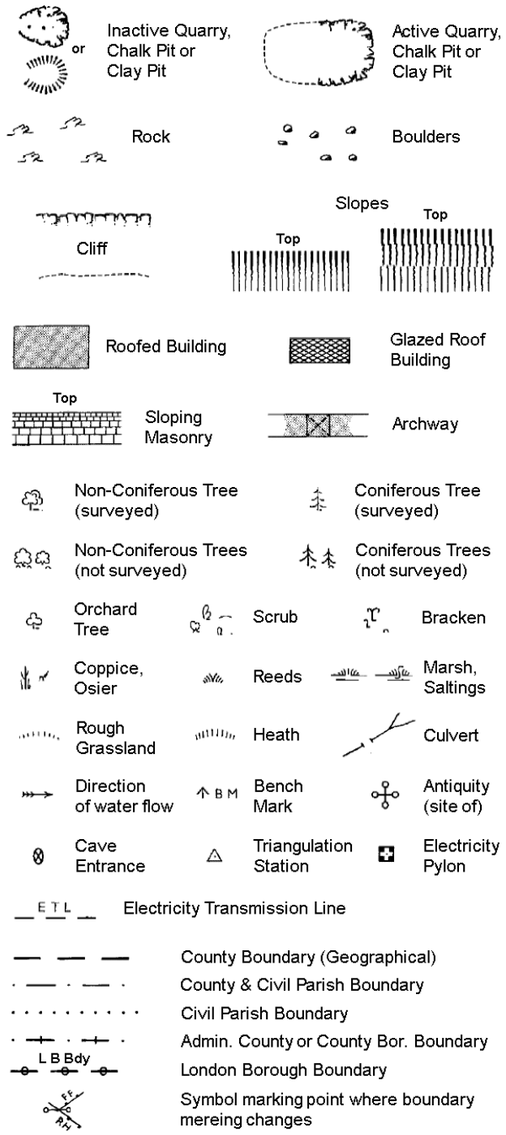
Administrative County & Civil Parish Boundary

Co. Boro. Bdy. County Borough Boundary (England)

Co. Burgh Bdy. County Burgh Boundary (Scotland)

B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	Sl.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

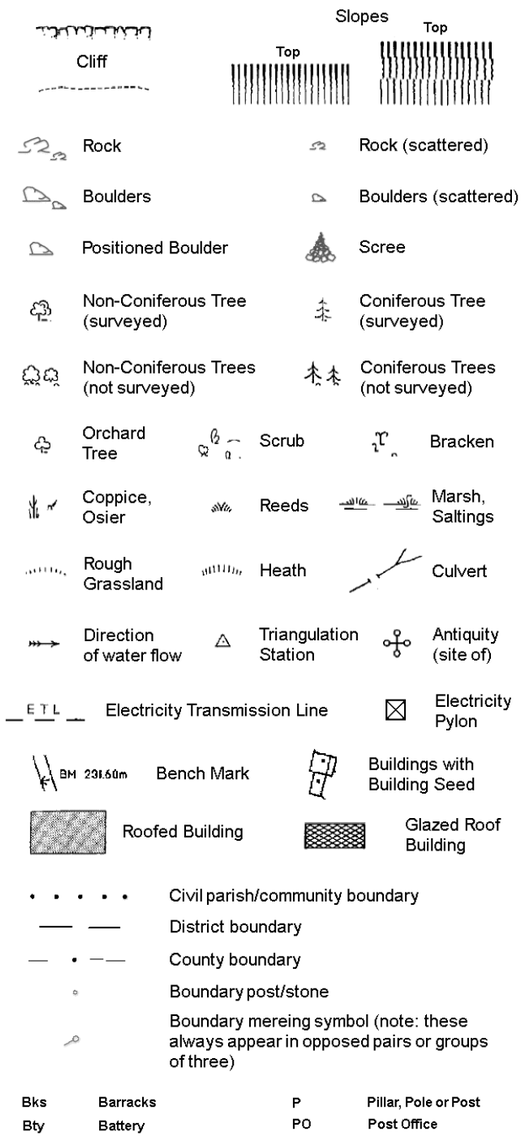
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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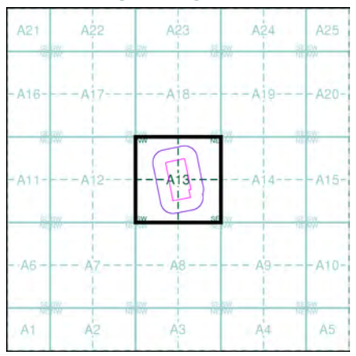
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Forfarshire	1:2,500	1885	2
Forfarshire	1:2,500	1903	3
Forfarshire	1:2,500	1922	4
Forfarshire	1:2,500	1938	5
Ordnance Survey Plan	1:1,250	1956 - 1982	6
Ordnance Survey Plan	1:2,500	1957 - 1965	7
Ordnance Survey Plan	1:1,250	1958 - 1974	8
Ordnance Survey Plan	1:2,500	1969	9
Supply of Unpublished Survey Information	1:1,250	1973	10
Additional SIMs	1:1,250	1980 - 1992	11
Additional SIMs	1:1,250	1988 - 1992	12
Large-Scale National Grid Data	1:1,250	1994	13
Large-Scale National Grid Data	1:1,250	1994 - 1995	14

Historical Map - Segment A13



Order Details

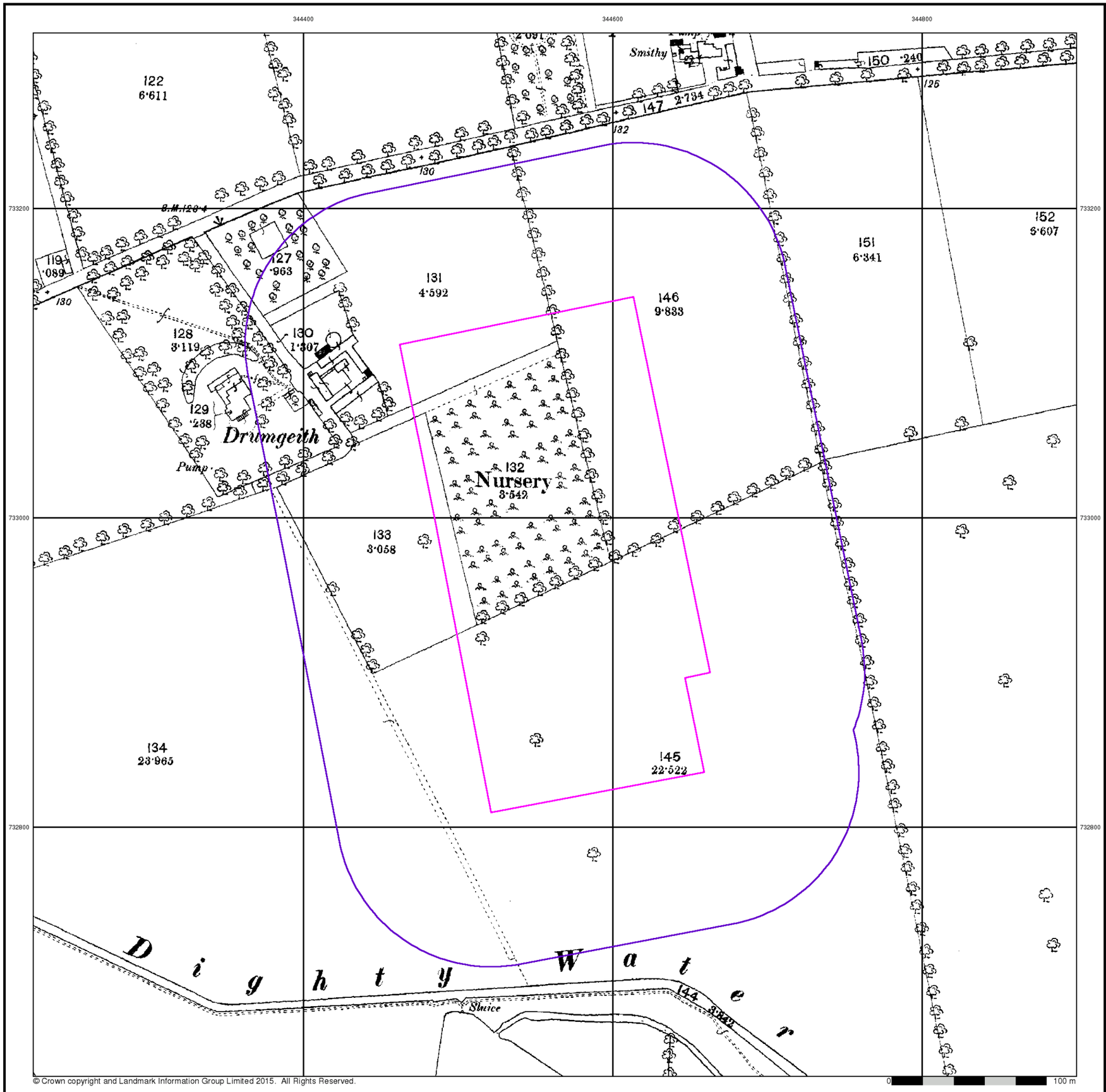
Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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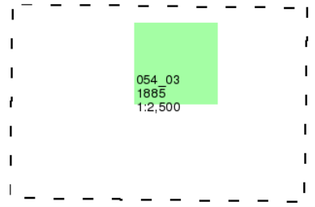
Forfarshire

Published 1885

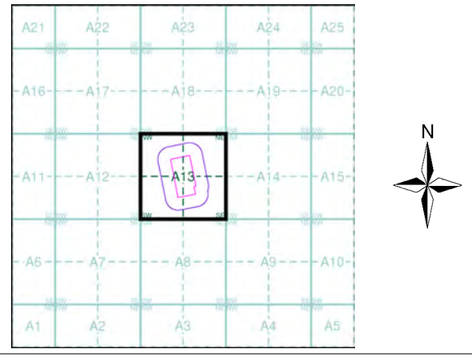
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Slice:	A
Site Area (Ha):	4.7
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Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
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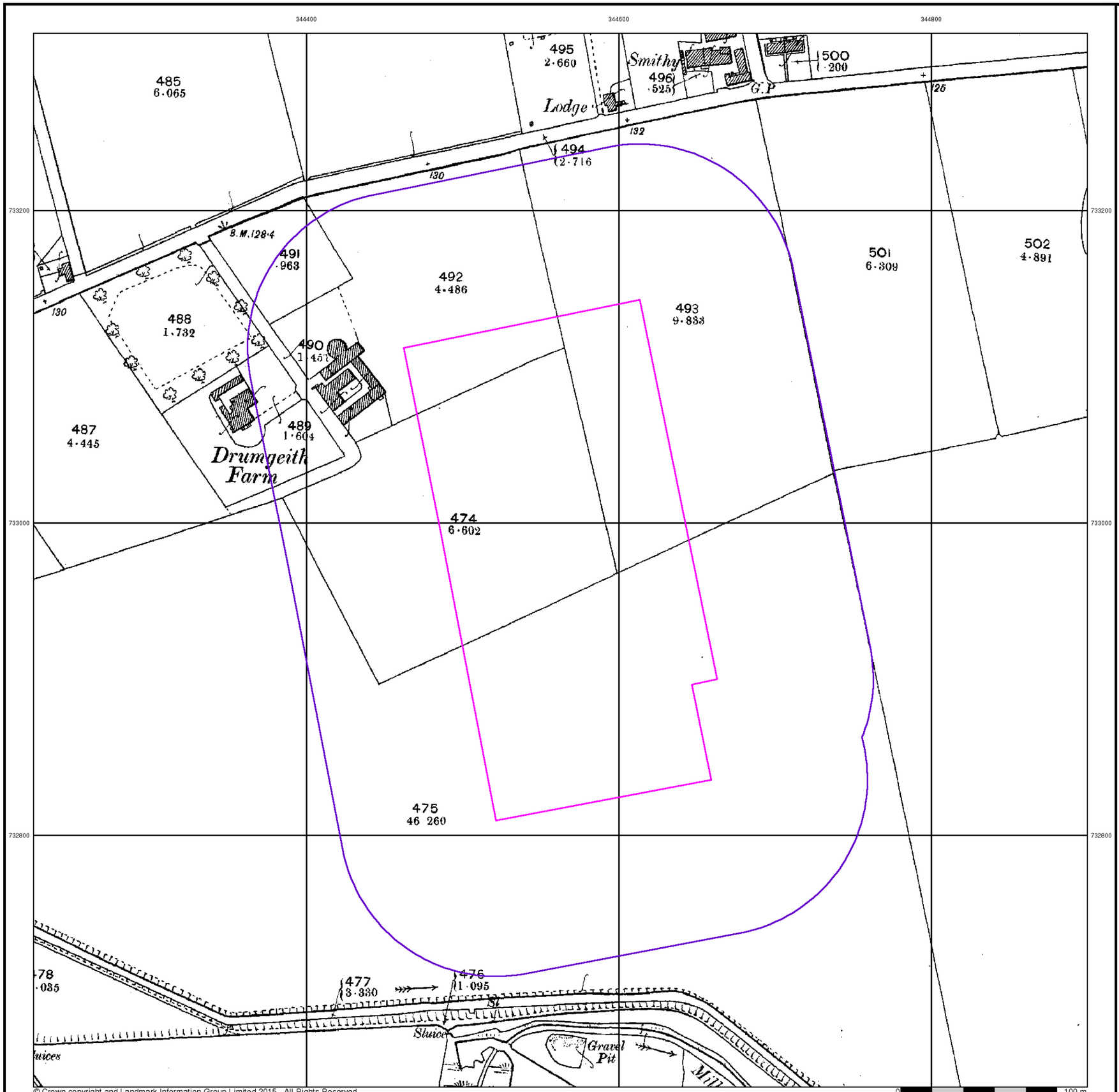


Envirocheck®

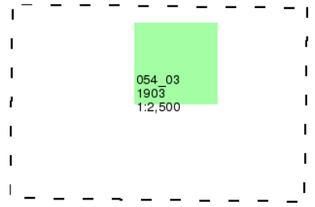
Forfarshire

Published 1903

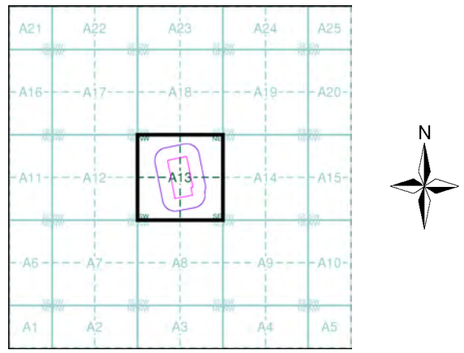
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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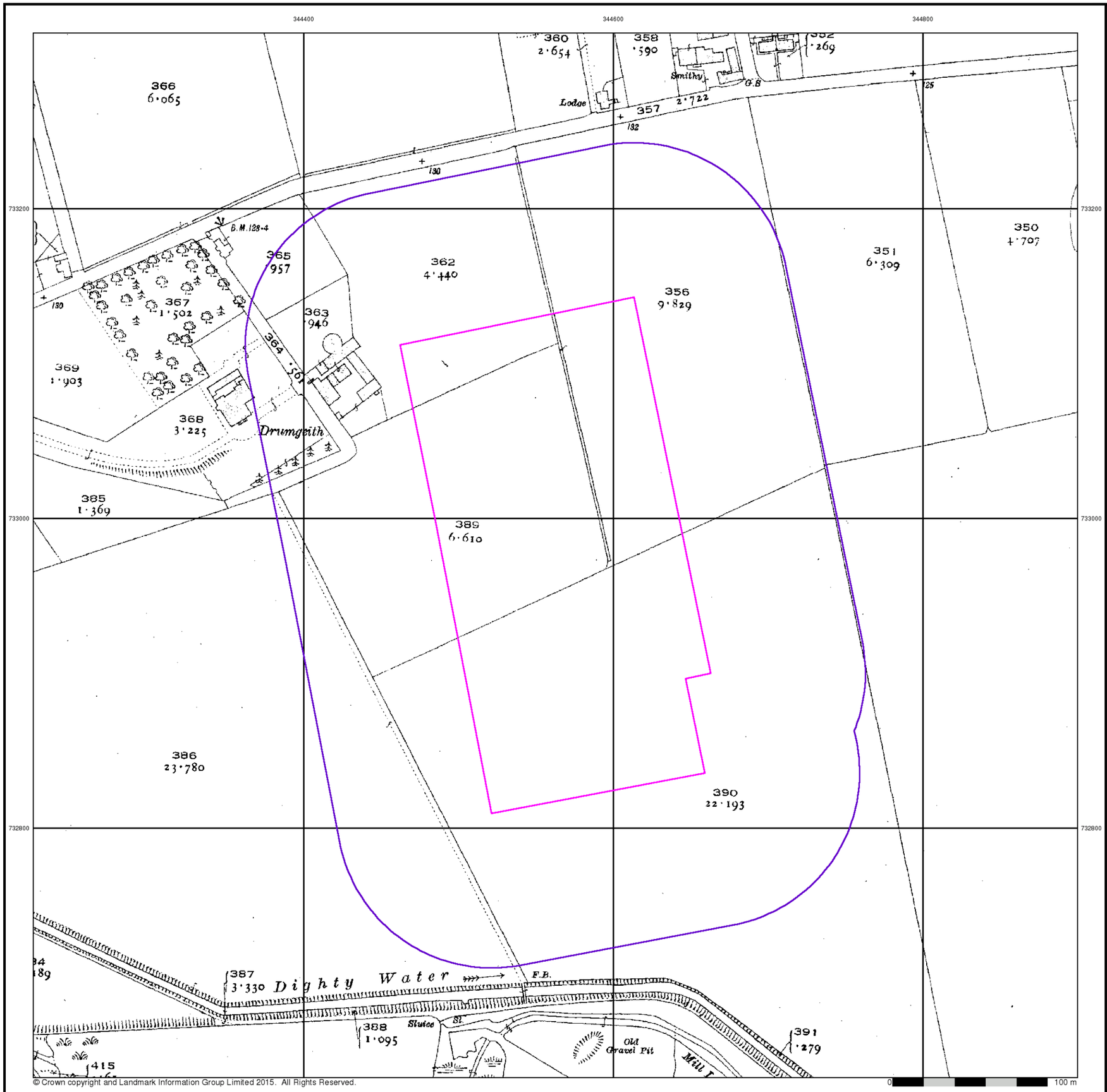


Envirocheck®

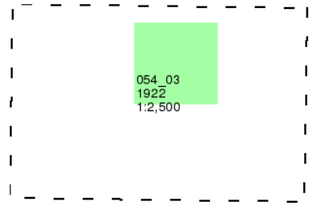
Forfarshire

Published 1922

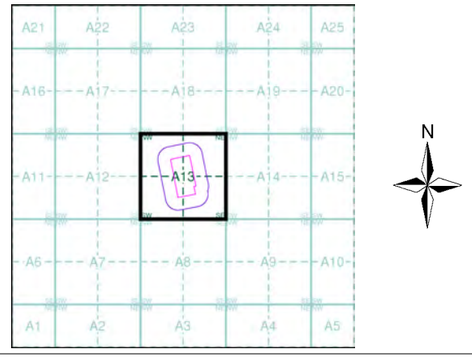
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

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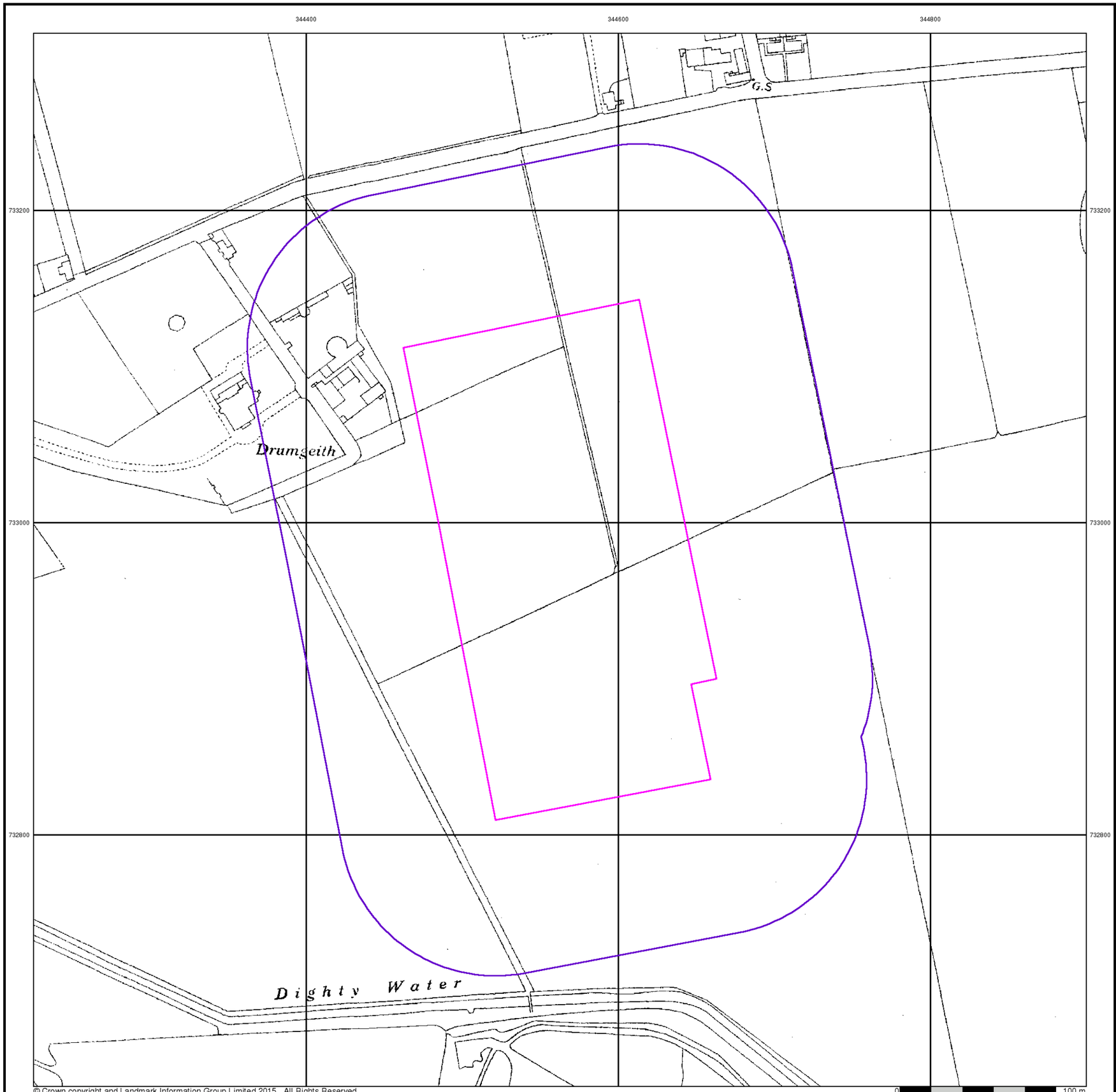


Envirocheck®

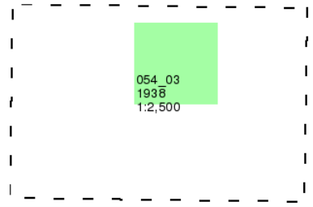
Forfarshire

Published 1938

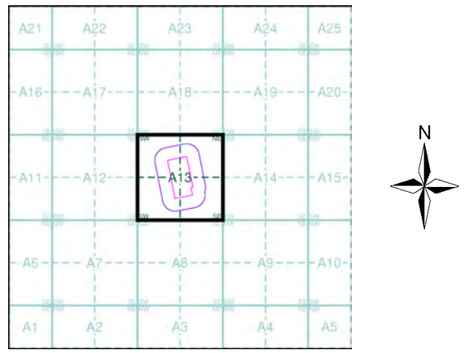
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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Ordnance Survey Plan

Published 1956 - 1982

Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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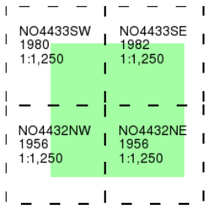
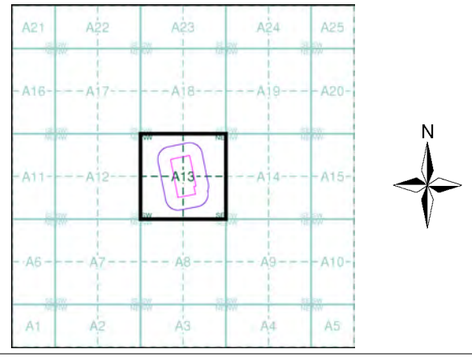


Historical Map - Segment A13



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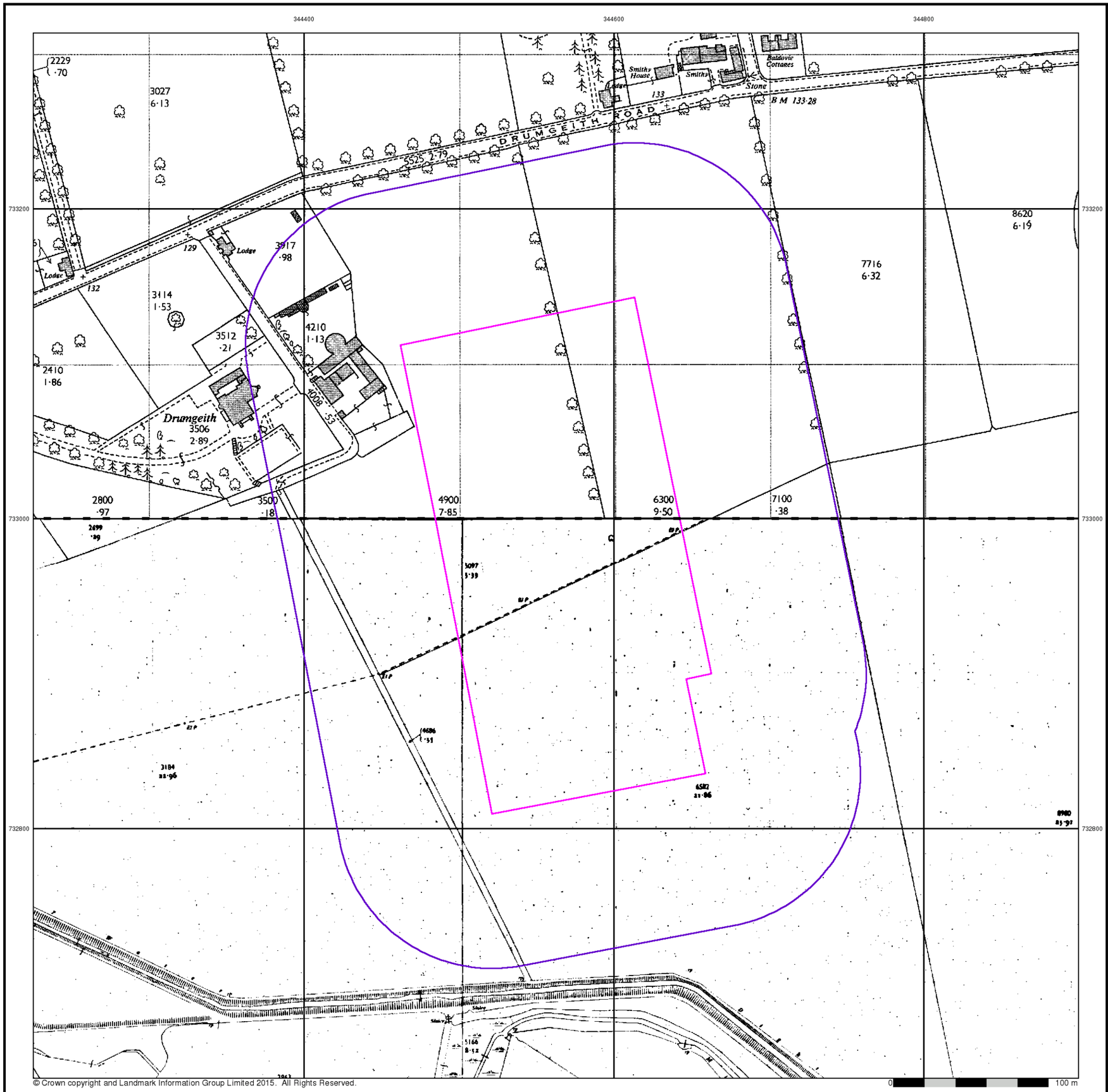
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

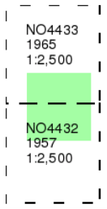
Ordnance Survey Plan

Published 1957 - 1965

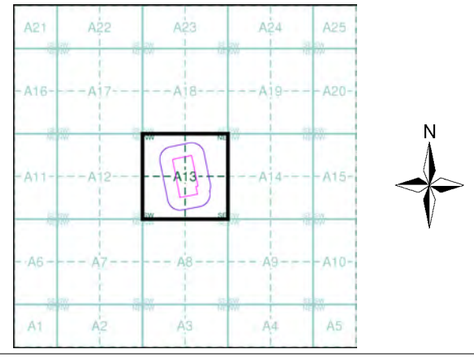
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck®

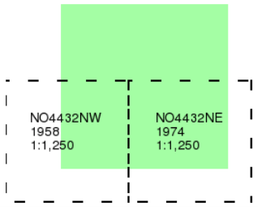
Ordnance Survey Plan

Published 1958 - 1974

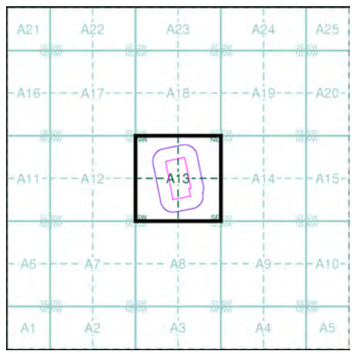
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



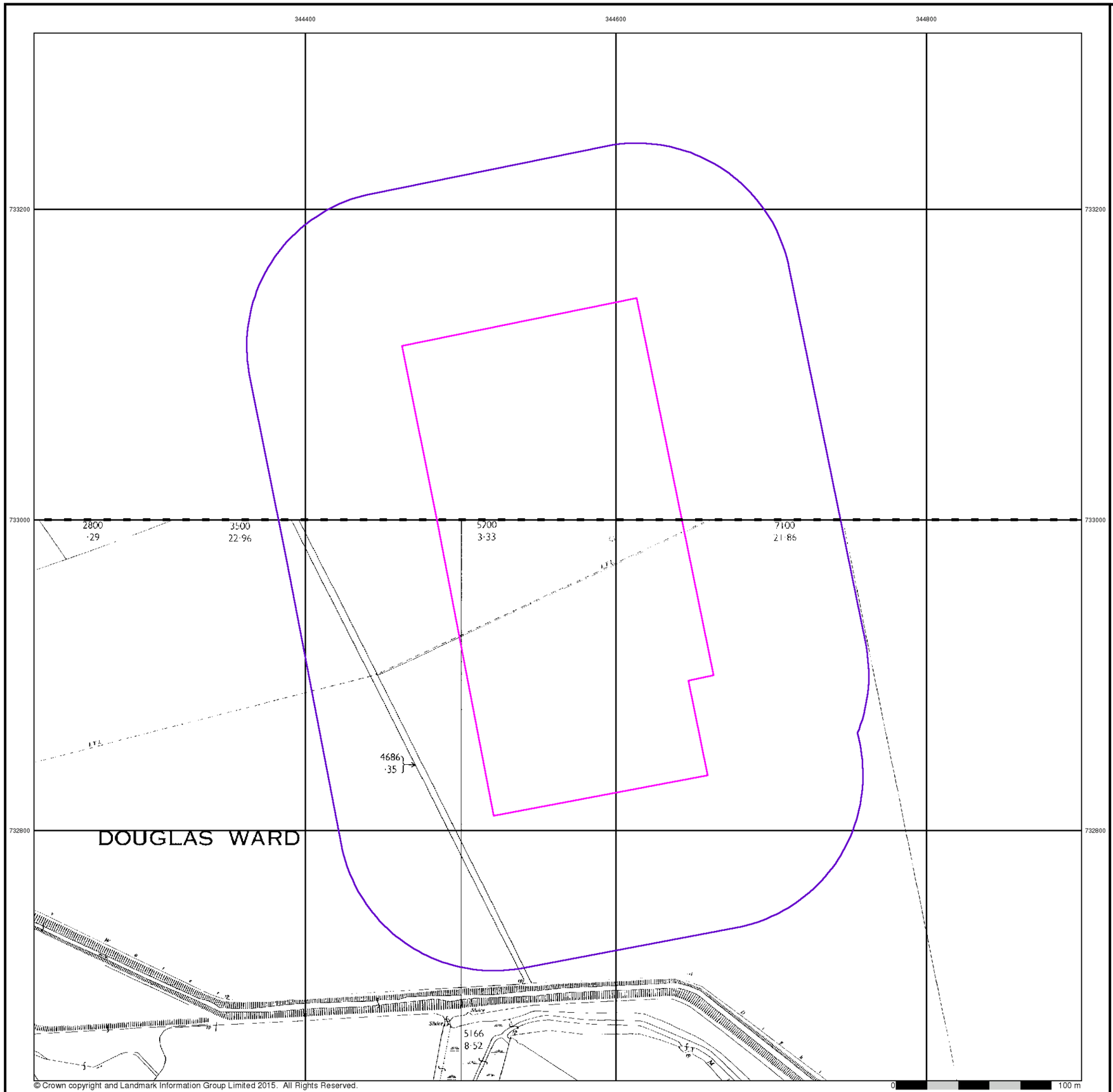
Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

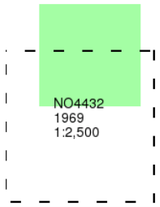
Ordnance Survey Plan

Published 1969

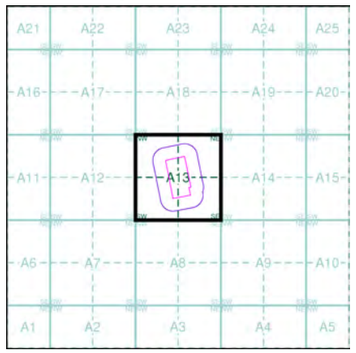
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



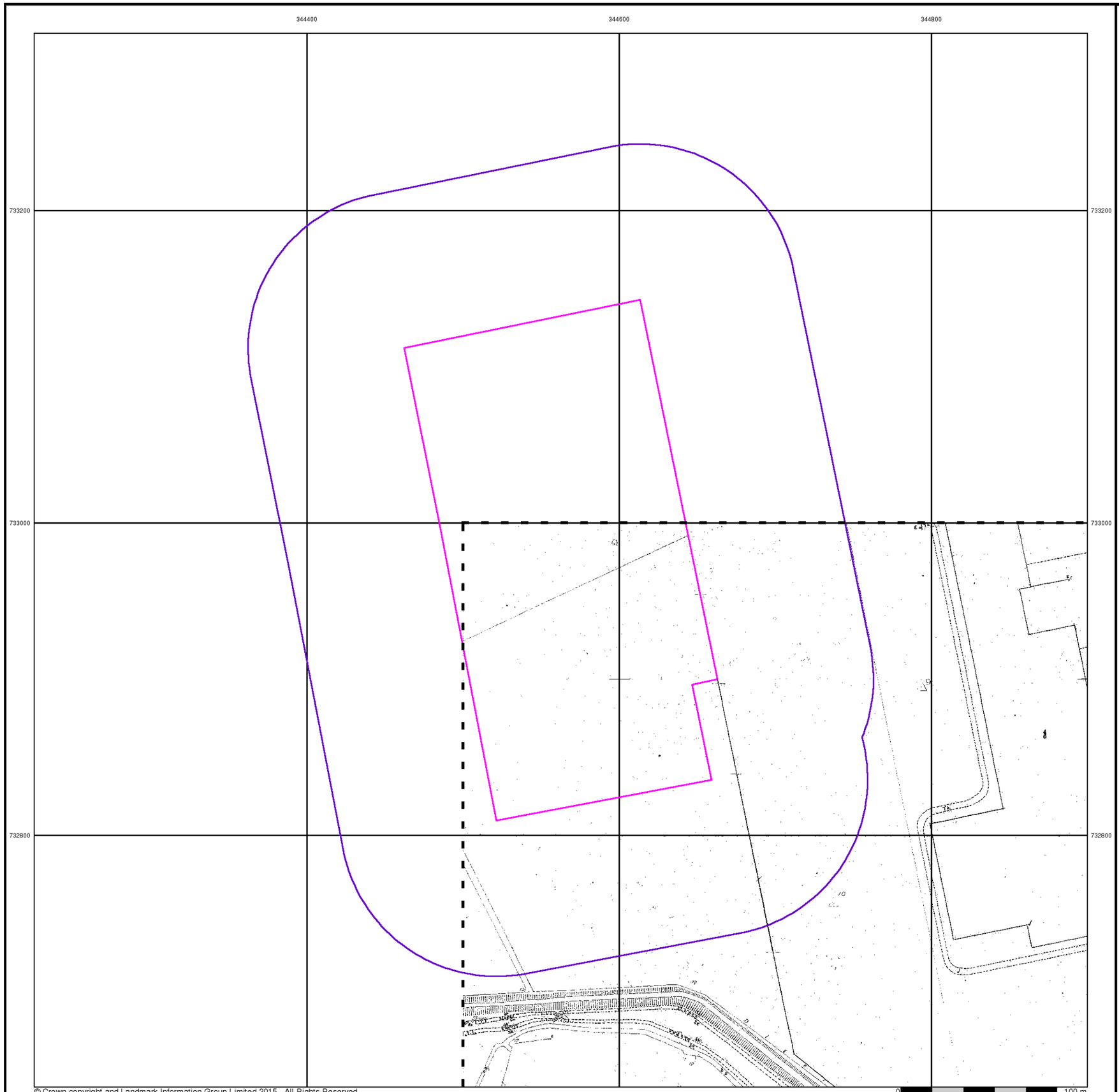
Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

Supply of Unpublished Survey Information

Published 1973

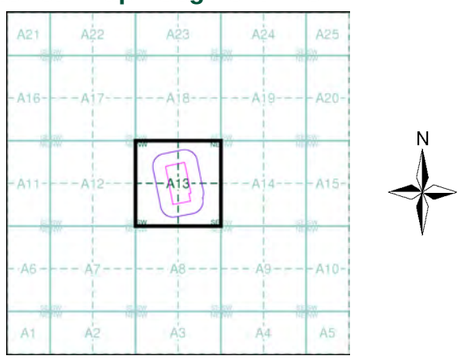
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

NO4432NE
1973
1:1,250

Historical Map - Segment A13



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
Tel: 0844 844 9952
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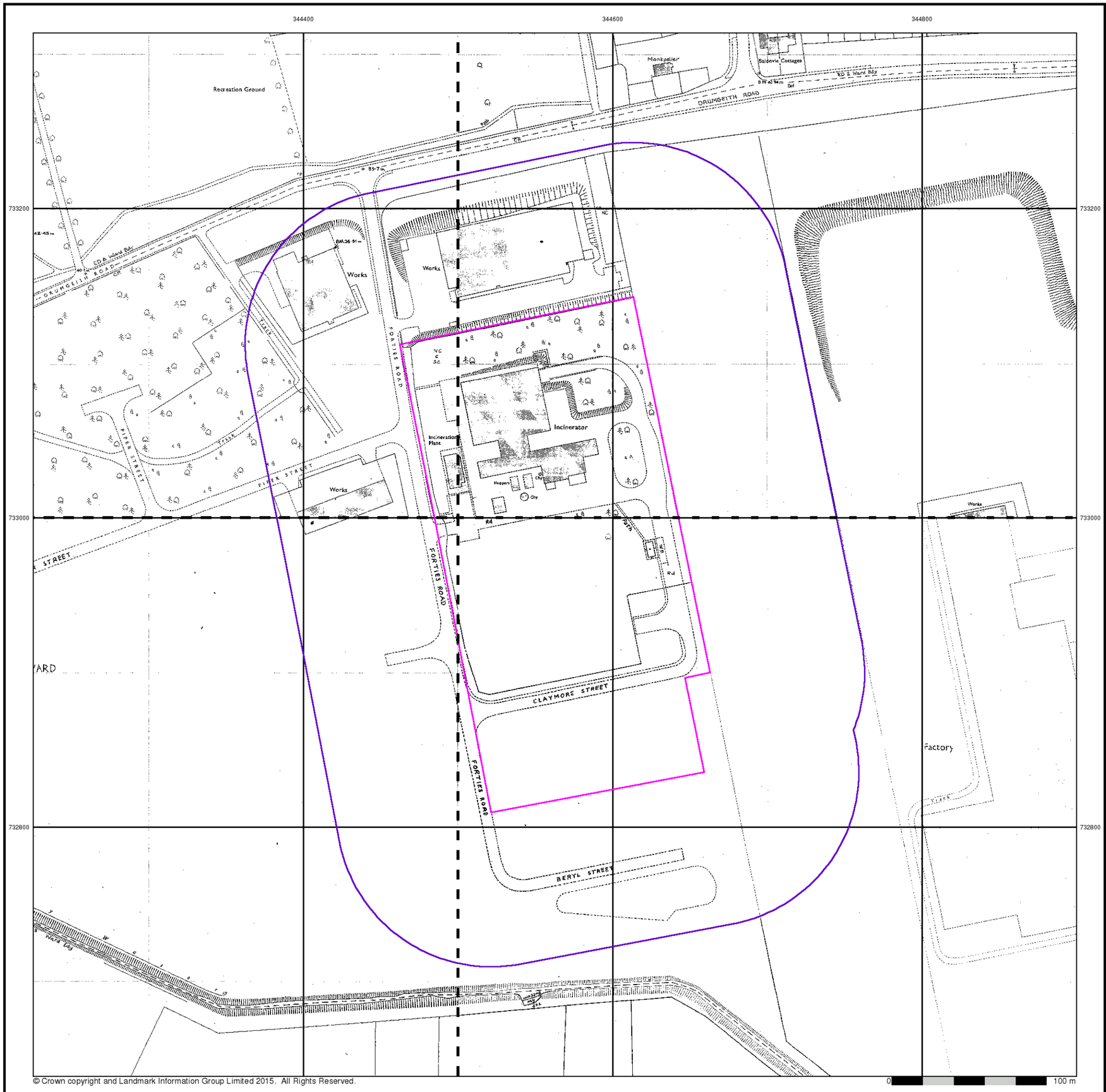
Web: www.envirocheck.co.uk



Envirocheck®

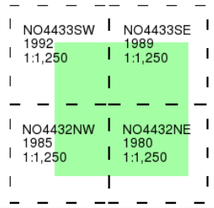
Additional SIMs

Published 1980 - 1992

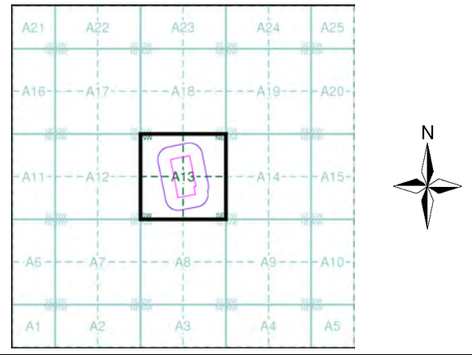
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

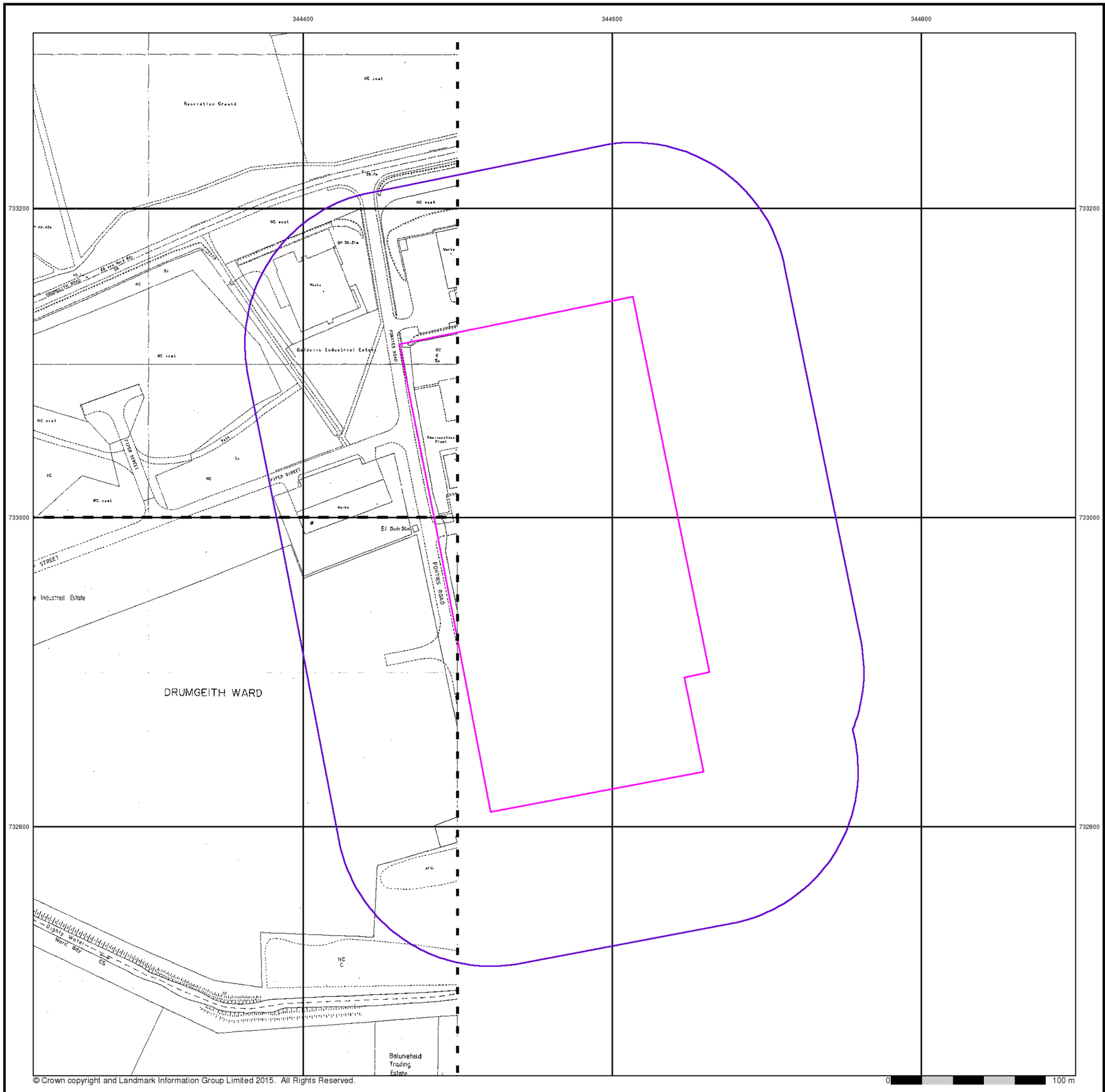
Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

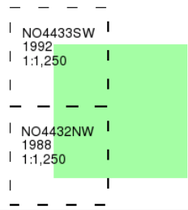
Additional SIMs

Published 1988 - 1992

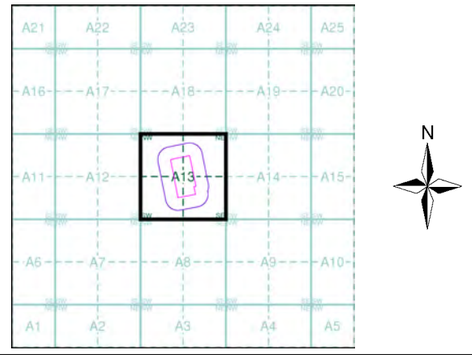
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

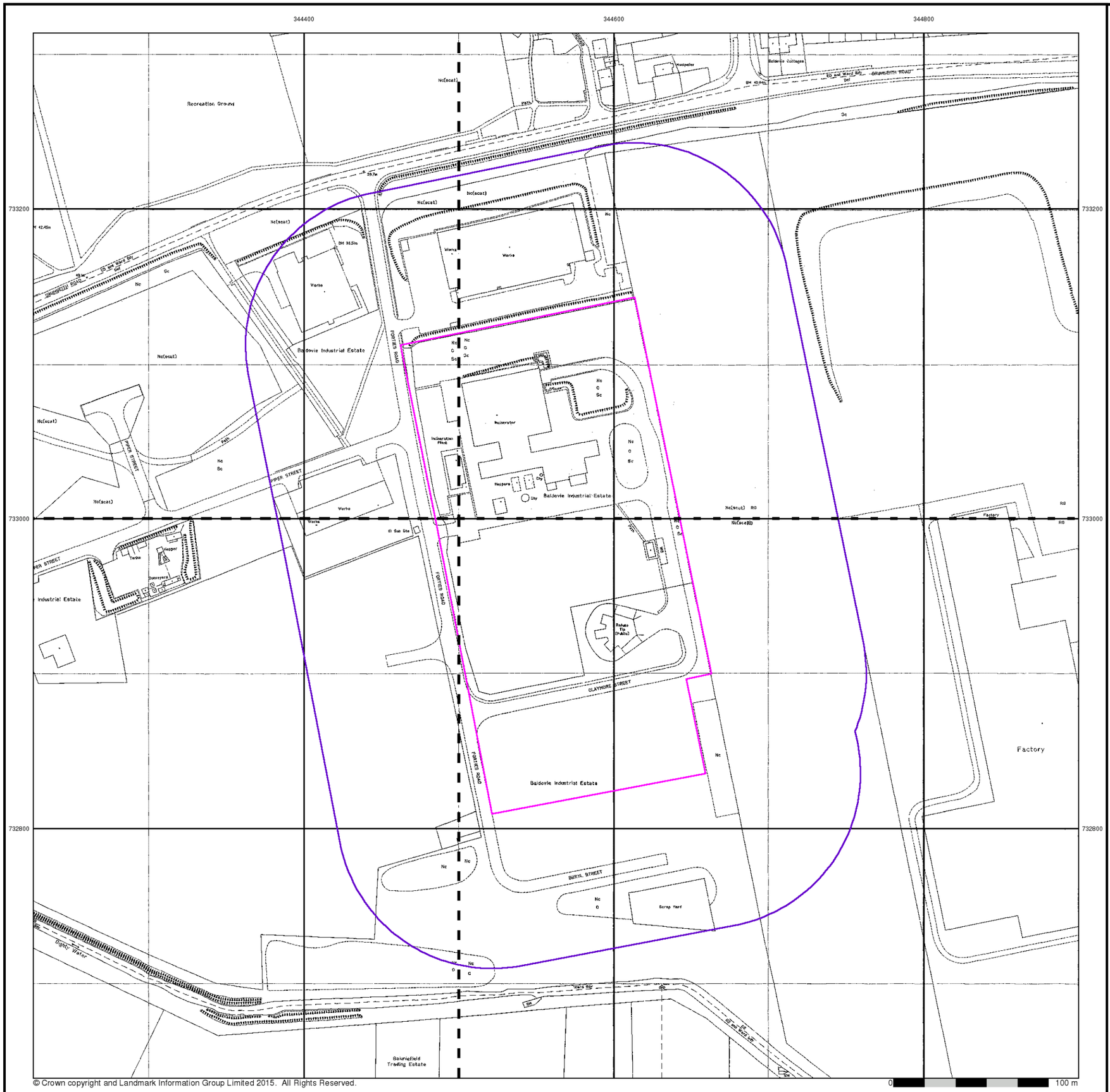
Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

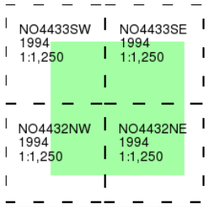
Large-Scale National Grid Data

Published 1994

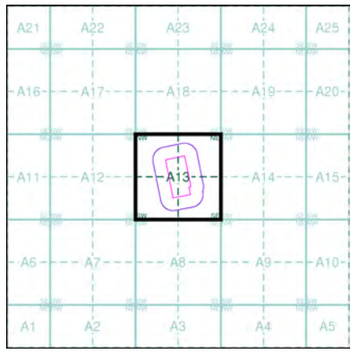
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

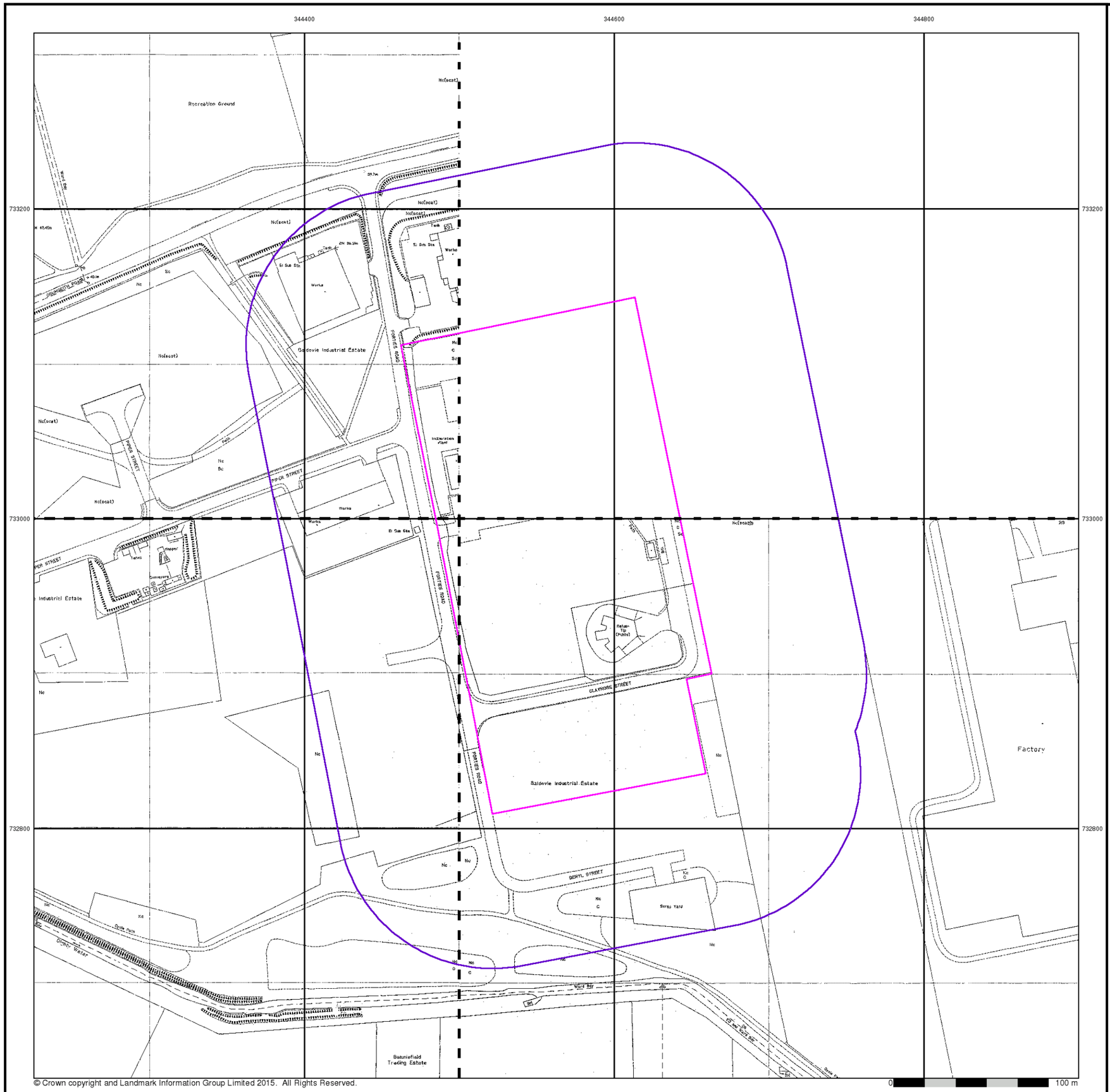
Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

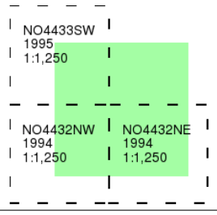
Large-Scale National Grid Data

Published 1994 - 1995

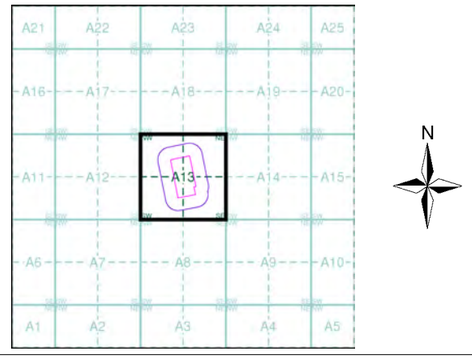
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	100

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix B

Radon Risk Report

Report of address search for radon risk

Radon Risk Report for addresses in Scotland

Address searched: Dundee Energy Recycling Ltd, Forties Road, Dundee, DD4 0NS

Grid reference searched:

344565 East

732901 North

Date of report: 28 March 2016

Guidance for existing properties

Is this property in a radon Affected Area? - No

A radon Affected Area is defined as where the radon level in at least one property in every hundred is estimated to exceed the Action Level.

The estimated probability of the property being above the Action Level for radon is: 0-1%

The result covers a 75 metre zone around the grid references above to allow for uncertainties in locations.

This report informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property; the only way to find out whether it is above or below the Action Level is to carry out a radon measurement in an existing property.

Radon Affected Areas are designated by the Public Health England. PHE advises that radon gas should be measured in all properties within Radon Affected Areas.

If you are buying a currently occupied property in a Radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the Radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and the results of re-testing confirmed the effectiveness of the measures.

Further information is available from PHE or http://www.ukradon.org

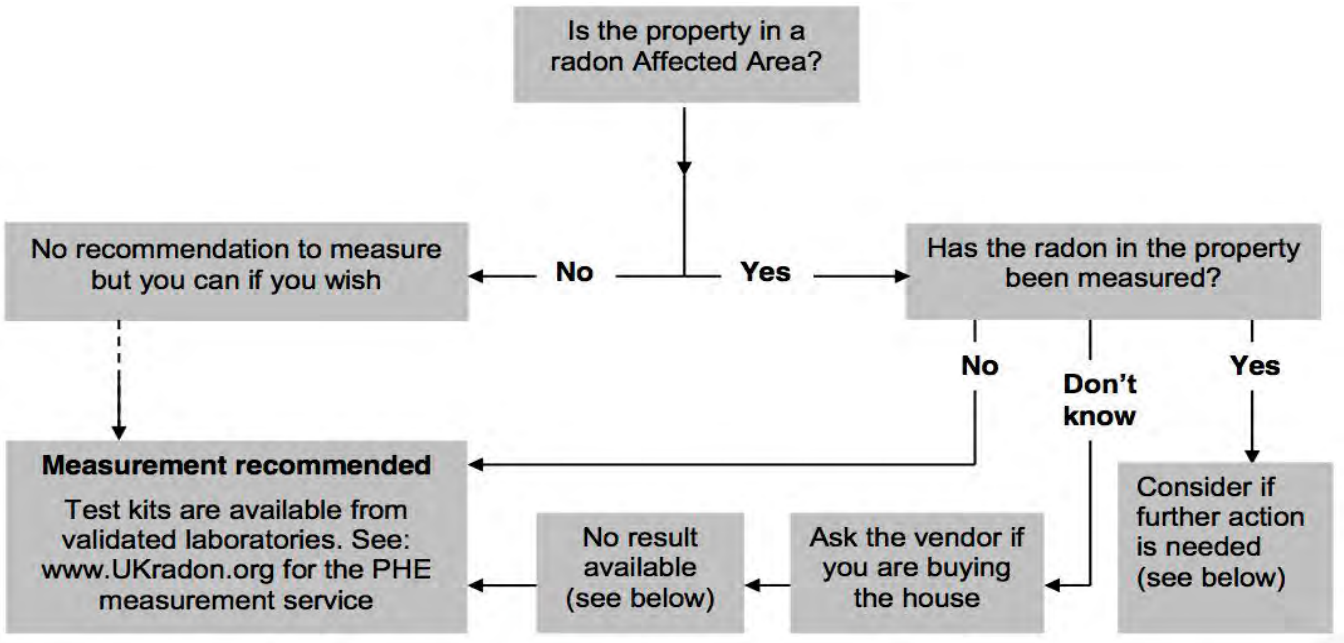
Guidance for new buildings and extensions to existing properties

What is the requirement under Building Regulations for radon protection in new buildings and extensions at the property location? - None

If you are buying a new property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

See the Radon and Building Regulations for more details.

PHE guidance for occupiers and prospective purchases



Existing radon test results: There is no public record of individual radon measurements. Results of previous tests can only be obtained from the seller. Radon levels can be significantly affected by changes to the building or its use, particularly by alterations to the heating and ventilation which can also be affected by changes in occupier. If in doubt, test again for reassurance.

Radon Bond: This is simply a retained fund, the terms of which are negotiated between the purchaser and the vendor. It allows the conveyance of the property to proceed without undue delay. The purchaser is protected against the possible cost of radon reduction work and the seller does not lose sale proceeds if the result is low. Make sure the agreement allows enough time to complete the test, get the result and arrange the work if needed.

High Results: Exposure to high levels of radon increases the risk of developing lung cancer. If a test in a home gives a result at or above the Action Level of 200 Becquerels per cubic metre of air (Bq/m3), formal advice will be given to lower the level. Radon reduction will also be recommended if the occupants include smokers or ex-smokers when the radon level is at or above the Target Level of 100 Bq/m3; these groups have a higher risk. Information on health risks and radon reduction work is available from PHE. Guidance about radon reduction work is also available from some Local Authorities, the Building Research Establishment and specialist contractors.

PHE designated radon website: http://www.ukradon.org
Building Research Establishment: http://www.bre.co.uk/radon/reduce.html

Appendix C

Envirocheck Datasheet and Site Sensitivity Maps

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
78681553_1_1

Customer Reference:
Baldovie Industrial Estate

National Grid Reference:
344570, 732980

Slice:
A

Site Area (Ha):
4.7

Search Buffer (m):
1000

Site Details:

Baldovie Industrial Estate
DUNDEE
DD4 8TF

Client Details:

Mr K Caucis
Ove Arup & Partners International Ltd
Scotstoun House
South Queensferry
West Lothian
EH30 9SE

Contents

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

Copyright Notice

Natural England Copyright Notice

Ove Arup Copyright Notice

Peter Brett Associates Copyright Notice

Radon Potential dataset Copyright Notice

Report Version v50.0

Envirocheck®

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents					
Enforcement and Prohibition Notices					
Integrated Pollution Controls	pg 1	1			1
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1		4		5
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 2	Yes			
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality	pg 2				1
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 2	Yes	n/a	n/a	n/a
Source Protection Zones					
River Flood Data (Scotland)	pg 2	Yes	Yes	n/a	n/a
Detailed River Network Lines					n/a
Detailed River Network Offline Drainage					n/a
Waste					
BGS Recorded Landfill Sites					
Integrated Pollution Control Registered Waste Sites	pg 4	1	1		
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites	pg 4	3			1
Registered Waste Treatment or Disposal Sites	pg 6	4	3		
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Envirocheck®

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 9	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 9	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 24				1
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 24	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 24	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 25	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 25	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 25	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 25	Yes		n/a	n/a
Radon Potential - Radon Affected Areas	pg 25	Yes	n/a	n/a	n/a
Radon Potential - Radon Protection Measures	pg 25	Yes	n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 26	1	15	7	52
Fuel Station Entries	pg 32				1

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
National Scenic Areas					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 33	1			
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Integrated Pollution Controls** Name: City Of Dundee District Council Location: Baldovie Incineration Plant, Forties Road, DUNDEE, Angus, DD4 0NS Authority: Scottish Environment Protection Agency, Head Office Permit Reference: n/a Dated: 30th October 1992 Process Type: Not Given Description: 6.1 Paper and Pulp manufacturing processes within Miscellaneous Industries **Status: Application has been authorised and any conditions apply to the operatorAuthorised** Positional Accuracy: Unknown	A13NW (NW)	0	2	344498 733038
2	**Integrated Pollution Controls** Name: Michelin Tyre Plc Location: Baldovie Road, DUNDEE, Angus, DD4 8UQ Authority: Scottish Environment Protection Agency, East Region Permit Reference: Ipc/E/0000082 Dated: 8th October 1999 Process Type: Not Given Description: Not Supplied **Status: Not Supplied** Positional Accuracy: Manually positioned to the road within the address or location	A14SW (SE)	510	3	345154 732713
3	**Local Authority Pollution Prevention and Controls** Name: DDC Location: Baldove Incineration Plant, Forties Road, DUNDEE, Angus, DD4 0NS Authority: Scottish Environment Protection Agency, East Region Permit Reference: HMIPI/3/92 Dated: 9th November 1992 Process Type: Local Authority Air Pollution Control Description: Part B process (no specific reference) **Status: Authorised** Positional Accuracy: Manually positioned to the road within the address or location	A13NW (NW)	4	3	344470 733054
4	**Local Authority Pollution Prevention and Controls** Name: Pioneer Concrete Location: Baldovie Industrial Estate, Piper Street, DUNDEE, Angus, DD4 0NT Authority: Scottish Environment Protection Agency, East Region Permit Reference: EPA/13/92 Dated: 20th October 1992 Process Type: Local Authority Air Pollution Control Description: PG3/1Blending, packing, loading and use of bulk cement **Status: Authorised** Positional Accuracy: Manually positioned to the road within the address or location	A13NW (W)	74	3	344403 733032
5	**Local Authority Pollution Prevention and Controls** Name: British Fuels Ltd Location: Baldovie Industrial Estate, Piper Street, DUNDEE, An Authority: Scottish Environment Protection Agency, East Region Permit Reference: APC/E/339 Dated: 20th March 1996 Process Type: Local Authority Air Pollution Control Description: Part B process (no specific reference) **Status: Not Supplied** Positional Accuracy: Manually positioned to the road within the address or location	A13NW (W)	134	3	344347 733010
6	**Local Authority Pollution Prevention and Controls** Name: Hanson Quarry Products Europe Ltd Location: Piper Street, Dundee, Dd4ont Authority: Scottish Environment Protection Agency, East Region Permit Reference: Apc/E/0000334 Dated: 4th October 1993 Process Type: Local Authority Air Pollution Control Description: Not Supplied **Status: Not Supplied** Positional Accuracy: Manually positioned to the address or location	A13SW (W)	187	3	344301 732969
7	**Local Authority Pollution Prevention and Controls** Name: Michelin Tyre Plc Location: Baldovie Road, Baldovie Industrial Estate, DUNDEE, Angus, DD4 8UQ Authority: Scottish Environment Protection Agency, East Region Permit Reference: Apc/E/350 Dated: 26th September 1994 Process Type: Local Authority Air Pollution Control Description: PG6/32 Adhesive coating **Status: Not Supplied** Positional Accuracy: Automatically positioned to the address	A14SW (SE)	510	3	345154 732713

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
8	**Local Authority Pollution Prevention and Controls** Name: Mctavish Ramsay & Co Location: Fowler Road, West Pitkerro Industrial Estate, Broughty Ferry, DUNDEE, Angus, DD5 3RN Authority: Scottish Environment Protection Agency, East Region Permit Reference: Apc/E/346 Dated: 19th October 1993 Process Type: Local Authority Air Pollution Control Description: Part B - General Wood Process (No Specific Reference) **Status: Not Supplied** Positional Accuracy: Automatically positioned to the address	A14NW (E)	586	3	345236 733023
9	**Local Authority Pollution Prevention and Controls** Name: Fowler Road Location: Fowler Road, West Pitkerro Road, DUNDEE, Angus, DD5 3RU Authority: Scottish Environment Protection Agency, East Region Permit Reference: Apc/E/0000386 Dated: 1st October 1995 Process Type: Local Authority Air Pollution Control Description: Not Supplied **Status: Not Supplied** Positional Accuracy: Automatically positioned to the address	A14NE (E)	620	3	345241 733166
9	**Local Authority Pollution Prevention and Controls** Name: BRE Ltd Location: Fowler Road, West Pitkerro Industrial Estate, DUNDEE, Angus, DD5 3RU Authority: Scottish Environment Protection Agency, East Region Permit Reference: EPA/6/95 Dated: 18th September 1995 Process Type: Local Authority Air Pollution Control Description: Part B process (no specific reference) **Status: Authorised** Positional Accuracy: Automatically positioned to the address	A14NE (E)	621	3	345241 733171
10	**Local Authority Pollution Prevention and Controls** Name: Brown & Tawse... Location: Fowler Road West, West Pitkerro Industrial Estate, Dundee, Dd53yn Authority: Scottish Environment Protection Agency, East Region Permit Reference: Apc/E/363 Dated: 21st April 1994 Process Type: Local Authority Air Pollution Control Description: Part B - General Coating Process (No Specific Reference) **Status: Not Supplied** Positional Accuracy: Manually positioned to the address or location	A14NE (E)	831	3	345436 733266
	Nearest Surface Water Feature	A13SE (E)	0	-	344615 732960
	River Quality Name: Not Supplied GQA Grade: River Quality A Reach: Not Supplied Estimated Distance (km): Not Supplied Flow Rate: Not Supplied Flow Type: Not Supplied Year: 1990	A8SW (S)	628	2	344408 732193
	Groundwater Vulnerability Geological Classification: Major or Highly Permeable Aquifer - Highly permeable strata usually with a known or probable presence of significant fracturing Soil Classification: Soils of Intermediate Leaching Potential - Soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer Map Sheet: Map of Scotland Scale: 1:625,000	A13NE (S)	0	2	344565 732977
	Drift Deposits None				
	River Flood Data (Scotland) Type: Flood Plain Depth 1 - 2 Metres Flood Plain Type: 1-2m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13NE (S)	0	4	344565 732977
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13NE (S)	0	4	344565 732977

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SW (SW)	63	4	344450 732850
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (S)	83	4	344650 732750
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (S)	110	4	344565 732700
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (SE)	142	4	344700 732700
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (SE)	146	4	344800 732800
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (SE)	207	4	344750 732650
	River Flood Data (Scotland) Type: Flood Plain Depth 0 -1 Metres Flood Plain Type: 0-1m estimated 100yr flood depth Source: Centre for Ecology and Hydrology	A13SE (SE)	210	4	344850 732750
	Detailed River Network Lines None				
	Detailed River Network Offline Drainage None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	**Integrated Pollution Control Registered Waste Sites** Name: Dundee Council Location: Baldovie Incineration Plant, Forties Road, DUNDEE, Dundee City, DD4 0NS Authority: Scottish Environment Protection Agency, East Region Permit Reference: Ipc/E/75 Dated: 2nd October 1995 Process Type: Not Given Description: 5.1 Incineration within the Waste Disposal Industry **Status: Revoked** Positional Accuracy: Manually positioned to the address or location	A13NW (NW)	0	3	344498 733033
12	**Integrated Pollution Control Registered Waste Sites** Name: Dundee Energy Recycling Ltd Location: Forties Road,, Baldovie Industrial Estate, Dundee Authority: Scottish Environment Protection Agency, East Region Permit Reference: Ipc/E/0020018 Dated: 27th February 2001 Process Type: Integrated Pollution Control (Part A Processes) Description: Not Supplied **Status: Not Supplied** Positional Accuracy: Manually positioned to the road within the address or location	A13SW (W)	6	3	344484 732975
	Local Authority Landfill Coverage Name: Dundee City Council - Has no landfill data to supply		0	9	344565 732977
	Local Authority Landfill Coverage Name: Angus Council - Has no landfill data to supply		733	10	344899 733817
13	**Registered Waste Transfer Sites** Licence Holder: Dundee City Council Licence Reference: WML/E/20006 Site Location: Baldovie Autoclave/Transfer, Forties Road, Dundee, Angus Operator Location: 21 City Square, City Chambers, DUNDEE, Angus, DD1 3BY Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Civic Amenity - with transfer Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 7th April 2000 Preceded By Licence: WML/E/20006 Superseded By Licence: Not Given Positional Accuracy: Positioned by the supplier Boundary Quality: Moderate Authorised Waste: Anatomical Parts; Animal Carcasses And Flesh; Civic Amenity Waste; Clinical Wastes; Commercial & Industrial Waste; Highly Infectious Wastes; Household Waste; Maximum Storage In Licence; Maximum Waste To C.A.Site; Maximum Waste To Transfer Station; Overall Maximum Waste Permitted By Licence; Pharmaceutical Waste; Special Waste (As In Epa 1990:S62 Of 1996 Regs); Substances In Control Of Radioactive Substances Act 1960 Prohibited Waste: Animal Carcasses; Asbestos; Clinical - As In Control.Led Waste Regs 1992; Garden Chemicals; Lead/Acid Batteries; Liquid Wastes; Liquid Wastes - Of Any Sort; Refrigeration Equipment Containing Cfcs; Sludge Wastes; Special Waste (As In Epa 1990:S62 Of 1996 Regs); Substances In Control Of Radioactive Substances Act 1960; Waste Motor Oil	A13NE (S)	0	5	344565 732977

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	**Registered Waste Transfer Sites** Licence Holder: Dundee City Council Licence Reference: WML/E/20006 Site Location: Baldovie Autoclave/Transfer, Forties Road, Dundee, Angus Operator Location: 21 City Square, City Chambers, DUNDEE, Angus, DD1 3BY Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Civic Amenity - with transfer Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Record supersededSuperseded Dated: 11th March 1998 Preceded By Licence: WML/E/20006 (20013) Superseded By Licence: WML/E/20006 Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Animal Carcasses Clinical - As In Control.Waste Regs'92 Clinical Waste Com. & Ind. Waste Household Waste Liquid Wastes Max.Waste At Trsnsfer St'N Max.Waste To Autoclave Max.Waste To C.A.Site Max.Waste To Trsnsfer St'N Overall Max.Waste Permitted By Lic. Sludge Wastes Special Wastes (As In '96 Regs) Sub'S Control. Radioactive Subs Act'60 Prohibited Waste: Anatomical Parts Animal Carcasses Asbestos Garden Chemicals Highly Infectious Wastes Lead/Acid Batteries Liquid Wastes Pharmaceuticals Refrig'N Equip. Containing Cfcs Special Wastes (As In '96 Regs) Sub'S Control. Radioactive Subs Act'60 Waste Motor Oil Waste N.O.S.	A13NW (N)	0	5	344550 733050
14	**Registered Waste Transfer Sites** Licence Holder: Dundee City Council Licence Reference: WML/E/20080 Site Location: Baldovie C.A.Site, Forties Road, DUNDEE, Angus, DD4 0NS Operator Location: Tayside House, Crighton Street, Dundee, Angus Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Civic Amenity Max Input Rate: Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Licence has completion certificateSurrendered Dated: 1st June 1997 Preceded By Licence: DDC 006 (RES) Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Commercial Waste (S75 Epa'90) Household Waste (May Incl.) Lead/Acid Batteries Max.Waste Permitted By Licence Waste Oil Prohibited Waste: Waste N.O.S.	A13NW (NW)	0	5	344550 733000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
15	**Registered Waste Transfer Sites** Licence Holder: Archibald Banks T/A Pyot Reclaim Licence Reference: Wml/E/20213 Site Location: Pyot Reclaim Transfer Station, Pearce Avenue, West Pitkerro Industrial Estate, Dundee, Angus Operator Location: 3 Middleton Farm Cottages, Dundee, Angus, Dd4 0pq Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Transfer Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 25th May 2002 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the road within the address or location Boundary Quality: Not Supplied Authorised Waste: Acid In Lead/Acid Batteries From Householders Household & Commercial Waste Inactive Waste Maximum Waste Permitted By Licence Waste Oil From Householders Prohibited Waste: Liquid Waste Not Otherwise Specified - Except Other Waste / Waste Not Otherwise Specified Special Waste (As In Epa 1990:S62 Of 1996 Regs)	A9NE (SE)	823	5	345450 732610
16	**Registered Waste Treatment or Disposal Sites** Licence Holder: Eddie Dunn Autobreakers Ltd Licence Reference: Wml/E/220118 Site Location: 5 Beryl Street, Baldovie Industrial Estate, Dundeee, Angus, Dd4 0hx Operator Location: 11 Panbride Road, Carnoustie, Angus, Dd7 6hs Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: End of Life Vehicles Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 15th October 2004 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Maximum Storage In Licence Maximum Waste Permitted By Licence Waste Motor Vehicles Prohibited Waste: Other Waste / Waste Not Otherwise Specified	A13SE (S)	0	5	344615 732827
17	**Registered Waste Treatment or Disposal Sites** Licence Holder: Mr & Mrs C Mc Callum (As Partners Of Csr) Licence Reference: Wml/E/220065 Site Location: 1 Beryl Street, Baldovie Industrial Estate, Dundeee, Angus, Dd4 0hx Operator Location: 24 Baldovan Road, Dundee, Angus, Dd3 9ea Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: End of Life Vehicles Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 24th September 2004 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Maximum Storage In Licence Maximum Waste Permitted By Licence Waste Motor Vehicles Prohibited Waste: Other Waste / Waste Not Otherwise Specified	A13SE (S)	0	5	344594 732823

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
18	**Registered Waste Treatment or Disposal Sites** Licence Holder: Dundee City Council Licence Reference: WML/E/20006 (20013) Site Location: Baldovie Transfer/Treatment Plant, Forties Road, Dundee, Angus Operator Location: 21 City Square, City Chambers, DUNDEE, Angus, DD1 3BY Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Transfer - with treatment Max Input Rate: Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Record supersededSuperseded Dated: 11th September 1996 Preceded By Licence: Not Given Superseded By Licence: WML/E/20006 Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Animal Carcasses Clinical Waste Clinical Wastes Household/Com./Ind. Waste Liquid Wastes Max.Waste Permitted By Licence Sludge Wastes Special Wastes (As In '96 Regs) Sub'S Control. Radioactive Subs Act'60 Prohibited Waste: Anatomical Parts Animal Carcasses Highly Infectious Wastes Pharmaceuticals Special Wastes (As In '96 Regs) Sub'S Control. Radioactive Subs Act'60	A13NW (N)	0	5	344550 733050
18	**Registered Waste Treatment or Disposal Sites** Licence Holder: City Of Dundee D.C. Licence Reference: DDC 006 (RES) Site Location: Baldovie Incinerator Plant, Forties Road, DUNDEE, Angus, DD4 0NS Operator Location: Marchbanks, 34 Harefield Road, DUNDEE, Angus, DD2 3JW Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Incineration - with civic amenity Max Input Rate: Large (Equal to or greater than 75,000 and less than 250,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Record supersededSuperseded Dated: 1st January 1985 Preceded By Licence: Not Given Superseded By Licence: WML/E/20080 Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Animal Carcasses Clinical Wastes Confidential Waste Domestic & Commercial Waste Hospital Wastes Incl. Max.Waste Permitted By Licence Medical Wastes Modif'N Wastes Not To Hand Pharmaceutical Waste Selected Industrial Wastes Selected Special Wastes Prohibited Waste: Halogenated Cmpds	A13NW (NW)	0	5	344550 733000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	**Registered Waste Treatment or Disposal Sites** Licence Holder: Dundee Alloys Licence Reference: 90/2 Site Location: Forties Road, Baldovie Industrial Estate, Dundee, Angus Operator Location: 8 Lenton Terrace, Millgate, Newark, Nottinghamshire Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Treatment Max Input Rate: Undefined Waste Source Restrictions: No known restriction on source of waste Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 1st November 1991 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Manually positioned to the road within the address or location Boundary Quality: Not Supplied Authorised Waste: Aluminium Slag Prohibited Waste: Waste N.O.S.	A13NW (NW)	5	5	344470 733050
20	**Registered Waste Treatment or Disposal Sites** Licence Holder: A M Tolan T/A A M T Motors Licence Reference: Wml/E/220137 Site Location: Beryl Street, Baldovie Industrial Estate, Dundeee, Angus Operator Location: Beryl Street, Baldovie Industrial Estate, Dundeee, Angus Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: End of Life Vehicles Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 8th October 2004 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Maximum Storage In Licence Maximum Waste Permitted By Licence Waste Motor Vehicles Prohibited Waste: Other Waste / Waste Not Otherwise Specified	A13SE (S)	66	5	344610 732760
21	**Registered Waste Treatment or Disposal Sites** Licence Holder: Dundee & Ferry Skiphire & Recycling Licence Reference: Wml/E/0120047 Site Location: Site 5 Piper Street, Baldovie Industrial Estate, Dundee, Angus Operator Location: Piper Street, Baldovie Industrial Estate, Dundee, Angus Authority: Scottish Environment Protection Agency - East Region, Perth Office Site Category: Transfer - with treatment Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source Restrictions: No known restriction on source of waste Licence Status: Operational as far as is knownOperational Dated: 8th July 2003 Preceded By Licence: Not Given Superseded By Licence: Not Given Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Acid In Lead/Acid Batteries From Households Commercial Waste Household Waste Inactive Waste Industrial Waste Maximum Waste Permitted By Licence Waste Oil From Households Prohibited Waste: Liquid Waste - Except Other Waste / Waste Not Otherwise Specified Special Waste (As In Epa 1990:S62 Of 1996 Regs)	A13SW (W)	94	5	344397 732962

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Arbuthnott-Garvock Group	A13NE (S)	0	6	344565 732977
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	0	6	344500 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (N)	0	6	344564 732982
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (S)	0	6	344565 732977
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (NW)	0	6	344526 733023
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	0	6	344610 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (N)	0	6	344565 733000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SW (S)	2	6	344562 732807
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	5	6	344483 732986
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	59	6	344425 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	92	6	344389 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (N)	123	6	344486 733247
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (S)	157	6	344606 732666

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	194	6	344287 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (SW)	330	6	344162 732696
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	338	6	345000 732977
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14SW (E)	343	6	345000 732803
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	351	6	345000 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (NW)	363	6	344150 733301

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	378	6	345000 733137
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (W)	420	6	344060 732983
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SW (N)	428	6	344420 733540
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	450	6	345101 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NW (E)	450	6	345096 733041
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (W)	463	6	344000 733000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (W)	463	6	344000 733109
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	466	6	345000 733402
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (NE)	470	6	344887 733527
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SW (N)	474	6	344366 733575
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (N)	475	6	344794 733581
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (W)	476	6	344000 732977

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (W)	484	6	344000 732958
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	485	6	344953 733488
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A9NW (SE)	487	6	345000 732489
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SW (N)	505	6	344396 733613
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	508	6	344988 733486
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (W)	512	6	344000 732814

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	517	6	345000 733485
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (W)	524	6	344000 732746
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	537	6	345000 733514
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	559	6	345000 733546
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12NE (W)	561	6	343913 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	583	6	345090 733478

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	596	6	345024 733575
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SW (W)	601	6	343880 732958
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NE (SW)	637	6	344000 732445
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17SE (NW)	690	6	344000 733624
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17SE (NW)	690	6	343971 733597
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NW (NE)	690	6	345000 733714

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17NE (NW)	693	6	344031 733654
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17NE (NW)	722	6	344176 733774
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17NE (NW)	723	6	344164 733770
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A17SE (NW)	737	6	343927 733618
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18NW (N)	782	6	344299 733876
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	791	6	344000 732215

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	791	6	343918 732292
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NW (NE)	792	6	345000 733833
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	792	6	344003 732212
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	796	6	344000 732209
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	805	6	344102 732123
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A8SE (S)	810	6	344565 732000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NW (NE)	814	6	345093 733800
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (SW)	819	6	343824 732381
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SW (W)	826	6	343697 732725
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (S)	840	6	344201 732034
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	858	6	344565 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A8SW (S)	858	6	344238 732000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SW (N)	862	6	344526 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	862	6	344701 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NW (NE)	863	6	345120 733841
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NW (NE)	874	6	345000 733926
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (SW)	875	6	343710 732484
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (S)	886	6	344162 732000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	889	6	344691 734028
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	893	6	344723 734029
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SW (N)	894	6	344347 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A14NE (E)	897	6	345554 733000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A9SW (SE)	903	6	345000 732000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	930	6	344677 734070

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NE (NE)	934	6	345382 733674
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SW (N)	935	6	344553 734075
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	935	6	344000 732034
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A24SW (NE)	941	6	345000 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A3NW (S)	949	6	344375 731872
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SE (N)	949	6	344700 734087

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (W)	953	6	343595 732589
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (W)	960	6	343588 732588
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A24SW (NE)	961	6	345046 734000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	963	6	344000 732000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (W)	963	6	343585 732587
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SE (NE)	976	6	345468 733613

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SW (N)	978	6	344288 734074
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7SE (SW)	984	6	343963 732000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A23SW (N)	987	6	344430 734117
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sed Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 120 - 180 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NE (NE)	999	6	345396 733763
22	**BGS Recorded Mineral Sites** Site Name: Ballumbie Location: , Dundee, Angus Source: British Geological Survey, National Geoscience Information Service Reference: 26824 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Unknown Operator Periodic Type: Silurian, Devonian Geology: Midland Valley Siluro-Devonian Mafic Intrusion Suite Commodity: Igneous and Metamorphic Rock Positional Accuracy: Located by supplier to within 10m	A17NE (NW)	939	6	343985 733920
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	6	344564 732982

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	6	344564 732982
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	123	6	344486 733247
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	157	6	344606 732666
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	6	344564 732982
	Radon Potential - Radon Protection Measures Protection Measure: Stage 1 radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	0	6	344576 732972
	Radon Potential - Radon Affected Areas Affected Area: The property is in an intermediate probability radon area, as between 1 and 3% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	6	344565 732977
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	0	6	344576 732972

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
23	**Contemporary Trade Directory Entries** Name: Dundee Energy Recycling Ltd Location: Forties Road, Dundee, DD4 0NS Classification: Waste Disposal Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (S)	0	-	344565 732901
24	**Contemporary Trade Directory Entries** Name: Eden Springs Dundee Location: Baldovie Industrial Estate, Piper Street, Dundee, DD4 0NT Classification: Water Coolers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13NW (W)	35	-	344448 733009
25	**Contemporary Trade Directory Entries** Name: Csr Baldovie Auto Breakers Location: 1, Beryl Street, Dundee, DD4 0HX Classification: Car Breakers & Dismantlers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (S)	39	-	344603 732786
25	**Contemporary Trade Directory Entries** Name: Eddie Dunn Location: 3 Beryl St, Dundee, Angus, DD4 0HX Classification: Car Breakers & Dismantlers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A13SE (S)	39	-	344603 732786
25	**Contemporary Trade Directory Entries** Name: Waste2use.Co.Uk Ltd Location: 5 Beryl St, Dundee, Angus, DD4 0HX Classification: Recycling Centres **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (S)	48	-	344595 732775
26	**Contemporary Trade Directory Entries** Name: Computer Recycling Services Location: Unit 4, Baldovie Industrial Estate, Piper Street, Dundee, DD4 0NT Classification: Computer Recycling & Disposal **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	61	-	344413 733147
27	**Contemporary Trade Directory Entries** Name: Supamix Mini Mix Location: Piper St, Dundee, Angus, DD4 0NT Classification: Concrete & Mortar Ready Mixed **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13NW (W)	98	-	344380 733024
28	**Contemporary Trade Directory Entries** Name: Wood Group Heavy Industrial Turbines Ltd Location: Drumgeith Road, DUNDEE, DD4 0NZ Classification: Engineering Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (W)	174	-	344293 733072
29	**Contemporary Trade Directory Entries** Name: Paterson Skip Hire & Recycling Location: Unit 5,Baldovie Ind Est, Piper Street, Dundee, Angus, DD4 0NT Classification: Builders' Merchants **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A13SW (W)	174	-	344318 732948
29	**Contemporary Trade Directory Entries** Name: Pioneer Concrete (Uk) Ltd Location: Baldovie Indust Est,Piper St, Dundee, DD4 0NT Classification: Concrete & Mortar Ready Mixed **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13NW (W)	179	-	344303 732996
29	**Contemporary Trade Directory Entries** Name: Hanson Premix Location: Baldovie Industrial Estate, Piper Street, Dundee, Angus, DD4 0NT Classification: Concrete & Mortar Ready Mixed **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (W)	182	-	344309 732954
29	**Contemporary Trade Directory Entries** Name: Ferguson Location: Baldovie Industrial Estate, Piper Street, Dundee, DD4 0NT Classification: Coal & Smokeless Fuel Merchants & Distributors **Status: Inactive** Positional Accuracy: Automatically positioned in the proximity of the address	A13SW (W)	201	-	344289 732955

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
30	**Contemporary Trade Directory Entries** Name: T C O Location: Unit 5, Baluniefield Trading Estate, Balunie Drive, Dundee, DD4 8UT Classification: Hardware **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	218	-	344520 732592
30	**Contemporary Trade Directory Entries** Name: Rembrand Timber Ltd Location: Baluniefield Trading Estate, Balunie Drive, Dundee, DD4 8UT Classification: Door Manufacturers - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	249	-	344519 732561
31	**Contemporary Trade Directory Entries** Name: Bunzl Cleaning & Hygiene Supplies Location: Unit 4, Baluniefield Trading Estate, Balunie Drive, Dundee, DD4 8UT Classification: Cleaning Materials & Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	229	-	344460 732589
31	**Contemporary Trade Directory Entries** Name: C P Garage Services Ltd Location: 3, Baluniefield Trading Estate, Balunie Drive, Dundee, Angus, DD4 8UT Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	248	-	344458 732570
32	**Contemporary Trade Directory Entries** Name: Clean & Clear Location: 123, Hawick Drive, Dundee, DD4 0TB Classification: Commercial Cleaning Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (NE)	295	-	344839 733333
33	**Contemporary Trade Directory Entries** Name: Kenway Tyres Location: Balunie Drive, DUNDEE, Angus, DD4 8UU Classification: Tyre Dealers **Status: Active** Positional Accuracy: Manually positioned to the road within the address or location	A8NW (S)	309	-	344519 732501
34	**Contemporary Trade Directory Entries** Name: Harry Lawson Ltd Location: Balunie Drive, Dundee, DD4 8UU Classification: Road Haulage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NE (S)	327	-	344729 732516
35	**Contemporary Trade Directory Entries** Name: P & K Heating Ltd Location: 6, Hawick Drive, DUNDEE, DD4 0TA Classification: Central Heating Supplies & Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A18SE (N)	341	-	344695 733473
36	**Contemporary Trade Directory Entries** Name: Harry Lawson Ltd Location: Balunie Drive, Dundee, DD4 8UU Classification: Road Haulage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NE (SE)	428	-	344895 732479
36	**Contemporary Trade Directory Entries** Name: Tayside Tyres Ltd Location: Balunie Drive, Dundee, DD4 8UU Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8NE (SE)	428	-	344895 732479
37	**Contemporary Trade Directory Entries** Name: Bag Supplies F I B C Ltd Location: 83, Hawick Drive, DUNDEE, DD4 0JY Classification: Paper & Cardboard Products & Packaging - Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A19SW (NE)	435	-	344970 733392
38	**Contemporary Trade Directory Entries** Name: Vermgon Location: 27, Balmoral Gardens, Dundee, DD4 8SB Classification: Pest & Vermin Control **Status: Active** Positional Accuracy: Automatically positioned to the address	A8NW (S)	508	-	344560 732303

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
39	**Contemporary Trade Directory Entries** Name: Michelin Tyre Location: Baldovie Road, Dundee, DD4 8UQ Classification: Tyre Manufacturers & Distributors **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SW (SE)	511	-	345154 732713
40	**Contemporary Trade Directory Entries** Name: X M Garage Services Location: Broughty Ferry Walk, Dundee, DD4 8UX Classification: Garage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NW (SE)	557	-	345049 732439
41	**Contemporary Trade Directory Entries** Name: Winters Office Supplies Ltd Location: Unit 16,Barlow Park, West Pitkerro Ind Est/Broughty, Dundee, Angus, DD5 3UB Classification: Office Furniture & Equipment **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A14SE (E)	583	-	345245 732918
41	**Contemporary Trade Directory Entries** Name: Pro-Check Environmental Services Northern Ltd Location: Unit 1, Barlow Avenue, Broughty Ferry, Dundee, DD5 3RS Classification: Pest & Vermin Control **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SE (E)	617	-	345278 732934
41	**Contemporary Trade Directory Entries** Name: Steven Clenaghan Location: Unit 2,Barlow Pk, West Pitkerro Ind Est/Broughty, Dundee, DD5 3UB Classification: Garage Services **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A14SE (E)	624	-	345286 732934
41	**Contemporary Trade Directory Entries** Name: G N C Associates (Uk) Ltd Location: Unit 3, Barlow Avenue, Broughty Ferry, Dundee, DD5 3RS Classification: Carpet, Curtain & Upholstery Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	635	-	345296 732935
42	**Contemporary Trade Directory Entries** Name: Mctavish Ramsay & Co Ltd Location: Fowler Road, Broughty Ferry, Dundee, DD5 3RN Classification: Door Manufacturers - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NW (E)	586	-	345236 733023
42	**Contemporary Trade Directory Entries** Name: G A Engineering Sliding Head Division Location: Fowler Road, Broughty Ferry, Dundee, DD5 3RU Classification: Precision Engineers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NW (E)	586	-	345236 733023
43	**Contemporary Trade Directory Entries** Name: Chips Away Car Care Location: Unit 17 Barlow Pk, West Pitkerro Ind Est/Broughty, Dundee, DD5 3UB Classification: Car Painters & Sprayers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A14SE (E)	592	-	345254 732874
43	**Contemporary Trade Directory Entries** Name: Medical Instrumentation Location: 18, Barlow Park, Broughty Ferry, Dundee, DD5 3UB Classification: Medical Equipment Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	594	-	345256 732861
43	**Contemporary Trade Directory Entries** Name: Green Core Location: Barlow Park,Barlow Av, West Pitkerro Ind Estat, Dundee, Angus, DD5 3UB Classification: Food Products - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14SE (E)	610	-	345272 732880

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
44	**Contemporary Trade Directory Entries** Name: Ravensby Glass Co Ltd Location: Fowler Road, Broughty Ferry, Dundee, DD5 3RU Classification: Glass Products - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NW (E)	617	-	345236 733171
45	**Contemporary Trade Directory Entries** Name: Abacus Location: 13, Balunie Place, Dundee, DD4 8ST Classification: Carpet, Curtain & Upholstery Cleaners **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8SE (S)	618	-	344725 732220
46	**Contemporary Trade Directory Entries** Name: Katrina Cleaning Location: 75, Balunie Avenue, Dundee, DD4 8RB Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8SW (S)	642	-	344435 732174
47	**Contemporary Trade Directory Entries** Name: I C S2 Location: Unit 1-3,Pearce Av, West Pitkerro Ind Est/Broughty, Dundee, Angus, DD5 3RX Classification: Electrical Goods Sales, Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14SE (SE)	646	-	345284 732672
47	**Contemporary Trade Directory Entries** Name: G B M Services (Scotland) Ltd Location: Unit H, Scottway, Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Cleaning Services - Commercial **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	672	-	345298 732629
47	**Contemporary Trade Directory Entries** Name: Wright Clean Location: Unit H, Scottway, Pearce Avenue, Broughty Ferry, Dundee, Angus, DD5 3RX Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	672	-	345298 732629
47	**Contemporary Trade Directory Entries** Name: Inverlea Supplies Location: Unit H, Scottway, Pearce Avenue, Broughty Ferry, Dundee, Angus, DD5 3RX Classification: Engineers - General **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	672	-	345298 732629
47	**Contemporary Trade Directory Entries** Name: C & G Autos Location: Unit A, Scottway, Pearce Avenue, West Pitkerro Industrial Estate, Broughty Ferry, Dundee, Angus, DD5 3RX Classification: Garage Services **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A14SE (SE)	679	-	345316 732667
48	**Contemporary Trade Directory Entries** Name: Select Wallpaper & Fabric Location: 1c, Ainslie Street, Broughty Ferry, Dundee, DD5 3RR Classification: Wallpapers & Wall Coverings **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SE (E)	653	-	345296 732696
49	**Contemporary Trade Directory Entries** Name: Ironing Express Location: Unit E, Scottway, Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Ironing & Home Laundry Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	695	-	345325 732637
49	**Contemporary Trade Directory Entries** Name: Smith Electrical & Security Contractors Location: Unit I, Scottway, Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Electrical Engineers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	700	-	345327 732629

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	**Contemporary Trade Directory Entries** Name: Tayside Automatic Doors Location: Unit N, Scottway, Pearce Avenue, Broughty Ferry, Dundee, Angus, DD5 3RX Classification: Door Manufacturers - Industrial **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	708	-	345322 732588
49	**Contemporary Trade Directory Entries** Name: Aps (Uk) Ltd Location: Scottway, Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Coating Specialists **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	716	-	345331 732588
49	**Contemporary Trade Directory Entries** Name: Pataks Foods Location: Scottway, Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Food Products - Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	753	-	345364 732572
50	**Contemporary Trade Directory Entries** Name: Mw Plastics Location: Fowler Rd, West Pitkerro Ind Est/Broughty, Dundee, Angus, DD5 3RU Classification: Recycling Centres **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14NE (E)	705	-	345346 733078
50	**Contemporary Trade Directory Entries** Name: Tubular Inspection Products Location: Unit 4 Fowler Road, Broughty Ferry, Dundee, Angus, DD5 3RU Classification: Engineering Services **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A14NE (E)	711	-	345345 733111
50	**Contemporary Trade Directory Entries** Name: Goodfellows Of Dundee Location: Unit 6 Pitkerro Park Fowler Road, Broughty Ferry, Dundee, Angus, DD5 3RU Classification: Manufacturers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A14NE (E)	711	-	345345 733111
50	**Contemporary Trade Directory Entries** Name: Dens Metals Ltd Location: Fowler Road, Broughty Ferry, Dundee, Angus, DD5 3RU Classification: Foundries **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14NE (E)	711	-	345345 733111
51	**Contemporary Trade Directory Entries** Name: B R E Ltd Location: Fowler Road, Broughty Ferry, Dundee, DD5 3RU Classification: Air Compressors **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NE (E)	706	-	345317 733225
52	**Contemporary Trade Directory Entries** Name: Unibev Ltd Location: Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Confectionery Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	731	-	345371 732672
52	**Contemporary Trade Directory Entries** Name: I C S 2 Ltd Location: Pearce Avenue, Broughty Ferry, Dundee, DD5 3RX Classification: Cable & Wire Equipment Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SE (E)	731	-	345371 732672
52	**Contemporary Trade Directory Entries** Name: I C S 2 Location: Pearce Avenue, West Pitkerro Industrial Estate, Broughty Ferry, Dundee, Angus, DD5 3RX Classification: Cable & Wire Equipment Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	731	-	345371 732672

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
53	**Contemporary Trade Directory Entries** Name: Witzend Domestic Services Location: 36, Balbeggie Street, Dundee, DD4 8RH Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A8SW (S)	753	-	344266 732102
54	**Contemporary Trade Directory Entries** Name: W B S Keillor Ltd Location: Unit 2, Pitkerro Park, Fowler Road, Broughty Ferry, Dundee, DD5 3RU Classification: Joinery Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NE (E)	775	-	345425 733036
55	**Contemporary Trade Directory Entries** Name: T S Transport Scotland Ltd Location: Ivory Place, Broughty Ferry, DUNDEE, DD5 3RY Classification: Road Haulage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A14SE (E)	781	-	345437 732775
56	**Contemporary Trade Directory Entries** Name: Alba Self Adhesive Tape Supply Co Ltd Location: 10, Rhynie Road, Broughty Ferry, Dundee, DD5 1RH Classification: Adhesives, Glues & Sealants **Status: Active** Positional Accuracy: Automatically positioned to the address	A8SW (S)	804	-	344461 732008
57	**Contemporary Trade Directory Entries** Name: Tayside Diesel Engineering Ltd Location: Fowler Road, Broughty Ferry, DUNDEE, DD5 3RU Classification: Marine Engineers **Status: Active** Positional Accuracy: Automatically positioned to the address	A14NE (E)	804	-	345433 733145
58	**Contemporary Trade Directory Entries** Name: Declutterz Location: 8, Ballantrae Place, Dundee, DD4 8QQ Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	807	-	343759 732547
59	**Contemporary Trade Directory Entries** Name: Caravan Service Centre Location: Unit 5,Fowler Rd, West Pitkerro Ind Est/Broughty, Dundee, Angus, DD5 3RU Classification: Caravans - Servicing & Repairs **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14NE (E)	822	-	345468 733066
59	**Contemporary Trade Directory Entries** Name: Agritay Ltd Location: Fowler Road, West Pitkerro Ind Est/, Dundee, DD5 3RY Classification: Container Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A14NE (E)	824	-	345464 733091
60	**Contemporary Trade Directory Entries** Name: Drive-Tec Location: 1, Tom Johnston Road, Dundee, DD4 8XD Classification: Asphalt & Coated Macadam Laying Contractors **Status: Active** Positional Accuracy: Automatically positioned to the address	A9NE (SE)	824	-	345347 732384
61	**Contemporary Trade Directory Entries** Name: Mafio Cleaners Location: 53, Strachan Avenue, Broughty Ferry, Dundee, DD5 1RF Classification: Cleaning Services - Domestic **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7SE (SW)	838	-	344164 732052
62	**Contemporary Trade Directory Entries** Name: Dundee Oven Cleaners Location: 34, Baldovie Road, Dundee, DD4 8UE Classification: Oven cleaning **Status: Active** Positional Accuracy: Automatically positioned to the address	A9SE (SE)	840	-	345272 732262
63	**Contemporary Trade Directory Entries** Name: Home Appliance Services Location: 12, Strachan Avenue, Broughty Ferry, Dundee, DD5 1RE Classification: Washing Machines - Servicing & Repairs **Status: Active** Positional Accuracy: Automatically positioned to the address	A8SW (S)	841	-	344365 731984

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
64	**Contemporary Trade Directory Entries** Name: Thistle Blinds Location: 14, Fithie Bank, Broughty Ferry, Dundee, DD5 3FP Classification: Blinds, Awnings & Canopies **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19NW (NE)	885	-	345169 733831
65	**Contemporary Trade Directory Entries** Name: W Brown Roadworks Ltd Location: Baker Rd, West Pitkerro Ind Est/Broughty, Dundee, Angus, DD5 3RT Classification: Asphalt & Coated Macadam Laying Contractors **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A14SE (E)	890	-	345550 732829
65	**Contemporary Trade Directory Entries** Name: Tokheim Ltd Location: Unit 3, Baker Road, Broughty Ferry, Dundee, DD5 3RT Classification: Petrol Pump Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A14SE (E)	891	-	345550 732829
66	**Contemporary Trade Directory Entries** Name: Beertech Ltd Location: Burnside House, Baldovie, Broughty Ferry, Dundee, DD5 3NX Classification: Air Conditioning & Refrigeration Contractors **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A19SE (NE)	933	-	345486 733471
67	**Contemporary Trade Directory Entries** Name: Morgan Timber Preservations Location: 26, Gotterstone Drive, Broughty Ferry, Dundee, DD5 1QX Classification: Timber Preservation Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A3NW (S)	938	-	344296 731899
68	**Contemporary Trade Directory Entries** Name: Tayside Cable Technologies Ltd Location: Scottway,Pearce Av, West Pitkerro Ind Est/Broughty, Dundee, DD5 3RX Classification: Cable & Wire Equipment Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A15SW (E)	975	-	345630 732754
69	**Fuel Station Entries** Name: Sainsburys Dundee Location: Baldovie Road, A92, Claypotts, Dundee, Angus, DD4 8UG Brand: Sainsburys Premises Type: Hypermarket **Status: Open** Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	942	-	345446 732319

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
70	**Nitrate Vulnerable Zones** Name: Strathmore And Fife Description: Polluted Water Source: Scottish Executive, Geographic Information Service	A13NE (S)	0	7	344565 732977

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Angus Council - Environmental and Consumer Protection	April 2014	Annual Rolling Update
Fife Council - Regional Headquarters	March 2014	Annual Rolling Update
Dundee City Council	October 2013	Annual Rolling Update
Discharge Consents		
Scottish Environment Protection Agency - East Region	June 2001	Not Applicable
Enforcement and Prohibition Notices		
Scottish Environment Protection Agency - East Region	January 2012	Not Applicable
Integrated Pollution Controls		
Scottish Environment Protection Agency - Head Office	February 1998	Variable
Scottish Environment Protection Agency - East Region	March 2002	Not Applicable
Local Authority Pollution Prevention and Controls		
Scottish Environment Protection Agency - East Region	March 2002	Not Applicable
Nearest Surface Water Feature		
Ordnance Survey	July 2012	Quarterly
Prosecutions Relating to Authorised Processes		
Scottish Environment Protection Agency - East Region	March 2007	Not Applicable
Prosecutions Relating to Controlled Waters		
Scottish Environment Protection Agency - East Region	March 2007	Not Applicable
Registered Radioactive Substances		
Scottish Environment Protection Agency - East Region	April 1996	Not Applicable
Scottish Environment Protection Agency - Head Office	January 1998	Not Applicable
River Quality		
Scottish Environment Protection Agency - Head Office	December 1990	Not Applicable
Water Abstractions		
Scottish Executive - Agriculture, Environment and Fisheries Department	December 1997	Not Applicable
Water Industry Act Referrals		
Scottish Environment Protection Agency - East Region	April 1996	Not Applicable
Groundwater Vulnerability		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
Drift Deposits		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
River Flood Data (Scotland)		
Centre for Ecology and Hydrology	September 1999	Not Applicable
Detailed River Network Lines		
Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage		
Environment Agency - Head Office	March 2012	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Integrated Pollution Control Registered Waste Sites		
Scottish Environment Protection Agency - Head Office	January 1998	Not Applicable
Scottish Environment Protection Agency - East Region	March 2002	Not Applicable
Local Authority Landfill Coverage		
Angus Council - Environmental and Consumer Protection	May 2000	Not Applicable
Dundee City Council	May 2000	Not Applicable
Fife Council - Regional Headquarters	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Dundee City Council	April 2003	Not Applicable
Angus Council - Environmental and Consumer Protection	May 2000	Not Applicable
Fife Council - Regional Headquarters	May 2000	Not Applicable
Registered Landfill Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable
Registered Waste Transfer Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable
Registered Waste Treatment or Disposal Sites		
Scottish Environment Protection Agency - East Region	December 2005	Not Applicable
Scottish Environment Protection Agency - East Region - Perth Office	December 2005	Not Applicable
Hazardous Substances	**Version**	**Update Cycle**
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	June 2015	Bi-Annually
Explosive Sites		
Health and Safety Executive	June 2015	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Angus Council - Planning Department	July 2014	Annual Rolling Update
Fife Council - Regional Headquaters	March 2001	Annual Rolling Update
Dundee City Council - Planning Department	March 2014	Annual Rolling Update
Planning Hazardous Substance Consents		
Angus Council - Planning Department	July 2014	Annual Rolling Update
Fife Council - Regional Headquaters	March 2001	Annual Rolling Update
Dundee City Council - Planning Department	March 2014	Annual Rolling Update

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	January 2010	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	November 2015	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Mining Report Service	March 2014	As notified
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	July 2014	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	As notified
Industrial Land Use	**Version**	**Update Cycle**
Contemporary Trade Directory Entries Thomson Directories	November 2015	Quarterly
Fuel Station Entries Catalist Ltd - Experian	August 2015	Quarterly

Sensitive Land Use	Version	Update Cycle
Areas of Unadopted Green Belt		
Fife Council - Regional Headquarters	November 201	As notified
Environmentally Sensitive Areas		
Scottish Executive - Geographic Information Service	October 2015	Annually
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Angus Council	October 2015	Bi-Annually
Dundee City Council	October 2015	Bi-Annually
Fife Council - Regional Headquarters	October 2015	Bi-Annually
Marine Nature Reserves		
Scottish Natural Heritage	February 2012	Bi-Annually
National Nature Reserves		
Scottish Natural Heritage	October 2015	Bi-Annually
Nitrate Vulnerable Zones		
Scottish Executive - Geographic Information Service	October 2015	Annually
Ramsar Sites		
Scottish Natural Heritage	October 2015	Bi-Annually
Sites of Special Scientific Interest		
Scottish Natural Heritage	October 2015	Bi-Annually
Special Areas of Conservation		
Scottish Natural Heritage	October 2015	Bi-Annually
Special Protection Areas		
Scottish Natural Heritage	October 2015	Bi-Annually

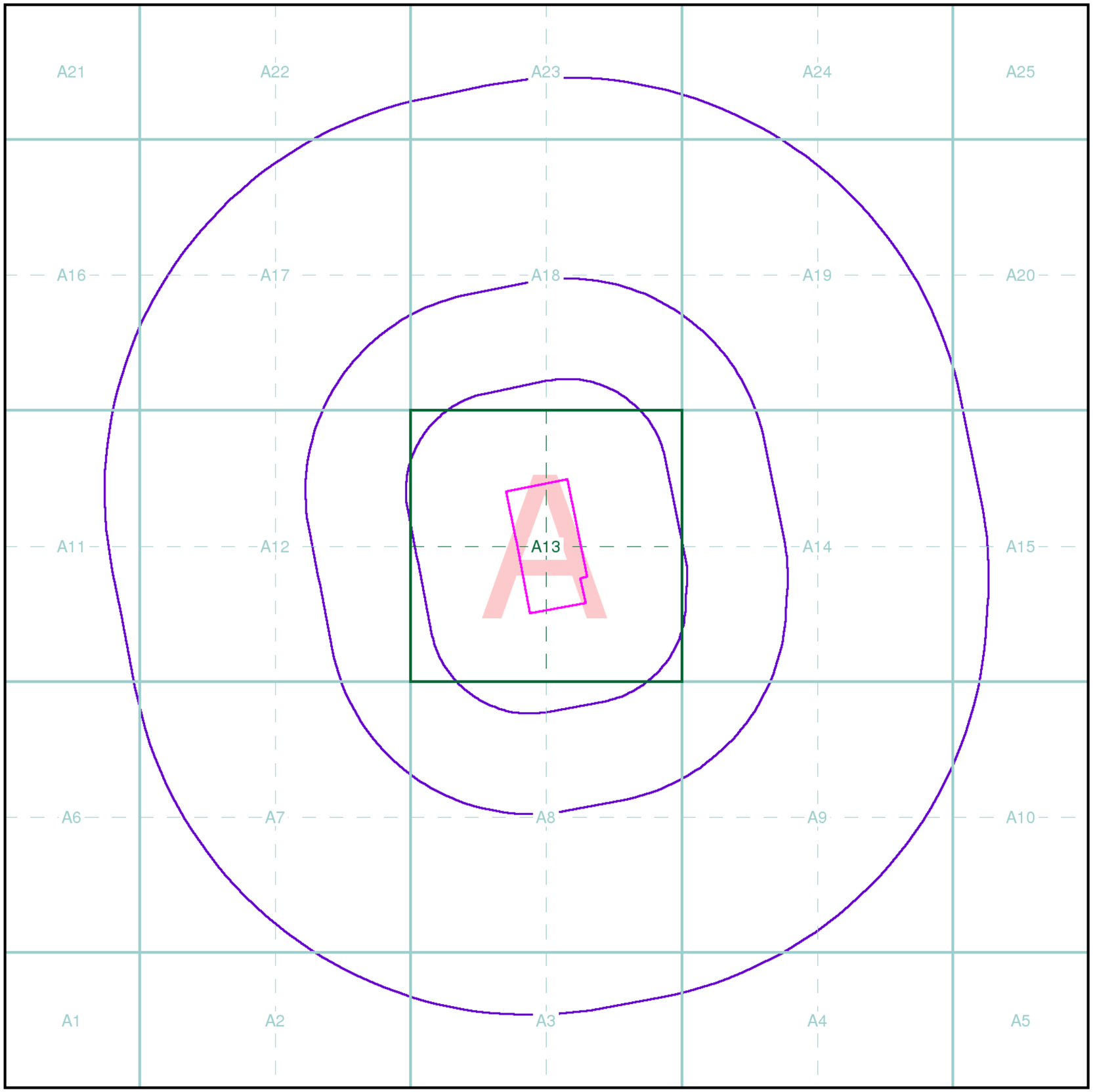
Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Contact	Name and Address	Contact Details
2	**Scottish Environment Protection Agency - Head Office** Erskine Court, The Castle Business Park, Stirling, Stirlingshire, FK9 4TR	Telephone: 01786 457700 Fax: 01786 446885
3	**Scottish Environment Protection Agency - East Region** Clearwater House, Heriot Watt Research Park, Avenue North, Riccarton, Edinburgh, Midlothian, EH14 4AP	Telephone: 0131 449 7296 Fax: 0131 449 7277
4	**Centre for Ecology and Hydrology** Maclean Building, Crowmarsh Gifford, WALLINGFORD, Oxfordshire, OX10 8BB	Telephone: 01491 838800 Fax: 01491 692424
5	**Scottish Environment Protection Agency - East Region - Perth Office** 1 South Street, Perth, Perthshire, PH2 8NJ	Telephone: 01738 627989 Fax: 01738 630997
6	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
7	**Scottish Executive - Geographic Information Service** St Andrews House, Regent Road, Edinburgh, EH1 3DG	Telephone: 0300 244 4000 Email: ceu@gov.scot Website: www.gov.scot
8	**Scottish Natural Heritage** 12 Hope Terrace, Edinburgh, Midlothian, EH9 2AS	Telephone: 0131 447 4784 Fax: 0131 446 2279
9	**Dundee City Council** Tayside House, 28 Crichton Street, Dundee, Perthshire, DD1 3RB	Telephone: 01382 433610 Fax: 01382 433013 Website: www.dundeecity.gov.uk
10	**Angus Council** St James House, St James Road, Forfar, DD8 2ZE	Telephone: 01307 461460 Fax: 01307 461874 Website: www.angus.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.



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Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Ordnance Survey® Licensed Partner

British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL

SEPA Scottish Environment Protection Agency

SCOTTISH NATURAL HERITAGE

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr K Caucis, Ove Arup & Partners International Ltd, Scotstoun House, South Queensferry, West Lothian, EH30 9SE

Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Site Area (Ha):	4.7
Search Buffer (m):	1000

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Full Terms and Conditions can be found on the following link:
http://www.landmarkinfo.co.uk/Terms/Show/515

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Web: www.envirocheck.co.uk

Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

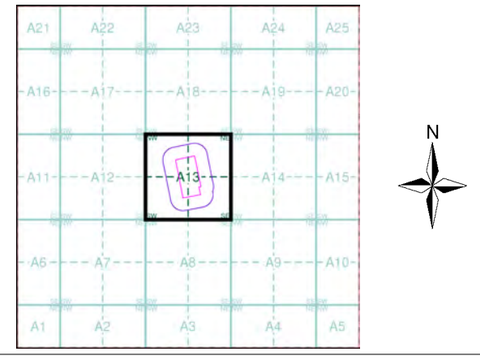
Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Site Sensitivity Map - Segment A13



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group
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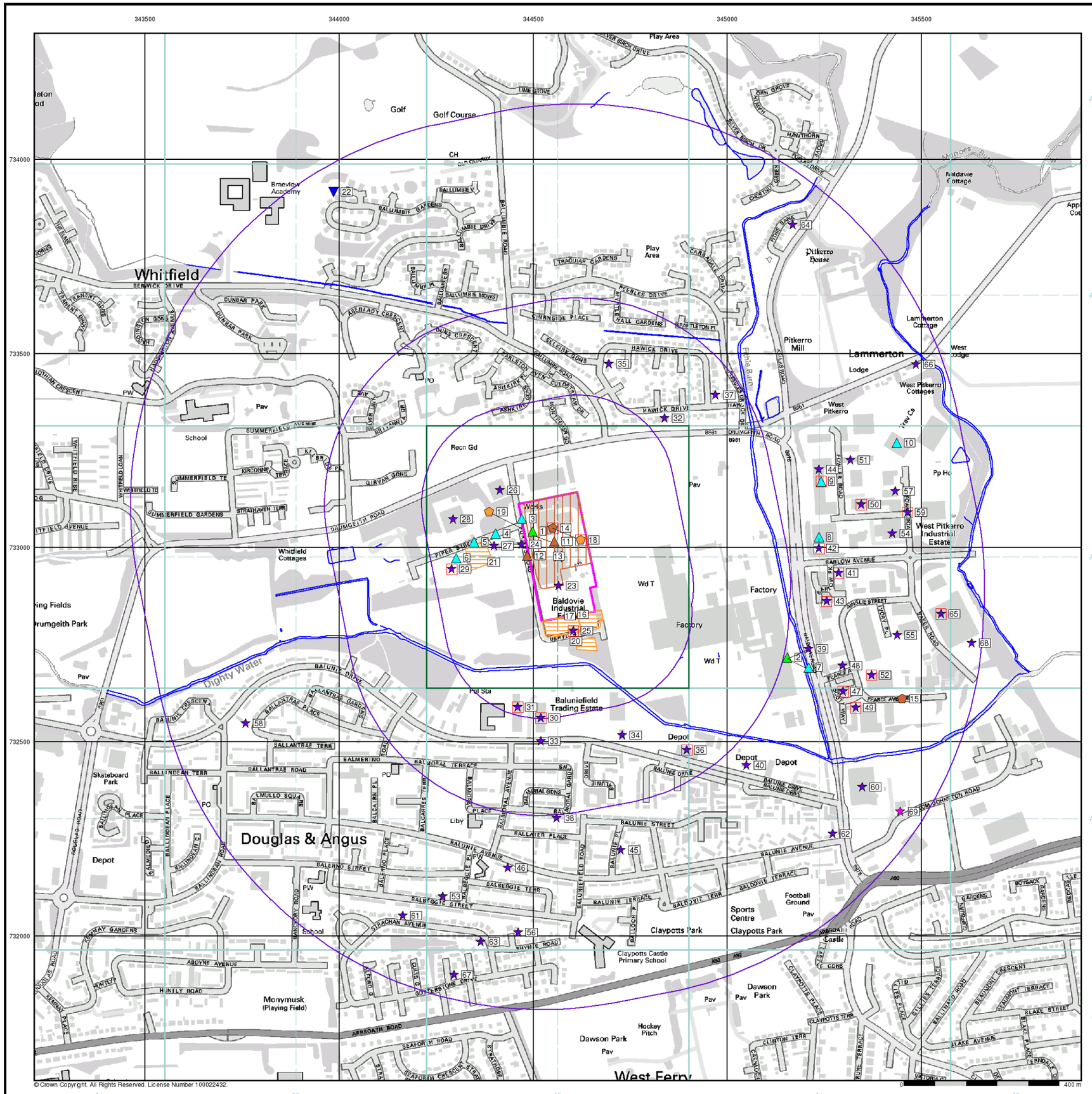

Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
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- Pollution Incident to Controlled Waters
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- Registered Radioactive Substance
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Waste

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- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
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Geological

- BGS Recorded Mineral Site

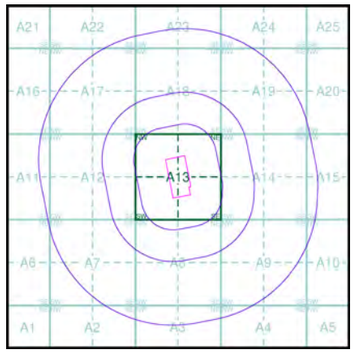
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Slice A



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

Site Details

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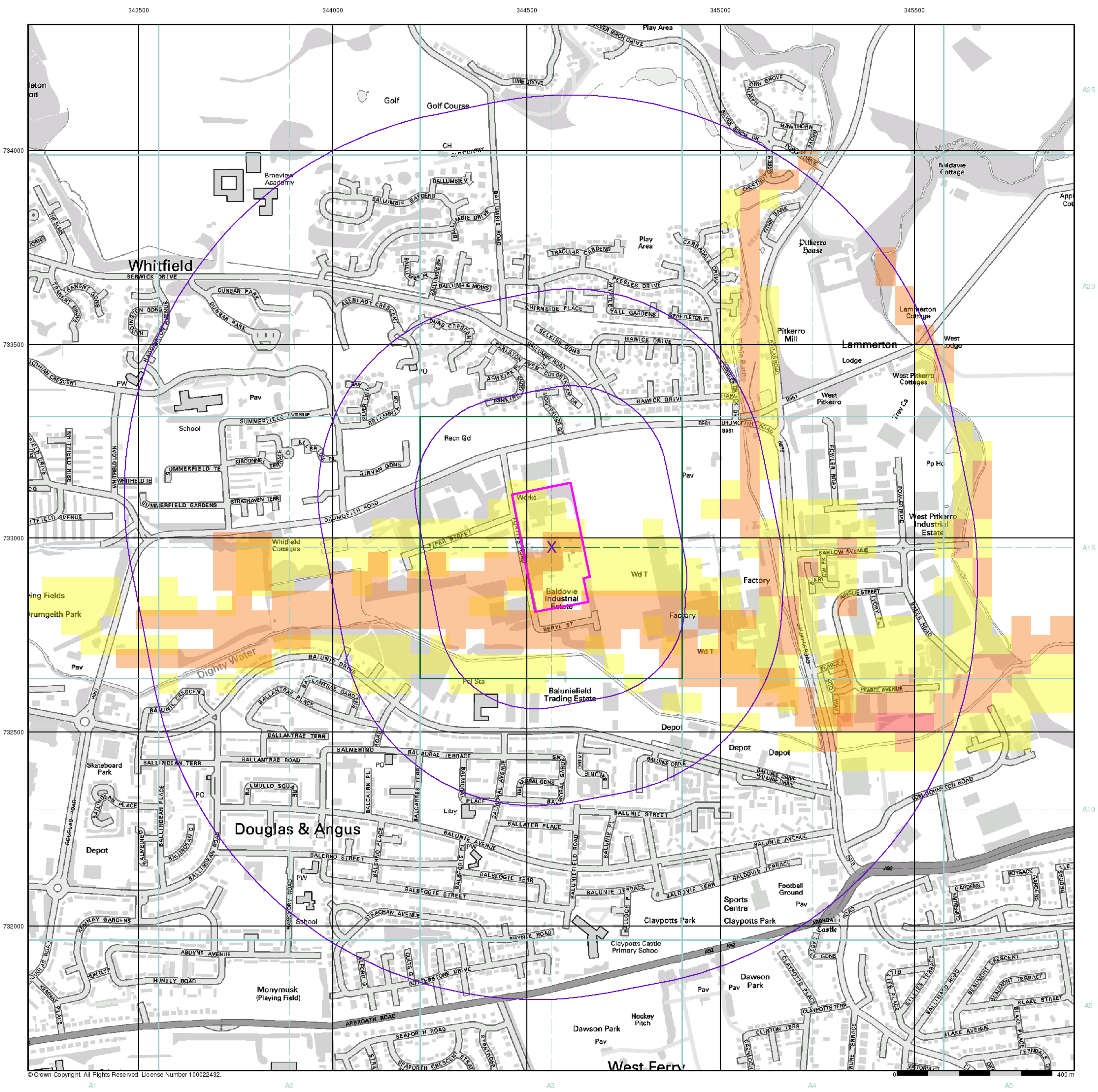

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General

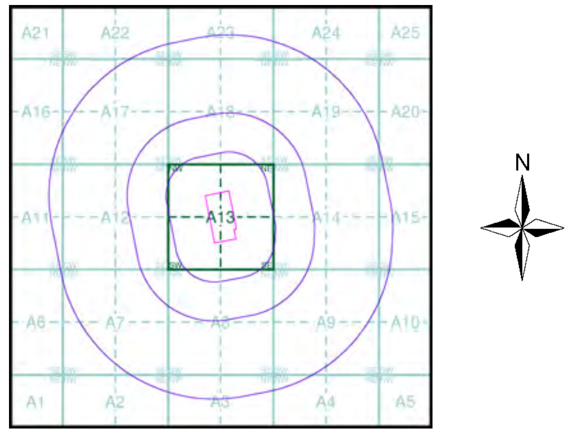
- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

- 0 - 1m estimated 100yr flood depth
- 1 - 2m estimated 100yr flood depth
- Over 2m estimated 100yr flood depth

The flooded areas have been generated using a generalised technique and should not, by themselves, be used to infer that specific areas are or are not at risk of inundation. Flood risk at any specific location may be influenced by local factors - not least flood defence - that have not been taken into account.

Flood Map - Slice A



Order Details

Order Number: 78681553_1_1
Customer Ref: Baldovie Industrial Estate
National Grid Reference: 344570, 732980
Slice: A
Site Area (Ha): 4.7
Search Buffer (m): 1000

Site Details

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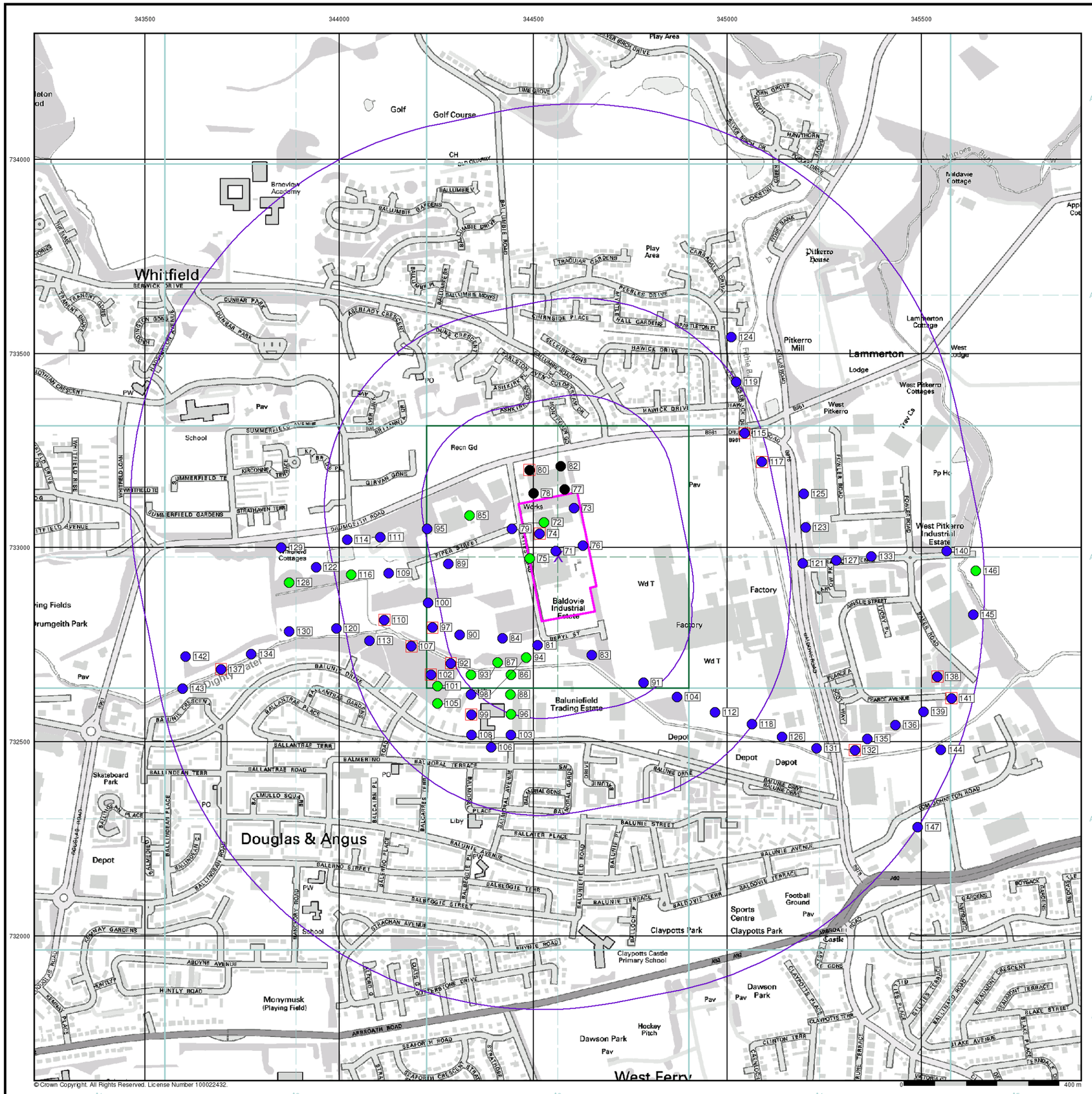


General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

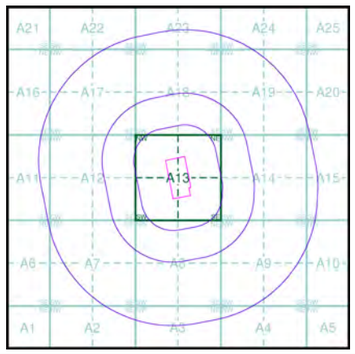
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

Order Number:	78681553_1_1
Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

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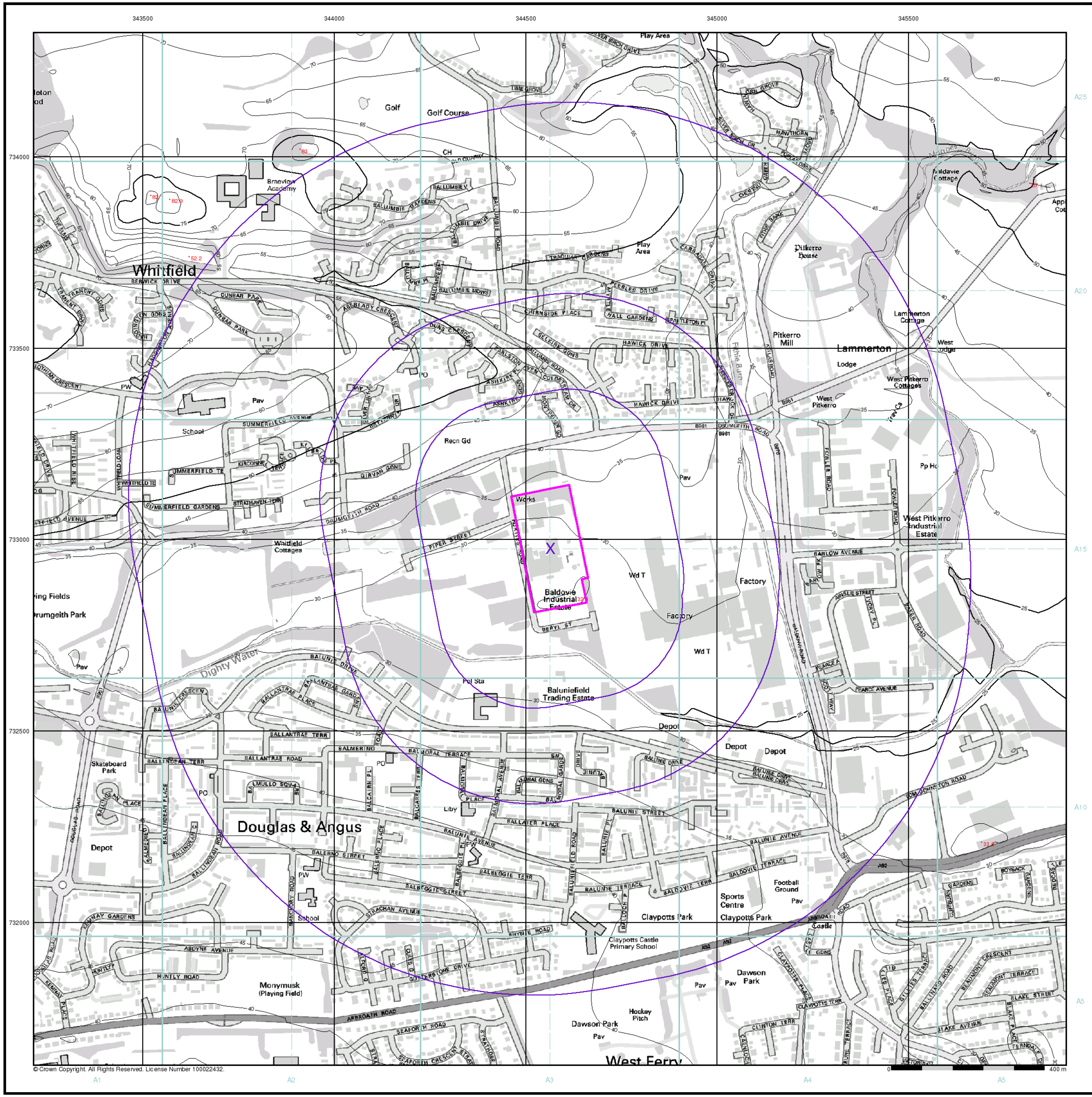

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General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- Map ID

Detailed River Network Data

Primary River	Extended Culvert (greater than 50m)
Secondary River	Underground River (inferred)
Tertiary River	Underground River (local knowledge)
Canal	Downstream of High Water Mark
Canal Tunnel	Downstream of Seaward Extension
Undefined River	Not assigned River feature
Lake/Reservoir	
Offline Drainage Feature	

Contours (height in metres)

Standard Contour — 105

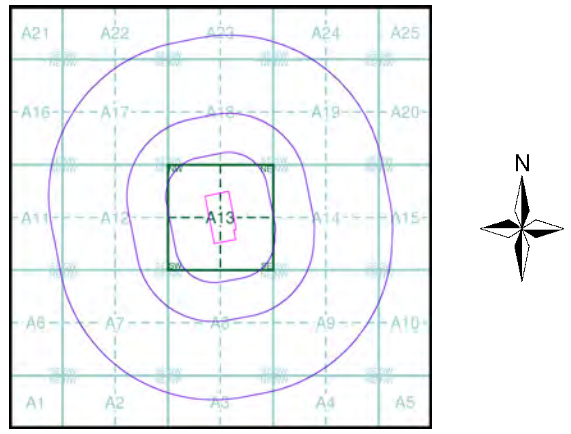
Master Contour — 100, 95

Spot Height — 167.3

MLW Mean Low Water Springs

MHW Mean High Water Springs

EA/NRW Detailed River Network Map - Slice A



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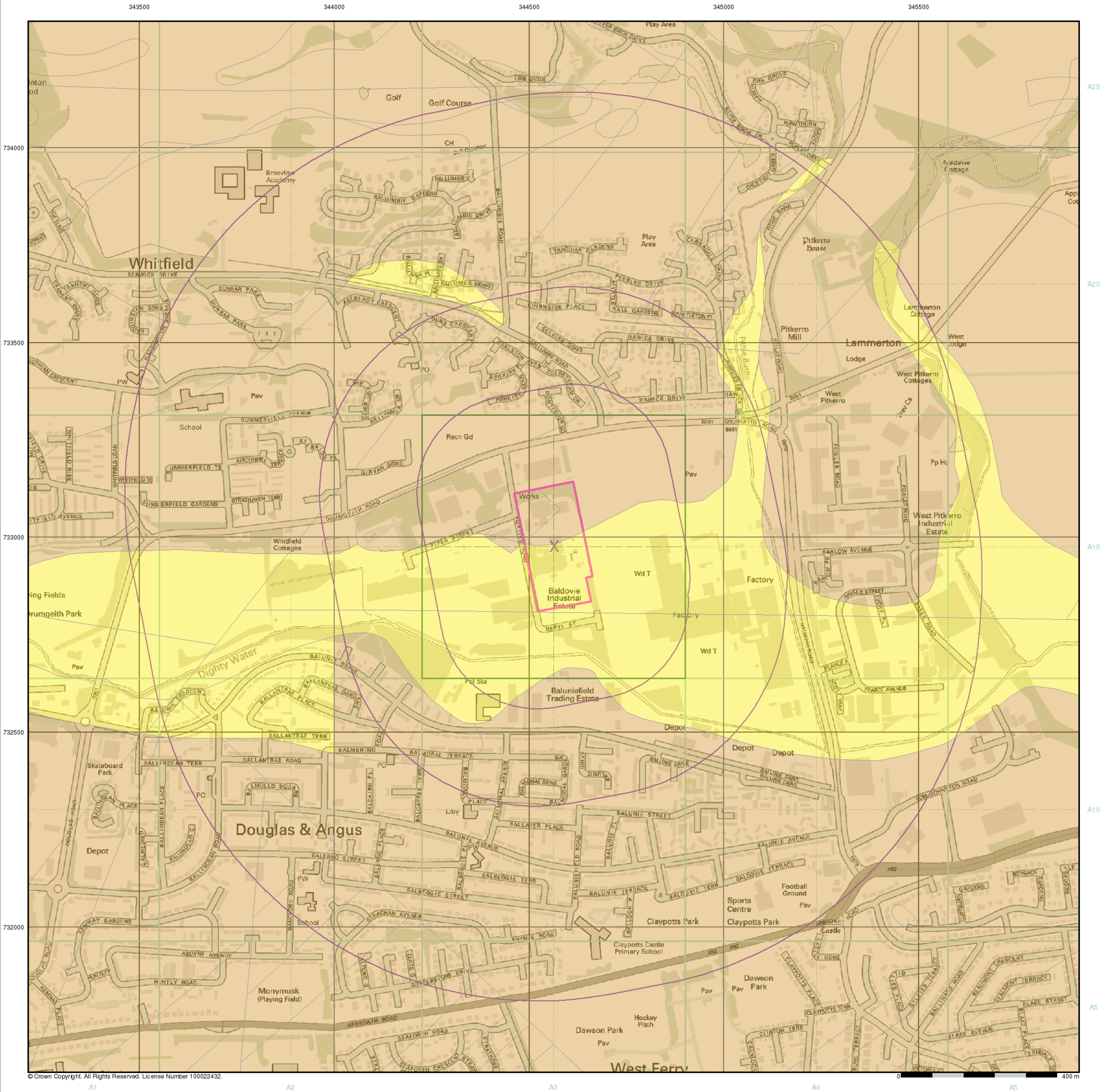

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General

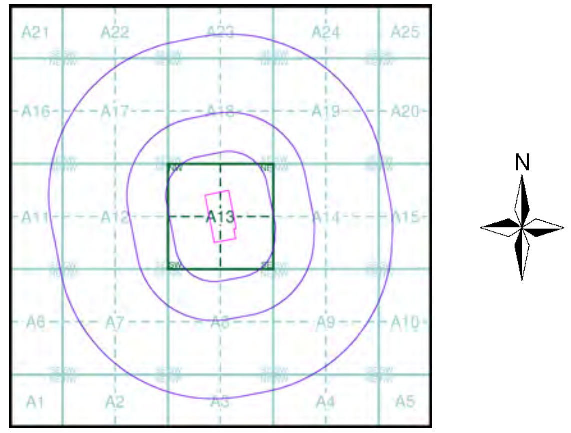
Specified Site   Specified Buffer(s)   X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



Order Details

Order Details: 78681553_1_1
Customer Ref: Baldovie Industrial Estate
National Grid Reference: 344570, 732980
Slice: A
Site Area (Ha): 4.7
Search Buffer (m): 1000

Site Details

Baldovie Industrial Estate, DUNDEE, DD4 8TF

Landmark Information Group

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Web: www.envirocheck.co.uk

General

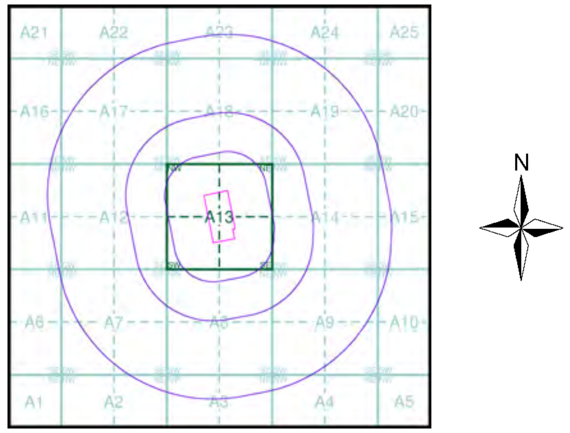
Specified Site   Specified Buffer(s)   X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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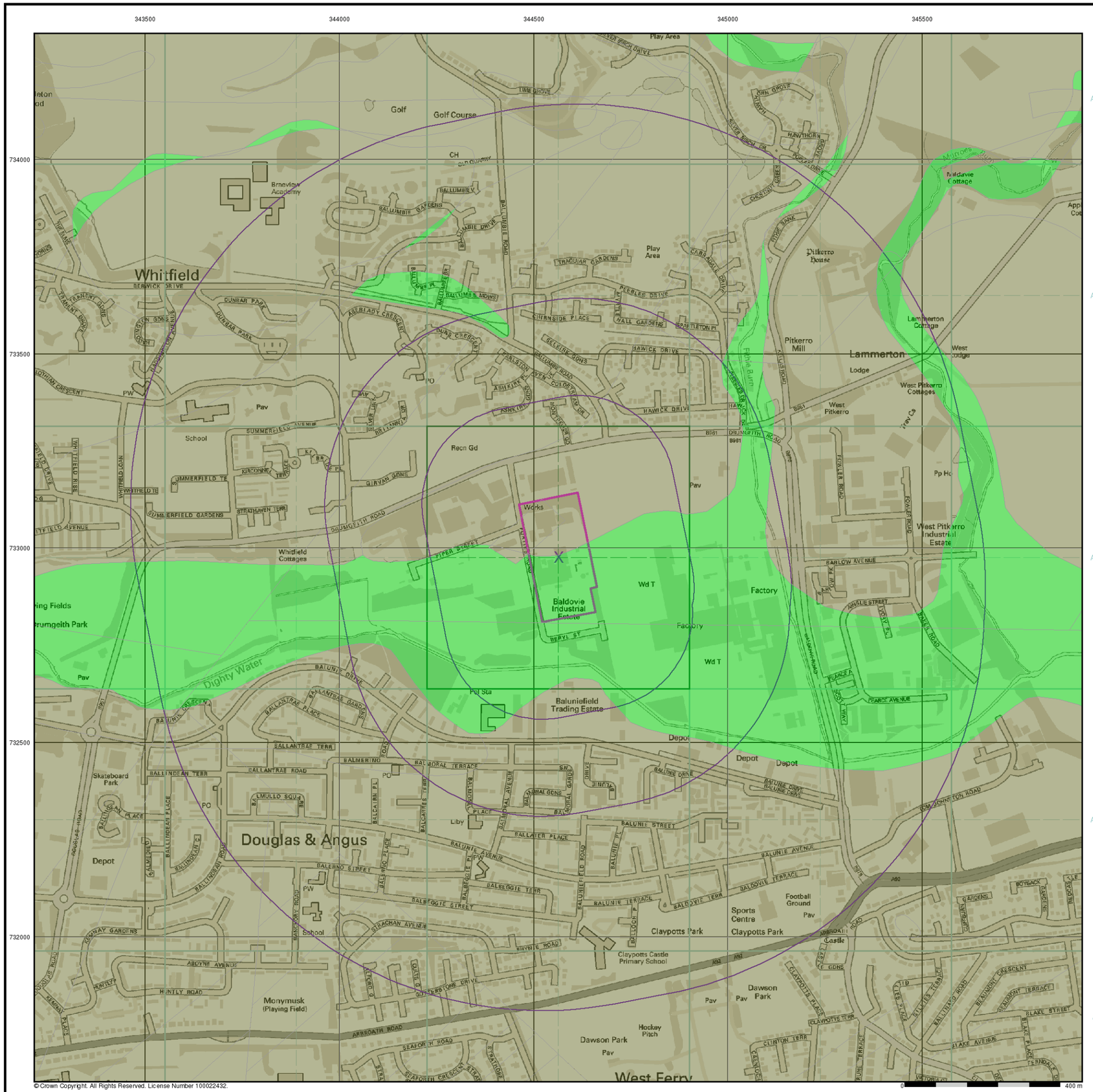


Envirocheck®

General

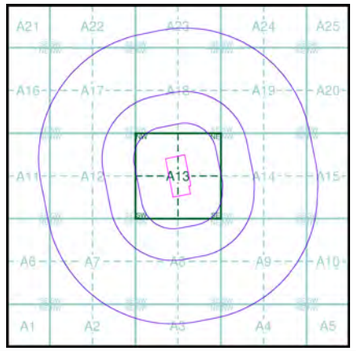
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



Order Details

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Customer Ref:	Baldovie Industrial Estate
National Grid Reference:	344570, 732980
Slice:	A
Site Area (Ha):	4.7
Search Buffer (m):	1000

Site Details

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Landmark Information Group
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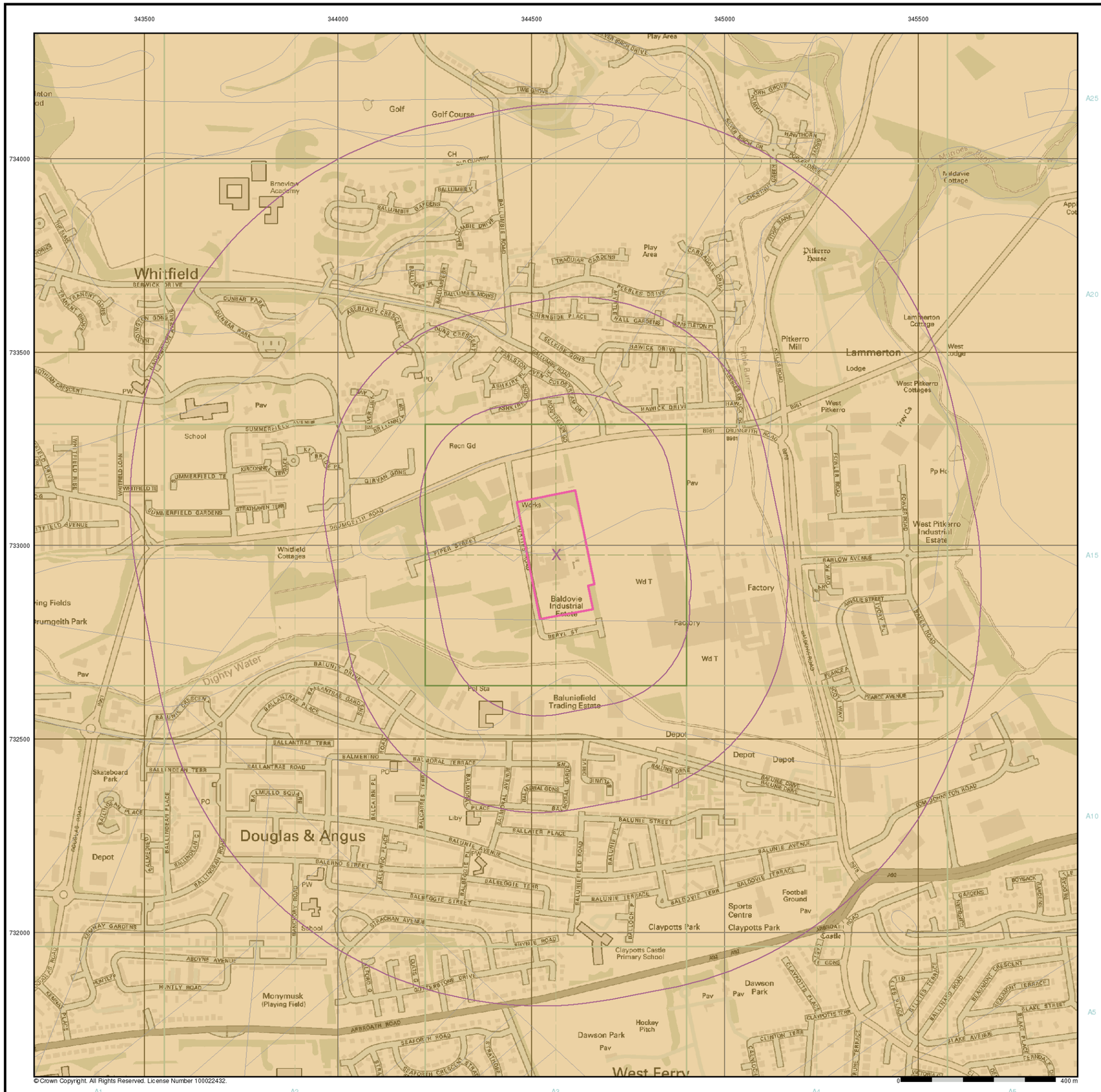
Web: www.envirocheck.co.uk



Envirocheck®

General

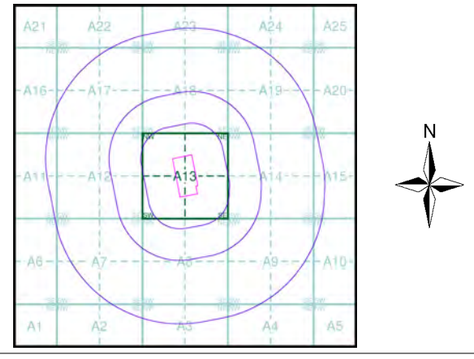
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- < 150
- 150 - 300
- 300 - 600
- 600 - 900
- > 900

Estimated Soil Chemistry Lead - Slice A



Order Details

Order Details:	78681553_1_1
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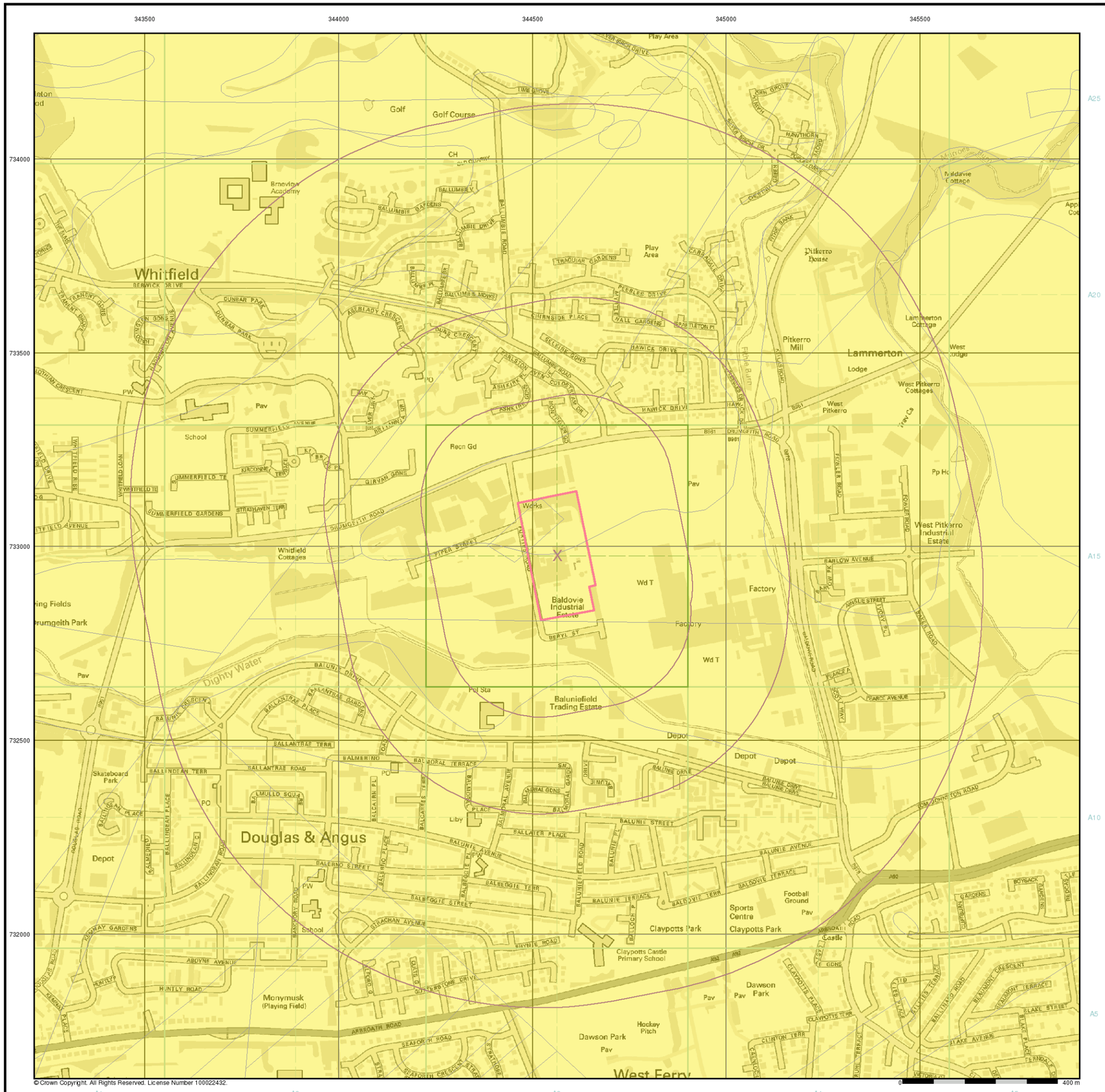


Envirocheck®

General

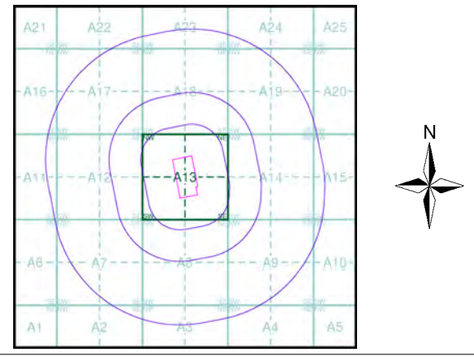
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



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Site Details

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Appendix D

Soil and Groundwater Test Results and Assessment Tables from SLR Investigation

D1 Soil Testing Results

JE Sample No.		1-3	4-6	13-15	16-18	19-21	4-6	22-24	28-30	1-3	4-6	31-33	4-6			
Sample ID		**BH1**	**BH1**	**BH1**	**BH2**	**BH2**	**BH 2**	**BH4**	**BH5**	**BH7**	**BH7**	**BH8**	**BH8**			
Depth		0.5	1	3.5	0.5	1	3	0.5	0.5	1.50	3.00	0.5	2			
COC No/misc																
Containers		VJ	VJ	VJ	VJ	VJ	VJ	VJ	VJ	VJ	VJ	VJ	V J			
Sample Date		25.9.15	25.9.15	25.9.15	25.9.15	25.9.15	28.9.15	25.9.15	25.9.15	1.10.15	1.10.15	12.9.15	12.10.15			
Sample Type		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number		1	1	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	Guideline Values	29.9.15	29.9.15	29.9.15	29.9.15	29.9.15	1.10.15	29.9.15	29.9.15	3.10.15	3.10.15	29.9.15	14.10.15	LOD/LOR	Units	Method No.
Arsenic #M	640	8.3	7.5	16	<0.5	7.8	17	5.5	3.9	13	11	4.9	10	<0.5	mg/kg	TM30/PM15
Barium #M		130	190	110	45	120	140	67	31	170	580	55	320	<1	mg/kg	TM30/PM15
Beryllium	12	0.9	1.2	0.8	0.6	1.2	1.5	0.8	0.7	1.1	1.5	0.9	1.3	<0.5	mg/kg	TM30/PM15
Cadmium #M	190	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Chromium #M	8600	85	78	84	27	75	82	72	48	77	110	55	93	<0.5	mg/kg	TM30/PM15
Copper #M	68000	22	40	38	19	43	75	19	11	44	71	13	44	<1	mg/kg	TM30/PM15
Lead #M	2300*	<5	<5	5	<5	<5	10	<5	<5	48	8	8	13	<5	mg/kg	TM30/PM15
Mercury #M	58	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel #M	980	37	48	59	25	49	74	45	26	44	67	33	50	<0.7	mg/kg	TM30/PM15
Selenium #M	12000	<1	1	<1	<1	<1	2	<1	<1	2	2	<1	2	<1	mg/kg	TM30/PM15
Vanadium	9000	68	72	70	47	66	78	67	81	68	110	75	95	<1	mg/kg	TM30/PM15
Water Soluble Boron #M	240000	0.6	0.4	0.2	1.2	0.7	0.1	0.4	0.2	0.8+	1.3+	0.4	0.8	<0.1	mg/kg	TM74/PM32
Zinc #M	730000	59	69	54	55	71	93	110	69	95	110	100	95	<5	mg/kg	TM30/PM15
Hexavalent Chromium #	33	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M		0.063	0.083	0.021	0.019	0.088	0.031	0.028	0.0041	<3	410	0.024	28	<0.0015	g/l	TM38/PM20
Total Organic Carbon #		0.35	0.11	<0.02	<0.02	0.07	0.1	0.2	<0.02	1.7	2.1	0.14	1.2	<0.02	%	TM21/PM24
Organic Matter		0.6	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	2.9	3.6	0.2	2.1	<0.2	%	TM21/PM24
pH #M		8.9	8.1	8.3	9.9	8.3	7.7	9.2	10	7.6	7.3	8.8	7.3	<0.01	pH units	TM73/PM11
Sample Type		Clayey	Sand	Clay	Sand	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay		None	PM13/PM0
Sample Colour		Medium Brown	Medium Brown	Medium Brown	Dark Grey	Medium Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items		stones	stones	stones	stones	stones	stones	stones	stones	stones	roots	stones	none		None	PM13/PM0
Chromium III	8600	85	78	84	27	75	82	72	48	77	110	55	93	<0.5	mg/kg	NONE

Asbestos ID		NAD	NAD		NAD	NAD		NAD	NAD	NAD	NAD	NAD	NAD			
Asbestos																
VOC TICs		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
Benzene #M	47	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
Toluene #M	110000	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.013	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Ethylbenzene #M	13000	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
p/m-Xylene #M	14000	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
o-Xylene #M	15000	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8		110	120	120	110	120	110	110	120	110	110	110	120	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene		120	150	150	140	150	140	140	150	100	110	130	120	<0	%	TM15/PM10
SVOC TICs		See Attache	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ee Attached		None	TM16/PM8
TPH CWG																
Aliphatics																
>C5-C6 #M	5900 (558)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #M	17000 (322)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	4800 (190)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #M	23000 (118)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>C12-C16 #M	82000 (59)	8	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM16
>C16-C21 #M	1700000	13	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
>C21-C35 #M	1700000	90	<7	<7	<7	<7	<7	<7	<7	86	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aliphatics C5-35		111	<19	<19	<19	<19	<19	<19	<19	86	<19	<19	<19	<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics																
>C5-EC7	46000 (2260)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8	10000 (1920	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	8100 (1500)	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12	28000 (899)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>EC12-EC16	37000	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM16
>EC16-EC21	28000	20	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
>EC21-EC35	28000	200	<7	<7	<7	<7	<7	<7	<7	180	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aromatics C5-35		220	<19	<19	<19	<19	<19	<19	<19	180	<19	<19	<19	<19	mg/kg	TM5/TM36/PM12/PM16

Total aliphatics and aromatics(C5-35)		331	<38	<38	<38	<38	<38	<38	<38	266	<38	<38	<38	<38	mg/kg	TM5/TM36/PM12/PM16
Natural Moisture Content		16.9	19.7	20.7	5.6	18.4	19.6	11	2.7	17.9	44.5	4.9	28.7	<0.1	%	PM4/PM0
Free Cyanide		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Total Cyanide #M		0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
PCB 77	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 81	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 105	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 114	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 118	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 123	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 126	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 156	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 157	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 167	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 169	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
PCB 189	0.24	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM16/PM8
Total 12 PCBs		<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM16/PM8
PCB 28 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 52 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 101 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 118 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 138 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 153 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
PCB 180 #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM17/PM8
Total 7 PCBs #		<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	mg/kg	TM17/PM8
SVOC MS																
Phenols																
2-Chlorophenol #M	4000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylphenol	80000 (3250(	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitrophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol #M	4000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	24000 (3140)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8

2,4,5-Trichlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	4000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Chloro-3-methylphenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Methylphenol	80000 (57800	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitrophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pentachlorophenol		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenol #M	690 (30000)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
PAHs																
2-Chloronaphthalene #M	960 (280)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene #M		0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Naphthalene	460 (183)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Acenaphthylene	97000 (212)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Acenaphthene	97000 (141)	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Fluorene	68000	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phenanthrene #M	22000	0.23	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Anthracene	540000	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Fluoranthene #M	23000	0.73	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Pyrene #M	54000	0.57	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(a)anthracene	170	0.39	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Chrysene	350	0.21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(bk)fluoranthene	44	0.53	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(a)pyrene	35	0.24	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Indeno(123cd)pyrene	510	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Dibenzo(ah)anthracene	3.6	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Benzo(ghi)perylene	4000	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Phthalates																
Bis(2-ethylhexyl) phthalate		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	15000 (11.4)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	89000 (81.5)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Diethyl phthalate	220000 (29.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8

Dimethyl phthalate #M		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM16/PM8
Other SVOCs																
1,2-Dichlorobenzene	4800 (1370)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene #M	530	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	73	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	10000 (540)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2-Nitroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	3700 (299)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	1900 (622)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
3-Nitroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether #M		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Chloroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
4-Nitroaniline		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Azobenzene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Carbazole		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Dibenzofuran #M		0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	120	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene #M		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Hexachloroethane		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Isophorone #M		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
N-nitrosodi-n-propylamine #M		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
Nitrobenzene #M		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
PAHs																
Benzo(b)fluoranthene	44	0.38	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8

Benzo(k)fluoranthene	1200	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	mg/kg	TM16/PM8
VOC MS																
Surrogate Recovery Toluene D8		110	120	120	110	120	110	110	120	110	110	110	120	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene		120	150	150	140	150	140	140	150	100	110	130	120	<0	%	TM15/PM10
Dichlorodifluoromethane		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
Chloromethane #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Vinyl Chloride	0.077	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
Bromomethane		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/kg	TM15/PM10
Chloroethane #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
Trichlorofluoromethane #M		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
Dichloromethane (DCM) #		<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
trans-1-2-Dichloroethene #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane #M	450	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene #M		<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
2,2-Dichloropropane		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Bromochloromethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Chloroform #M	170	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
1,1,1-Trichloroethane #M	1300	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
1,1-Dichloropropene #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Carbon tetrachloride #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,2-Dichloroethane #M	0.97	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
Benzene #M	47	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
Trichloroethene (TCE) #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
1,2-Dichloropropane #M	5.9	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Dibromomethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10

Bromodichloromethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
cis-1-3-Dichloropropene		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Toluene #M	10000 (1920	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.013	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
trans-1-3-Dichloropropene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane #M	190	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Tetrachloroethene (PCE) #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,3-Dichloropropane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Dibromochloromethane #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
1,2-Dibromoethane #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Chlorobenzene #M	130	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
Ethylbenzene #M	13000 (1220)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
p/m-Xylene #M	14000 (1470)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
o-Xylene #M	15000 (1120)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Styrene	6500 (1440)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromoform	1500	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Isopropylbenzene #	3300 (950)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #M		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
Bromobenzene	220	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/kg	TM15/PM10
1,2,3-Trichloropropane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Propylbenzene #	9700 (981)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
2-Chlorotoluene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
4-Chlorotoluene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/kg	TM15/PM10
tert-Butylbenzene #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	99	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.02	<0.006	mg/kg	TM15/PM10
sec-Butylbenzene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
4-Isopropyltoluene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10

1,3-Dichlorobenzene #M	73	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene #	10000 (540)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
n-Butylbenzene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,2-Dichlorobenzene #M	4800 (1370)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene #	530	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10
Hexachlorobutadiene		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/kg	TM15/PM10
Naphthalene	460 (183)	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	mg/kg	TM15/PM10
1,2,3-Trichlorobenzene #	250	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/kg	TM15/PM10

LQM/S4UL 2014 value (2.5% SOM)

*c4sl 2014 value

Arup GAC 2013

J E Sample No.		7-9	16-18	25-27	31-33	37-39	49-51	61-63	76-78	82-84	91-93	61-72			
Sample ID		**TP1**	**TP1**	**TP3A**	**TP3A**	**TP2**	**TP2**	**TP5**	**TP5**	**TP4**	**TP4**	**WAC**			
Depth		1.2	3	1.5	3.3	0.9	2.5	0.9	3	0.6	1.5				
COC No / misc															
Containers		V J	V J	V J	V J	V J	V J	V J	V J	V J	V J	V J T			
Sample Date		07.10.15	07.10.15	07.10.15	07.10.15	07.10.15	07.10.15	06.10.15	06.10.15	06.10.15	06.10.15	08.10.15			
Sample Type		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number		1	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	Guideline Values	09.10.15	09.10.15	08.10.15	08.10.15	08.10.15	08.10.15	08.10.15	08.10.15	08.10.15	08.10.15	09.10.15			
Arsenic #M	640	2.3	10	5	11	3	14	2.9	14	5.3	5.3	-	<0.5	mg/kg	TM30/PM15
Barium #M	22100	49	280	130	340	110	370	72	320	120	170	-	<1	mg/kg	TM30/PM15
Beryllium	12	0.7	1.5	1	1.2	0.8	1.5	0.7	1.5	0.7	1	-	<0.5	mg/kg	TM30/PM15
Cadmium #M	190	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM30/PM15
Chromium #M	8600	55	98	28	90	72	97	77	98	88	76	-	<0.5	mg/kg	TM30/PM15
Copper #M	68000	9	55	34	29	24	62	25	100	19	52	-	<1	mg/kg	TM30/PM15
Lead #M	2300*	<5	27	43	12	15	24	13	55	12	110	-	<5	mg/kg	TM30/PM15
Mercury #M	58	<0.1	0.2	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	0.2	-	<0.1	mg/kg	TM30/PM15
Nickel #M	980	31	61	32	50	31	64	26	56	30	33	-	<0.7	mg/kg	TM30/PM15
Selenium #M	12000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	mg/kg	TM30/PM15
Vanadium	9000	100	95	63	82	75	98	90	86	48	68	-	<1	mg/kg	TM30/PM15
Water Soluble Boron #M	240000	0.6	0.9	0.8	2.1	0.7	0.7	0.4	1.6	0.5	1.2	-	<0.1	mg/kg	TM74/PM32
Zinc #M	730000	66	100	100	84	73	110	63	120	55	96	-	<5	mg/kg	TM30/PM15
Hexavalent Chromium #	33	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	mg/kg	TM38/PM20
Asbestos		NAD		Yes		NAD		NAD		NAD	NAD				
Asbestos ID				Chrysotile											
VOC TICs		See Attachec	ND	ND	ND	ND	ND	ND	ND	ND	ND			None	TM15/PM10
Methyl Tertiary Butyl Ether #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	mg/kg	TM15/PM10
Benzene #M	47	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
Toluene #M	110000	<0.003	<0.003	0.01	<0.003	0.014	<0.003	<0.003	<0.003	0.011	0.006	-	<0.003	mg/kg	TM15/PM10
Ethylbenzene #M	13000	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
p/m-Xylene #M	14000	<0.004	<0.004	0.01	<0.004	<0.004	<0.004	<0.004	<0.004	0.013	<0.004	-	<0.004	mg/kg	TM15/PM10
o-Xylene #M	15000	<0.004	<0.004	0.007	<0.004	<0.004	<0.004	<0.004	<0.004	0.009	<0.004	-	<0.004	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8		100	120	88	110	92	140	84	120	75	93	-	<0	%	TM15/PM10

Surrogate Recovery 4-Bromofluorobenzene		110	100	90	99	92	140	94	120	82	93	-	<0	%	TM15/PM10
SVOC TICs		See Attached	ND	NDAA	ND	NDAA	ND	NDAA	ND	NDAA	NDAA	-		None	TM16/PM8
TPH CWG															
Aliphatics															
>C5-C6 #M	5900 (558)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>C6-C8 #M	17000 (322)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>C8-C10	4800 (190)	0.9	<0.1	0.5	<0.1	0.1	<0.1	0.2	0.3	0.4	<0.1	-	<0.1	mg/kg	TM36/PM12
>C10-C12 #M	23000 (118)	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	mg/kg	TM5/PM16
>C12-C16 #M	82000 (59)	19	<4	14	<4	16	<4	19	<4	15	<4	-	<4	mg/kg	TM5/PM16
>C16-C21 #M	1700000	19	<7	40	<7	59	<7	72	<7	59	15	-	<7	mg/kg	TM5/PM16
>C21-C35 #M	1700000	94	<7	520	<7	940	<7	1300	<7	860	320	-	<7	mg/kg	TM5/PM16
Total aliphatics C5-35		136	<19	575	<19	1015	<19	1391	<19	935	335	-	<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics															
>C5-EC7	46000 (2260)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8	110000 (1920)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	8100 (1500)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12	28000 (899)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	4.4	<0.2	5	<0.2	-	<0.2	mg/kg	TM5/PM16
>EC12-EC16	37000	<4	<4	7	<4	17	<4	32	<4	25	6	-	<4	mg/kg	TM5/PM16
>EC16-EC21	28000	<7	<7	65	<7	130	<7	210	<7	160	48	-	<7	mg/kg	TM5/PM16
>EC21-EC35	28000	120	<7	1100	<7	2000	<7	3200	<7	2100	760	-	<7	mg/kg	TM5/PM16
Total aromatics C5-35		120	<19	1172	<19	2147	<19	3446	<19	2290	814	-	<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)		256	<38	1747	<38	3162	<38	4837	<38	3225	1149	-	<38	mg/kg	TM5/TM36/PM12/PM16
Natural Moisture Content		4.9	23.2	NDP	48.9	6.5	44	9.9	26	12.9	11.2	7.4	<0.1	%	PM4/PM0
Hexavalent Chromium #	33	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M		98	260	NDP	1800	1400	120	220	220	660	-	-	<3	mg/kg	TM38/PM20
Free Cyanide		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	mg/kg	TM89/PM45
Total Cyanide #M		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #		-	-	NDP	2	1.3	1.6	3.2	2.6	0.66	2.1	0.6	<0.02	%	TM21/PM24
Organic Matter		0.4	2.4	NDP	3.4	2.2	2.8	5.5	4.5	1.1	3.6	-	<0.2	%	TM21/PM24
pH #M		10	7.6	11	7.5	10	7.7	9.5	7.4	10	8.3	9.4	<0.01	pH units	TM73/PM11
Sample Type		Sandy Loam	Loam	Sand	Clay	Loam	Clay	Loam	Clay	Loamy Sand	Loamy Sand	Soil		None	PM13/PM0

Sample Colour		Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items		STONES	ONES AND SA	STONES	NONE	ONES AND SA	STONES	SAND	NONE	STONES	STONES	STONES		None	PM13/PM0
PCB 77	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 81	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 105	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 114	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 118	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 123	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 126	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 156	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 157	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 167	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 169	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
PCB 189	0.24	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	-	<0.005	mg/kg	TM16/PM8
Total 12 PCBs		<0.60AA	<0.06	<0.60AA	<0.06	<0.60AA	<0.06	<0.60AA	<0.06	<0.60AA	<0.60AA	-	<0.06	mg/kg	TM16/PM8
PCB 28 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 52 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 101 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 118 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 138 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 153 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
PCB 180 #		<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.005	<0.050AA	<0.050AA	<0.050AA	<0.005	mg/kg	TM17/PM8
Total 7 PCBs #		<0.350AA	<0.035	<0.350AA	<0.035	<0.350AA	<0.035	<0.350AA	<0.035	<0.350AA	<0.350AA	<0.350AA	<0.035	mg/kg	TM17/PM8
Sulphate as SO4 (2:1 Ext) #M		98	260	700	-	-	-	-	-	-	-	-	<3	mg/kg	TM38/PM60
Chromium III		55	98	NDP	90	72	97	77	98	88	76	-	<0.5	mg/kg	NONE/NONE
Chromium III		55	98	28	-	-	-	-	-	-	-	-	<0.5	mg/kg	NONE/NONE
SVOC MS															
Phenols															
2-Chlorophenol #M	4000	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2-Methylphenol	180000 (32500)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2-Nitrophenol		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol #M	4000	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	24000 (3140)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8

2,4,5-Trichlorophenol		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	4000	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Chloro-3-methylphenol		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Methylphenol	180000 (57800)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Nitrophenol		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Pentachlorophenol		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Phenol #M	690 (30000)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
PAHs												-			
2-Chloronaphthalene #M	960 (280)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene #M		0.03	0.02	0.20AA	<0.01	0.15AA	<0.01	0.11AA	0.01	0.28AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Naphthalene	460 (183)	<0.01	0.11	0.40AA	<0.01	0.35AA	<0.01	0.16AA	0.02	0.52AA	0.15AA	-	<0.01	mg/kg	TM16/PM8
Acenaphthylene	97000 (212)	-	-	<0.10AA	<0.01	<0.10AA	<0.01	0.12AA	<0.01	<0.10AA	<0.10AA	<0.30AA	<0.01	mg/kg	TM16/PM8
Acenaphthene	97000 (141)	0.07	<0.01	0.51AA	<0.01	0.76AA	<0.01	0.92AA	<0.01	0.56AA	0.41AA	-	<0.01	mg/kg	TM16/PM8
Fluorene	68000	0.04	<0.01	0.29AA	<0.01	0.48AA	<0.01	0.45AA	<0.01	0.32AA	0.21AA	-	<0.01	mg/kg	TM16/PM8
Phenanthrene #M	22000	-	-	1.5AA	0.03	2.9AA	<0.01	2.5AA	0.03	1.6AA	1.6AA	1.2AA	<0.01	mg/kg	TM16/PM8
Anthracene	540000	0.07	<0.01	0.53AA	<0.01	1.1AA	<0.01	1.2AA	<0.01	0.54AA	0.48AA	-	<0.01	mg/kg	TM16/PM8
Fluoranthene #M	23000	-	-	2.5AA	0.03	4.8AA	<0.01	5.0AA	0.05	1.9AA	2.1AA	1.7AA	<0.01	mg/kg	TM16/PM8
Pyrene #M	54000	0.28	<0.01	2.2AA	0.03	4.6AA	<0.01	4.9AA	0.05	1.7AA	2.1AA	-	<0.01	mg/kg	TM16/PM8
Benzo(a)anthracene	170	0.17	<0.01	1.7AA	<0.01	3.1AA	<0.01	3.2AA	<0.01	1.2AA	1.5AA	-	<0.01	mg/kg	TM16/PM8
Chrysene	350	0.13	<0.01	1.5AA	<0.01	2.4AA	<0.01	3.0AA	0.01	1.7AA	1.2AA	-	<0.01	mg/kg	TM16/PM8
Benzo(bk)fluoranthene	44	0.27	<0.01	2.7AA	<0.01	5.6AA	<0.01	5.7AA	0.07	2.2AA	2.5AA	-	<0.01	mg/kg	TM16/PM8
Benzo(a)pyrene	35	0.14	<0.01	1.3AA	<0.01	2.6AA	<0.01	2.7AA	0.04	1.3AA	1.3AA	-	<0.01	mg/kg	TM16/PM8
Indeno(123cd)pyrene	510	0.06	<0.01	0.69AA	<0.01	1.4AA	<0.01	1.4AA	0.02	0.75AA	0.69AA	-	<0.01	mg/kg	TM16/PM8
Dibenzo(ah)anthracene	3.6	0.03	<0.01	0.31AA	<0.01	0.66AA	<0.01	0.77AA	<0.01	0.51AA	0.31AA	-	<0.01	mg/kg	TM16/PM8
Benzo(ghi)perylene	4000	0.08	<0.01	0.92AA	<0.01	1.7AA	<0.01	1.9AA	0.03	1.2AA	0.90AA	-	<0.01	mg/kg	TM16/PM8
Phthalates															
Bis(2-ethylhexyl) phthalate		<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate		<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	15000 (11.4)	<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	89000 (81.5)	<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8

Diethyl phthalate	220000 (29.1)	<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8
Dimethyl phthalate #M		<0.1	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<0.1	<1.0AA	<1.0AA	-	<0.1	mg/kg	TM16/PM8
Other SVOCs															
1,2-Dichlorobenzene	4800 (1370)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene #M	530	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	73	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	10000 (540)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2-Nitroaniline		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	3700 (299)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	1900 (622)	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
3-Nitroaniline		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether #M		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Chloroaniline		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
4-Nitroaniline		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Azobenzene		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Carbazole		0.02	<0.01	0.19AA	<0.01	0.26AA	<0.01	0.28AA	<0.01	0.13AA	0.12AA	-	<0.01	mg/kg	TM16/PM8
Dibenzofuran #M		0.03	<0.01	0.20AA	<0.01	0.28AA	<0.01	0.27AA	<0.01	0.26AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	120	<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene #M		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Hexachloroethane		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Isophorone #M		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
N-nitrosodi-n-propylamine #M		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
Nitrobenzene #M		<0.01	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.01	<0.10AA	<0.10AA	-	<0.01	mg/kg	TM16/PM8
PAHs															

Benzo(b)fluoranthene	44	-	-	1.9AA	<0.01	4.0AA	<0.01	4.1AA	0.05	1.6AA	1.8AA	1.3AA	<0.01	mg/kg	TM16/PM8
Benzo(k)fluoranthene	1200	-	-	0.76AA	<0.01	1.6AA	<0.01	1.6AA	0.02	0.62AA	0.70AA	0.50AA	<0.01	mg/kg	TM16/PM8
VOC MS															
Surrogate Recovery Toluene D8		100	120	88	110	92	140	84	120	75	93	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene		110	100	90	99	92	140	94	120	82	93	-	<0	%	TM15/PM10
Dichlorodifluoromethane		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	mg/kg	TM15/PM10
Chloromethane #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
Vinyl Chloride	0.077	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	mg/kg	TM15/PM10
Bromomethane		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	mg/kg	TM15/PM10
Chloroethane #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	mg/kg	TM15/PM10
Trichlorofluoromethane #M		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #M		<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	mg/kg	TM15/PM10
Dichloromethane (DCM) #		<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	mg/kg	TM15/PM10
trans-1-2-Dichloroethene #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane #M	450	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	-	<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene #M		<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	mg/kg	TM15/PM10
2,2-Dichloropropane		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Bromochloromethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Chloroform #M	170	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
1,1,1-Trichloroethane #M	1300	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
1,1-Dichloropropene #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
Carbon tetrachloride #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,2-Dichloroethane #M	0.97	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10

Benzene #M	47	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
Trichloroethene (TCE) #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
1,2-Dichloropropane #M	5.9	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Dibromomethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Bromodichloromethane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
cis-1-3-Dichloropropene		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Toluene #M	110000 (1920)	<0.003	<0.003	0.01	<0.003	0.014	<0.003	<0.003	<0.003	0.011	0.006	-	<0.003	mg/kg	TM15/PM10
trans-1-3-Dichloropropene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane #M	190	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Tetrachloroethene (PCE) #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
1,3-Dichloropropane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Dibromochloromethane #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
1,2-Dibromoethane #		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
Chlorobenzene #M	130	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #M		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
Ethylbenzene #M	13000 (1220)	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
p/m-Xylene #M	14000 (1470)	<0.004	<0.004	0.01	<0.004	<0.004	<0.004	<0.004	<0.004	0.013	<0.004	-	<0.004	mg/kg	TM15/PM10
o-Xylene #M	15000 (1120)	<0.004	<0.004	0.007	<0.004	<0.004	<0.004	<0.004	<0.004	0.009	<0.004	-	<0.004	mg/kg	TM15/PM10
Styrene	6500 (1440)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
Bromoform	1500	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Isopropylbenzene #	3300 (950)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #M		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
Bromobenzene	220	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	mg/kg	TM15/PM10
1,2,3-Trichloropropane #M		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Propylbenzene #	9700 (981)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
2-Chlorotoluene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10

1,3,5-Trimethylbenzene #		0.008	<0.003	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
4-Chlorotoluene		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	<0.003	mg/kg	TM15/PM10
tert-Butylbenzene #		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	99	0.018	<0.006	0.019	<0.006	0.016	<0.006	<0.006	<0.006	0.02	<0.006	-	<0.006	mg/kg	TM15/PM10
sec-Butylbenzene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
4-Isopropyltoluene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene #M	73	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene #	10000 (540)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
n-Butylbenzene #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,2-Dichlorobenzene #M	4800 (1370)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene #	530	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	mg/kg	TM15/PM10
Hexachlorobutadiene		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.004	mg/kg	TM15/PM10
Naphthalene	460 (183)	0.039	<0.027	0.3	<0.027	0.27	<0.027	<0.027	<0.027	0.41	0.095	-	<0.027	mg/kg	TM15/PM10
1,2,3-Trichlorobenzene #	250	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	-	<0.007	mg/kg	TM15/PM10

LQM/S4UL 2014 value (2.5% SOM)

*c4sl 2014 value

Arup GAC 2013

D2 Groundwater Testing Results

J E Sample No.			1-6	7-12	13-18	19-24	25-30	31-36	37-42			
Sample ID			**BH1**	**BH2**	**BH4**	**BH5**	**BH6**	**BH7**	**BH8**			
Depth			5.5	5	2.2	5	5	5	8			
Containers			V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G			
Sample Date			23.10.15	23.10.15	22.10.15	22.10.15	23.10.15	23.10.15	23.10.15			
Sample Type			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water			
Batch Number			1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt			24.10.15	24.10.15	24.10.15	24.10.15	24.10.15	24.10.15	24.10.15			
	Screening Value (Notes)	ISL										
Dissolved Arsenic #	EQS	0.05	0.0025	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	mg/l	TM30/PM14
Dissolved Barium #	RPV ©	0.7	0.17	0.67	0.14	0.059	0.32	0.24	0.12	<0.0018	mg/l	TM30/PM14
Dissolved Beryllium	RPV (a)(b)	0.004	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM14
Dissolved Boron	EQS	2	0.36	0.057	0.044	0.028	0.19	0.063	0.1	<0.002	mg/l	TM30/PM14
Dissolved Cadmium #	EQS	0.00008	0.00016	0.00075	0.00028	0.00027	0.0008	0.00057	0.00009	<0.00003	mg/l	TM30/PM14
Total Dissolved Chromium #	EQS	0.0047	<0.0002	0.0062	0.0023	0.0003	0.0031	0.0014	0.0012	<0.0002	mg/l	TM30/PM14
Dissolved Copper #	EQS	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	0.004	<0.003	mg/l	TM30/PM14
Dissolved Lead #	EQS	0.0072	0.0037	0.0038	0.0024	0.0029	0.0082	0.0074	0.0069	<0.0004	mg/l	TM30/PM14
Dissolved Nickel #	EQS	0.02	0.0003	0.0018	0.0021	0.0011	0.0019	0.0038	0.0023	<0.0002	mg/l	TM30/PM14
Dissolved Selenium #	RPV (a)(b)(c)	0.01	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	mg/l	TM30/PM14
Dissolved Vanadium #	EQS	0.02	0.0021	0.0025	0.0017	0.0013	0.0026	0.0027	0.0072	<0.0006	mg/l	TM30/PM14
Dissolved Zinc #	EQS	0.0119	<0.0015	0.0026	0.0026	0.0025	0.004	0.0099	0.019	<0.0015	mg/l	TM30/PM14
Mercury Dissolved by CVAF #	EQS	0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM38
VOC TICs			ND	ND	ND	ND	ND	ND	ND		None	TM15/PM10
Methyl Tertiary Butyl Ether #			<0.0001	<0.0001	<0.0001	<0.0001	0.012	0.0023	<0.0001	<0.0001	mg/l	TM15/PM10
Benzene #	EQS	0.01	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
Toluene #	EQS	0.074	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	mg/l	TM15/PM10
Ethylbenzene #	EQS	0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
p/m-Xylene #	EQS	0.03	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM15/PM10
o-Xylene #	EQS	0.03	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
Total Xylenes #	EQS	0.03	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM15/PM10
Surrogate Recovery Toluene D8			90	88	88	92	93	94	91	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene			110	110	110	110	110	110	110	<0	%	TM15/PM10
SVOC TICs			ND	ND	ND	ND	ND	ND	ND		None	TM16/PM30

TPH CWG												
Aliphatics												
>C5-C6 #	WHO	15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>C6-C8 #	WHO	15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>C8-C10 #	WHO	0.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>C10-C12 #	WHO	0.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM5/PM30
>C12-C16 #	WHO	0.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
>C16-C21 #	WHO	0.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
>C21-C35 #	WHO	0.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
Total aliphatics C5-35 #			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/TM36/PM30
Aromatics												
>C5-EC7 #	WHO	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>EC7-EC8 #	WHO	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>EC8-EC10 #	WHO	0.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM36/PM12
>EC10-EC12 #	WHO	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM5/PM30
>EC12-EC16 #	WHO	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
>EC16-EC21 #	WHO	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
>EC21-EC35 #	WHO	0.09	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
Total aromatics C5-35 #			<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/PM30
Total aliphatics and aromatics(C5-35) #			<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM5/TM36/PM30
Sulphate #	EQS	400	57	52	86	26	500	94	37	<0.05	mg/l	TM38/PM0
Chloride #	EQS	250	42	1200	55	12	540	79	59	<0.3	mg/l	TM38/PM0
Free Cyanide #			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM89/PM0
Total Cyanide #	EQS	0.001	<0.01	0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #			<0.03	0.09	0.17	0.07	3.1	0.38	0.03	<0.03	mg/l	TM38/PM0
Dissolved Organic Carbon #			14	4	16	<2	27	71	4	<2	mg/l	TM60/PM0
pH #			8	7.6	7.9	8.1	7.1	7.1	7.9	<0.01	pH units	TM73/PM0
PCB 77			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 81			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 105			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 114			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 118			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 123			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 126			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30

PCB 156			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 157			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 167			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 169			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 189			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
Total 12 PCBs			<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	mg/l	TM17/PM30
PCB 28			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 52			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 101			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 118			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 138			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 153			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
PCB 180			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM17/PM30
Total 7 PCBs			<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	mg/l	TM17/PM30
Hexavalent Chromium	EQS	0.0034	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM38/PM0
Total Dissolved Chromium III	EQS	0.0047	<0.002	0.006	0.002	<0.002	0.003	<0.002	<0.002	<0.002	mg/l	NONE/NONE
SVOC MS												
Phenols												
2-Chlorophenol #	EQS	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
2-Methylphenol #	EQS	0.1	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
2-Nitrophenol			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
2,4-Dichlorophenol #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
2,4-Dimethylphenol			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
2,4,5-Trichlorophenol #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
2,4,6-Trichlorophenol			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Chloro-3-methylphenol #	EQS	0.04	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
4-Methylphenol			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Nitrophenol			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM16/PM30
Pentachlorophenol	EQS	0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Phenol	EQS	0.0077	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
PAHs												
2-Chloronaphthalene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
2-Methylnaphthalene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Naphthalene #	EQS	0.0024	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30

Acenaphthylene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Acenaphthene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Fluorene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Phenanthrene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Anthracene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Fluoranthene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Pyrene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Benzo(a)anthracene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Chrysene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Benzo(bk)fluoranthene #	EQS	0.00003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Benzo(a)pyrene	EQS	0.00005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Indeno(123cd)pyrene	EQS	0.000002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Dibenzo(ah)anthracene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Benzo(ghi)perylene #	EQS	0.000002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	EQS	0.0013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM16/PM30
Butylbenzyl phthalate			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Di-n-butyl phthalate #			<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM16/PM30
Di-n-Octyl phthalate			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Diethyl phthalate #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Dimethyl phthalate			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Other SVOCs												
1,2-Dichlorobenzene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
1,2,4-Trichlorobenzene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
1,3-Dichlorobenzene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
1,4-Dichlorobenzene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
2-Nitroaniline			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
2,4-Dinitrotoluene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
2,6-Dinitrotoluene			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
3-Nitroaniline			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Bromophenylphenylether #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Chloroaniline			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Chlorophenylphenylether #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
4-Nitroaniline			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30

Azobenzene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Bis(2-chloroethoxy)methane #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Bis(2-chloroethyl)ether #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Carbazole #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Dibenzofuran #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Hexachlorobenzene #	EQS	0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Hexachlorobutadiene #	EQS	0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Hexachlorocyclopentadiene			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Hexachloroethane #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Isophorone #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
N-nitrosodi-n-propylamine #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM16/PM30
Nitrobenzene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl			95	71	91	97	105	100	84	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14			99	76	95	102	110	106	87	<0	%	TM16/PM30
VOC MS												
Dichlorodifluoromethane			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Methyl Tertiary Butyl Ether #			<0.0001	<0.0001	<0.0001	<0.0001	0.012	0.0023	<0.0001	<0.0001	mg/l	TM15/PM10
Chloromethane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Vinyl Chloride #			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	TM15/PM10
Bromomethane			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM15/PM10
Chloroethane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Trichlorofluoromethane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Dichloromethane (DCM) #	EQS	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
trans-1-2-Dichloroethene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,1-Dichloroethane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
cis-1-2-Dichloroethene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
2,2-Dichloropropane			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM15/PM10
Bromochloromethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Chloroform #	EQS	0.0025	0.006	<0.002	<0.002	0.004	<0.002	0.004	0.003	<0.002	mg/l	TM15/PM10
1,1,1-Trichloroethane #	EQS	0.1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,1-Dichloropropene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Carbon tetrachloride #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,2-Dichloroethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10

Benzene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
Trichloroethene (TCE) #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,2-Dichloropropane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Dibromomethane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Bromodichloromethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
cis-1-3-Dichloropropene			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Toluene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	mg/l	TM15/PM10
trans-1-3-Dichloropropene			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,1,2-Trichloroethane #	EQS	0.4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Tetrachloroethene (PCE) #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,3-Dichloropropane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Dibromochloromethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,2-Dibromoethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Chlorobenzene #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,1,1,2-Tetrachloroethane #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Ethylbenzene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
p/m-Xylene #			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	TM15/PM10
o-Xylene #			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM15/PM10
Styrene			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Bromoform #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
Isopropylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,1,2,2-Tetrachloroethane			<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	mg/l	TM15/PM10
Bromobenzene #			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,2,3-Trichloropropane #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Propylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
2-Chlorotoluene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,3,5-Trimethylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
4-Chlorotoluene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
tert-Butylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,2,4-Trimethylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
sec-Butylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
4-Isopropyltoluene #	EQS	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,3-Dichlorobenzene #	EQS	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,4-Dichlorobenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10

n-Butylbenzene #			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,2-Dichlorobenzene #	EQS	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
1,2-Dibromo-3-chloropropane			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,2,4-Trichlorobenzene	EQS	0.0004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Hexachlorobutadiene			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Naphthalene			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM15/PM10
1,2,3-Trichlorobenzene			<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM15/PM10
Surrogate Recovery Toluene D8			90	88	88	92	93	94	91	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene			110	110	110	110	110	110	110	<0	%	TM15/PM10

10	Concentration Exceeds Screening Value
10	Exceeds level of detection (no SV available)

Notes:

* - Screening Values based upon:

RPV WAT-PS-10-01)
(a) (Scotland) Regulations 2001
(b) Drinking Water Directive 98/83/EC
(c) Quality
(d) Water Regulations
(Surface Water Typology,
EQS Standards for Discharges to Surface
WHO Water Standards

Appendix E

Landscape and Visual Amenity

E1 Viewpoint Consultation

Cathy Edy

From: @dundeecity.gov.uk
Sent: 21 June 2016 11:51
To: [redacted]
Subject: Re: FW: MVV Dundee - viewpoints

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Daniela,

yes, this is acceptable.

Many thanks,

Sharon

Sharon Dorward
Planning Officer
[redacted]

-----Daniela Brohm < > wrote: -----
To: " [redacted] >
Subject: FW: MVV Dundee - viewpoints

Hi Sharon

As per your discussion with our client Bruce Braithwaite (Planning Manager, MVV Environment Services Ltd.) we would like to formally confirm that we will move viewpoint 1 from the Public Right of Way within the open space along Dighty Water to the south west of the site to the edge of the residential housing at Balunie Drive to the south of the site. Please see attached mark up.

Please could you confirm this would be acceptable?

Many Thanks

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

www.arup.com

From: [redacted]

Subject: RE: MVV Dundee - viewpoints

Hi Sharon

That's not a problem. We will incorporate predicted night time visibility as a short section for each view. I'll find out about the lighting proposals for the new facility. I can imagine there might be a safety lighting for air traffic at the top of the stack.

Thank you

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

www.arup.com

From: [redacted]

Subject: RE: MVV Dundee - viewpoints

Thanks Daniela,

it was a good call, I did foget to ask about lighting, but there was mention made that the development may end up at 45 metres tall. We would simply ask that if you considered a night time view to be contentious that you illustate it - would it be visible at night? Would the plant have lighting to that height?

Cheers,

Sharon

Sharon Dorward

Planning Officer

Development Management

City Development Department

[redacted]

[redacted]

[redacted]

[redacted]

Email:

-----Daniela Brohm < > wrote: -----

To: " " >
[redacted] >
Date: 02/01/2016 09:55AM
Subject: RE: MVV Dundee - viewpoints

Good morning Sharon

Many thanks for your response. My colleague Jane will be at the conference call.

Thank you

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

[redacted]

www.arup.com

Cities Alive rethinking green infrastructure ARUP

From:
Sent: 01 February 2016 09:44
To: Daniela Brohm
Subject: Re: MVV Dundee - viewpoints

Hello Daniela,

I am happy with all of thepoints you have made below! Apologies for not having responded to the email you sent before Christmas. There is a conference call shortly, are you involved in this? I shall report back afterwards if not, will assess the night time requirement further as I'm not sure what the proposals are for lighting.

Many thanks,

Sharon

Sharon Dorward

Planning Officer

Development Management

[redacted]

Email:

-----Daniela Brohm wrote: -----

To:
From: Daniela Brohm

Date: 01/29/2016 05:09PM
Subject: MVV Dundee - viewpoints

Hi Sharon

Sorry long time no speak. I was calling earlier and left a message. There are a few points I would like your opinion on.

Viewpoint location

We have been to site and checked the agreed viewpoints. Please find the photos of the viewpoints attached. There are a few we would like to move slightly.

Viewpoint 1 Balunie Drive – we originally intended to take the view from the residential area. However vegetation in the foreground of the view only allow glimpsed views. Therefore we are thinking of moving the view into the adjoining park which would provide a more open view towards the development.

Viewpoint 2 Dighty Water to the west – due to the new building been currently built at the Michelin factory we would like to move the view slightly further west. Otherwise the new Michelin building would screen most of the proposed development at the Energy from Waste site.

Viewpoint 5 Middleton Farm – we would like to move the view to Middleton Cottages as the view is very similar, however more residential receptors would be affected as they are facing towards Dundee.

Would this be acceptable?

Wirelines

As in my previous email we recommend to prepare wirelines as photomontages can be slightly misleading if the materials/cladding and colours of the outer facade are not fixed. Wirelines will show the extent of the development (silhouette) as a line on the views. We are proposing to prepare wirelines from the following viewpoints:

- Viewpoint 1 and 2 as they are closest to the site and the greatest effect on visual amenity is expected from here.
- Viewpoint 6 as the view from Dundee Law is an elevated and promoted view with many visitors coming to enjoy it as a local destination.

Would these viewpoints be acceptable for the preparation of wirelines or would you prefer different locations?

Methodology

Also before Christmas I sent you and email (see attached) with some key points regarding the LVIA (Landscape and Visual Impact Assessment) methodology. Have you had a chance to look at this? I am particularly interested in your view on the night time assessment. Currently we are not proposing to undertake a night time visual assessment due to the presence of the existing lighting at the existing facility and wind turbines within close proximity of the application site and the location of the site within the well-lit urban area of Dundee. What do you think?

Also are the winter views acceptable as they represent worst case in terms of visibility of the proposed development or would you prefer in addition to see summer photography of the same views, where leaf cover would slightly reduce the visibility of the proposed development in some views?

Sorry for the rather long email.

Please do not hesitate to give me a call if you want to discuss any of the above.

Best wishes

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

[redacted]

www.arup.com

Cities Alive rethinking green infrastructure ARUP

----- Message from Daniela Brohm > on Wed, 9 Dec 2015 12:24:54 +0000 -----

To:

Jane Saul

cc:

Subject: FW: MVV Dundee - viewpoints

Hi Sharon,

Thank you for your support with identifying the viewpoints for the EfW site in Dundee. Please find attached the updated viewpoint map, which shows the new location of viewpoint 4.

I just left you a message on your voice mail. As mentioned, I would like your opinion on a few key points regarding the assessment methodology.

Regarding our approach for assessing the landscape and visual effects we are thinking of the following:

- Preparation of 2 separate ZTV (Zone of Theoretical Visibility) drawings - one ZTV drawing showing the extent of the visibility of the proposed development (buildings and stack) and one showing the extent of the visibility of the prosed buildings only. This approach has the advantage is to differentiate the effect of the slender, but tall stack from the bulky, lower buildings. So the proposed stack does not disproportionately distort the ZTV map.
- Preparation of approximately 3 wirelines. Number and location of the wirelines will be agreed with you following our initial site visit. Wirelines will show the extent of the development (silhouette) as a line on the selected views from different directions. We are not proposing to do any photomontages as they can be misleading regarding the appearance of outer façade and building materials.
- Taking representative baseline photography in winter, when vegetation is without leaf cover. This is to represent the worst case in terms of visibility of the site and the proposed development.
- Professional photographer to take verified views (recording GPS coordinates), with tripod and appropriate camera. These views will form the base of the wirelines.
- Study area of approximately 5km from the centre of the application site for the assessment of landscape and visual effect. This is to include the further distance viewpoints. It is not anticipated that

significant effects will arise beyond 5km as the Project would gradually become less prominent within the view.

- We are not proposing to do night time assessment due to the presence of the existing facility and wind turbines within close proximity of the application site and the location of the site within the well-lit urban area of Dundee.

- The methodology for assessing the landscape and visual effects will be based on GLVIA 3 (Guidelines for Landscape and Visual Impact Assessment, third edition).

Please could you let us know if the above points seems acceptable.

If you have any queries or would like to discuss the above, please do not hesitate to contact me.

Thank you,

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

www.arup.com

From: Daniela Brohm
Sent: 04 November 2015 16:03

To:
Cc:
Subject: RE: MVV Dundee - viewpoints

Both,

Thank you very much for your assistance. Viewpoint 4 will be moved to the new cemetery, Pitkerro Grove as suggested.

Thank you,

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

[redacted]

www.arup.com

From:
Sent: 04 November 2015 15:46
To: Daniela Brohm

Cc:
Subject: Re: MVV Dundee - viewpoints

Hello Daniela,

I have sought the opinion of Dundee City Council's Landscape Design Team, and it is considered in general terms that these are reasonable viewpoints. It was noted that Viewpoint No. 4. Drumsturdy Rd. could perhaps be moved slightly to account for potential impact on views from the new cemetery, Pitkerro Grove.

I hope that this is useful to you.

Many thanks,

Sharon

Sharon Dorward

Planning Officer

Development Management

[redacted]

Email:

-----Daniela Brohm < > wrote: -----

To:
From: Daniela Brohm
Date: 11/03/2015 05:48PM
Subject: MVV Dundee - viewpoints

Dear Sharon,

As discussed, we would like to confirm with you the location of the representative viewpoints for the proposed development at the Baldovie EfW site, Dundee. The viewpoints would form the baseline for the Landscape and Visual Impact Assessment.

Therefore please find below our proposed list of viewpoints as well as the attached map showing the approximate locations. The viewpoints have been chosen following a desktop study of potential sensitive receptors and relevant landscape designations (resource: Historic Scotland, Scottish Natural Heritage, Dundee Local Development Plan, Proposal Map 2014 as well as using OS mapping and aerial images).

Viewpoint 1 - Balunie Drive – residential and recreational receptor to the south west

Viewpoint 2 - Dighty Water cycle route – recreational receptors to the south east

Viewpoint 3 - Open space at Traquair Gardens – recreational and residential receptor to the north

Viewpoint 4 - Drumsturdy Road/B961 – transport and residential receptor to the north east

Viewpoint 5 - Middleton Farm – long distance view, residential and transport receptor to the north west

Viewpoint 6 - Dundee Law – recreational receptor at designated viewpoint (also Listed Building, War Memorial) to the south west

Please note these are approximate viewpoint locations, which would be verified during the site visit as possible intervening vegetation, local topography or buildings might restrict views. Once we have been to site we can confirm the exact locations with you.

Please could you confirm if the number and location of the selected viewpoints would be acceptable.

Thank you,

Daniela

Daniela Brohm

Landscape Architect

Dipl.-Ing. CMLI

Arup

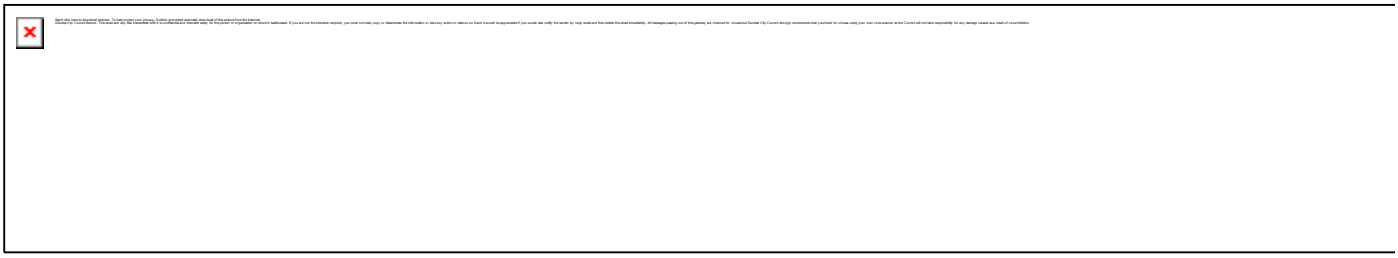
[redacted]

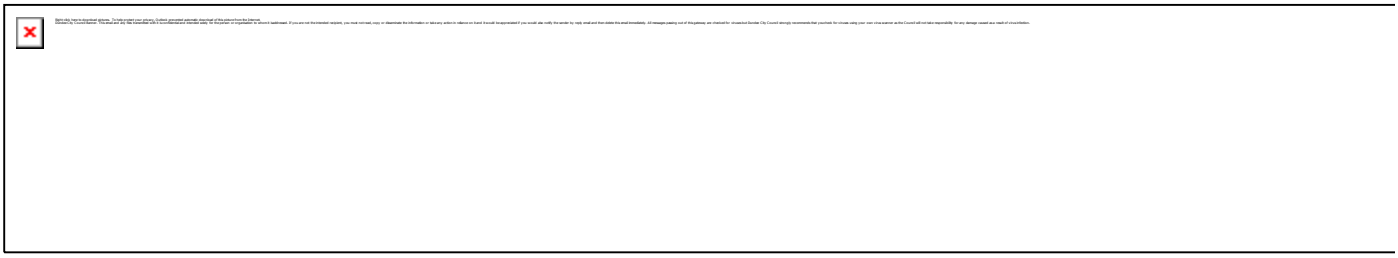
[redacted]

www.arup.com

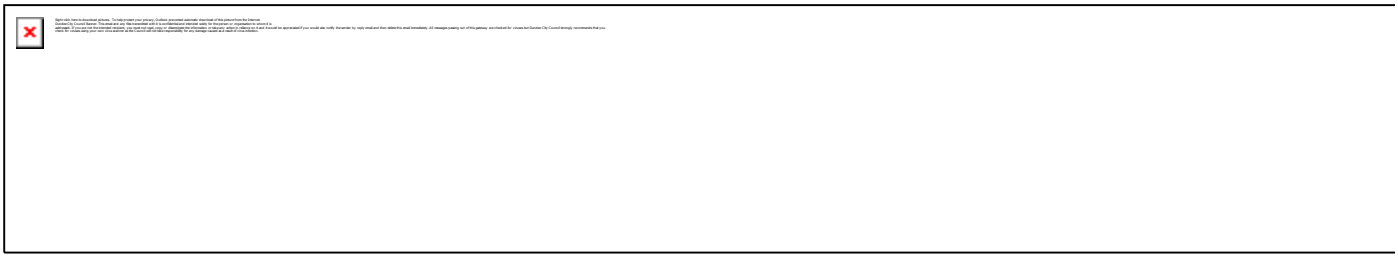
[attachment "MVV Dundee - viewpoints.jpg" removed by Sharon Dorward/CD/dundeecity]

[attachment "view 1.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "view 1_original location.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "View 2.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "View 3.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "view 4.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "View 5.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "View 6.jpg" removed by Sharon Dorward/CD/dundeecity]
[attachment "Dundee - viewpoints, RevA.jpg" removed by Sharon Dorward/CD/dundeecity]





[attachment "Dundee - viewpoints, RevC.pdf" removed by Sharon Dorward/CD/dundeecity]



E2 Assessment Methodology

E2.1 Introduction

The landscape and visual impact assessment (LVIA) process identifies and evaluates the likely effects which may arise from the construction and operation of the proposed development.

The methodology for the LVIA has been informed by current best practice and guidance, in particular:

- Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3)[1]; and
- An Approach to Landscape Character Assessment[2].

The LVIA has been carried out using professional judgement with reference to the good practice guidelines and takes into account both the adverse and beneficial contribution that the proposed development can make upon the surrounding landscape and visual amenity. The assessment considers the sensitivity of the landscape and visual receptor alongside the magnitude of change arising from the proposed development to determine the overall level of effect.

E2.2 Study Area

A 5km study area was initially agreed with Dundee City Council for the consideration of both landscape and visual effects. However, following detailed site work a reduced 2km study area for the assessment of landscape effects was considered appropriate to capture all of the likely significant effects that would arise as a result of the construction and operation of the proposed development.

E2.3 Baseline Methodology

The existing landscape and visual baseline has been informed by an initial desktop study, including a review of relevant publications, Ordnance Survey (OS) data and aerial mapping. The findings of the preliminary desktop study have been verified in the field during September 2016.

E2.3.1 Landscape baseline

The landscape baseline within the study area considers the following:

- The existing situation - including a factual description of the existing landscape and its condition (topography, built form, patterns, scale, transport routes);

[1] Landscape Institute and Institute of Environmental Management & Assessment (2013) *Guidelines for Landscape and Visual Impact Assessmen*t Third Edition
[2] Natural England (2014) *An Approach to Landscape Character Assessment*

- The existing landscape character - initially through desktop study informed by the Landscape Assessment of the Borough of Rugby Sensitivity and Condition Survey [3]and Warwickshire Landscape Guidelines [4]followed by verification in the field; and
- The value of the existing landscape - including reference to relevant statutory and non-statutory designations.

E2.3.2 Landscape value

The value attached to landscape receptors is a relative value informed by professional judgement. The value of a landscape is influenced by its designation, condition, scenic quality, recreational value, cultural associations and other issues including representativeness and/or rarity of the landscape. It should be noted that the fact that a landscape is not designated does not mean it does not have any value.

The factors that influence landscape value are described in Table E2.1.

Table E2.1: Criteria for landscape value

Scale	Typical description
International	Located within a World Heritage Site; and Considered an internationally important component of the world's or country's character, experienced by substantial numbers of international tourists.
National	Located within a National Park or Area of Outstanding Natural Beauty; A nationally significant historic or cultural resource; and Considered a distinctive component of the country's character, experienced by significant numbers of tourists from around the country.
Borough	Designated landscape/open space within the local authority local plans; Designated as a conservation area; and Experienced by a large proportion of the borough's population.
Local	A public, semi-public or private open space that serves the local community or residents; and A residential area likely to be valued by the local community.
Limited	A commercial, industrial or disused area that has limited value to the local community or residents.

[3] Warwickshire County Council (April 2006) *Landscape Assessment of the Borough of Rugby Sensitivity and Condition Survey*
[4] Warwickshire County Council (November 1993) *Warwickshire Landscape Guidelines: Dunsmore, High Cross Plateau and Mease Lowlands*

E2.3.3 Visual baseline

The visual baseline has been established through a combination of desk based research and field surveys to establish the existing visual context.

Zone of Theoretical Visibility

Two Zone of Theoretical Visibility (ZTV) plans have been produced been produced to show the area over which the proposed development, with and without the stack, would potentially be visible.

The ZTV plans have been generated in ArcGIS using the following data sets:

OS Terrain 5;

- Mastermap for building locations and heights within approximately 250m of the site;
- OS Openmap - Local for building locations with an assumed 10m height for domestic buildings and 15 m for larger buildings for the remainder of the study area; and
- Woodland Inventory 2015 data with an assumed 15m height for established woodland and 10m for young woodland.

The proposed stack, boiler house, fuel bunker, flue gas cleaning and tanks building, tipping hall and machine house were modelled based on maximum parameters and layouts provided by MVV. The ground level was assumed to be 28.5m Above Ordnance Datum (AOD).

Viewpoints

The ZTV has been used to identify broad receptor types that would be potentially affected by the proposed development and the selection representative viewpoints from publically accessible locations within the study area.

The location of each viewpoint has been confirmed in consultation with the Dundee City Council, see Appendix E1.

The baseline characteristics of each viewpoint have been described including:

- The composition of the view, including skyline, foreground, middle ground and background characteristics and how these are distinctive, aesthetically or culturally important, or detract from the view;
- The nature of the view of the site, including what, if anything, filters or screens the view and whether a view is a wide panorama, framed, glimpsed or part of a sequential (or kinetic) view; and
- Any conditions within the view that may affect the assessment, including atmospheric conditions, distance, seasonal change or building works that may block or harm views on a temporary basis.

Baseline Photography

Baseline photographs have been taken for each viewpoint, see Volume 3, Appendix E5.

E2.4 Methodology for the Assessment of Effects

This section sets out the methodology for assessing the effects of the proposed development on the landscape and visual receptors during the construction and operational phases.

Construction effects are generally temporary in nature and relate to the plant and activity present during the construction of the proposed development. Operational effects are considered to be permanent in nature and relate to the final state of the proposed development site.

E2.4.1 Landscape effects

Landscape effects relate to changes in character arising from direct impacts (which are limited to within the site boundary) and changes to the setting of wider character areas.

Effects are assessed for each landscape character area by weighing the findings of receptor sensitivity and magnitude of change, to arrive at a level of effect.

E2.4.2 Landscape sensitivity

Landscape sensitivity is derived from consideration of the landscape value attached to landscape receptors, which is identified in the baseline study, and the susceptibility of the landscape receptor to the type of change arising from the development proposed. An assessment has been made of the sensitivity of the existing landscape character within the study area.

The methodology for the identification of the value of the landscape has been outlined within the baseline methodology section.

Susceptibility

Landscape susceptibility is the ability of landscape receptors to accommodate the type of development proposed without compromising the current baseline situation of the landscape and/or the realisation of planning policies or strategies. The ability will vary according to the specific type and nature of change being proposed.

The assessment of landscape susceptibility should be tailored to the specific project with judgements about the susceptibility of a landscape receptor clearly identified.

Determining landscape sensitivity

The sensitivity of landscape receptors has been determined by reference to the value and susceptibility of a landscape receptor. The presence of any combination of attributes may be considered when determining sensitivity. This allows professional judgement to be used when determining the relative importance of different attributes.

Attributes which contribute to the sensitivity of a landscape receptor are described in Table E2.2. The occurrence of any one attribute may be sufficient to determine the sensitivity rating.

Table E2.2: Landscape sensitivity

Sensitivity	Typical attributes
High	Is valued at the borough scale or higher; Is a designated landscape at international, national, regional or borough level, for example World Heritage Site, National Park, Areas of Outstanding Natural Beauty; Is predominantly characterised by landscape components that are rare and distinctive and/or listed; Is designated as a conservation area, registered park and garden or public open space; Has a character that is rare within the assessment area; High importance and rarity which contains rare elements; Susceptible to change; and No or limited scope for substitution or positive enhancement.
Medium	Is locally valued; Has some components that are rare and/or distinctive; Has a character which is common within the assessment area; Moderate importance and rarity with some degraded elements; and Some scope for substitution or positive enhancement.
Low	Has limited landscape value; Has few or no distinctive components, or components that detract from the overall character of the site; Has a character that is common within the assessment area; Low importance and rarity with few, if any valued feature; Scope for substitution or positive enhancement; and Low susceptibility to change.

E2.4.2.1 Magnitude of Change

The likely magnitude of change (impact) that would be experienced by landscape receptors has been described. The factors that are considered in assessing the magnitude of change include the:

- Size or scale of change;
- Geographical extent of change;
- Duration and reversibility of the effect; and
- Effectiveness of any mitigation proposed.

The criteria which have been used to guide the assessment of the magnitude of change to each landscape character area are described in Table E2.3.

Table E2.3: Landscape magnitude of change criteria

Magnitude of change	Definition
High	Total loss of or major alteration to key characteristics or components of the landscape; Addition of new features or landscape components that would substantially change the existing character of the landscape; and Loss or addition of features that would substantially alter the immediate setting of the landscape receptor.
Medium	Partial loss of or alteration to one or more key characteristics or components of the landscape; Addition of new features or landscape components that may be prominent, but are largely in character with the landscape; and Loss or addition of features that represent change to part of the immediate setting of a landscape receptor.
Low	Fairly small loss or alterations to one or more characteristics or components of the landscape; Addition of new features or components that are in character with the existing landscape; and Loss or addition of features in the wider setting of the landscape receptor.
Negligible	Very limited loss or alteration of characteristic or landscape components of the landscape character area or setting of surrounding; and Addition of new features or landscape components that are relatively inconspicuous and largely in character with the existing landscape receptor.

E2.4.2.2 Significance of effect

Determination of the level of an effect requires the application of professional judgement to weigh the findings of receptor sensitivity and the magnitude of change. Effects may be adverse or beneficial.

The broad criteria that influence the level of significance are shown in Table E2.4. Any one aspect described may result in a categorisation within that level of effect.

Major and moderate effects are considered to constitute a significant effect.

Table E2.4: Significance criteria for assessment of landscape effects

Significance of effect	Typical description
Major adverse	At considerable variance with the existing landscape character, degrading its integrity; Permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and /or their setting; Adverse at a national or regional level; and Affects a large proportion of the LCA or its setting.

Significance of effect	Typical description
Moderate adverse	At variance with existing landscape character; Cannot be fully mitigated and may cumulatively amount to a moderate adverse effect; Adverse at a local level; and Affects a part of the LCA or its setting.
Minor adverse	Slightly at variance with the existing landscape character; Largely mitigated with only small residual adverse effect; and Affects only a small proportion of the LCA or its setting.
Negligible	Compatible with the existing landscape character; and Affects only a small proportion of the wider setting of a LCA.
Minor beneficial	Improves and enhances existing landscape character; Restores valued characteristic features partially lost through other land uses; and Enhances a small proportion of the LCA or its setting.
Moderate beneficial	Markedly improves and enhances existing landscape character; Restores valued characteristic features substantially lost through other land uses; and Enhances a part of the LCA or its setting.
Major beneficial	Considerably and distinctly improves and enhances the existing landscape character; Restores valued characteristic features substantially or entirely lost through other land uses; and Enhances a large proportion of the LCA or its setting.

E2.4.3 Visual effects

Visual effects relate to changes that arise in the composition of views as a result of changes arising from the proposed development and the responses of people to these changes.

The assessment of visual effects has been undertaken with reference to representative viewpoints, using professional judgement, with reference to project descriptions, method statements and drawings.

E2.4.3.1 Production of visualisations

Photomontages have been produced for each viewpoint following the methodology outlined in Appendix E3.

Visual sensitivity

Visual sensitivity is derived from consideration of cultural significance or value of the viewpoint and the susceptibility of the different visual receptors to the changes in view and visual amenity. The sensitivity of the potential visual receptors has been identified.

Value

The value of a particular view is influenced by various factors including its appearance in guidebooks, maps, literature and art, the view's popularity, the provision of facilities for the enjoyment of the view, its relationship to areas of landscape value/designations and cultural and/or historical association.

Susceptibility

The susceptibility of visual receptors to the changes in view considers the occupation or activity of people, their expectation of the view and the extent to which their attention or interest may be focused on the view and the visual amenity at a particular location.

As identified within GLVIA3, the most sensitive receptors include residential receptors and users of recreational facilities, where interest is focused on their surroundings. Less sensitive receptors are people engaged in outdoor sports, people travelling through the area (with the exception of scenic routes) and people at work whose attention is likely to be focused on their activity rather than the surrounding landscape.

Determining sensitivity of visual receptors

The sensitivity of visual receptors is determined taking a visual receptor's susceptibility to change in views and the value attached to particular views into account.

The criteria which have been used to inform the assessment of visual sensitivity are outlined in Table E2.5.

Table E2.5: Visual sensitivity

Sensitivity	Typical description
High	Receptors with key interest in the view such as residential properties, and receptors undertaking recreation including tourists where the view is a key reason for the activity and attention is focused on the surrounding landscape e.g. users of Public Rights of Way and Open Access Land.
Medium	Receptors with moderate interest in their environment e.g. outdoor workers, pedestrian users of major movement corridors and people taking part in outdoor sports.
Low	Receptors with passing or momentary interest in their environment e.g. motorists and office or shop workers. Their attention is generally focused on the activity rather than on the wider landscape.

E2.4.3.2 Magnitude of Change

The magnitude of change (impact) to the visual amenity of the identified receptors has been described by reference to the:

- Size or scale of change including the degree of contrast or integration of any new features in the landscape and the degree of screening or filtering of a view;

- Geographical extent of change including angle of view and extent of area over which the changes would be visible;
- Duration and reversibility of the effect; and
- Effectiveness of any mitigation proposed.

The criteria which have been used to guide the assessment of the magnitude of change that would be experienced by visual receptors are outlined in Table E2.6.

Table E2.6: Visual magnitude of change criteria

Magnitude of change	**Definition**
High	Total loss of or major alteration to key characteristics of the view from a receptor; Addition of new features or components which would be continuously highly visible and markedly different in character to the existing composition of the view; and Substantial changes in close proximity to the visual receptor, within the direct frame of view.
Medium	Partial loss of or alteration to one or more key characteristics of the view from a receptor; Addition of new features or landscape components that may be continuously highly visible, but are largely characteristic of the existing view from a receptor; Changes a relatively short distance from a receptor, but viewed as one of a series of components in the middle ground of the view; and Substantial change partially filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor.
Low	Fairly small loss of, or alterations to, one or more characteristics of the view from a receptor; Addition of new features or components that may be continuously or intermittently visible, but are largely characteristic of the existing view from a receptor; Changes within the background of the view, viewed as one of a series of components in the wider panoramic view from a receptor; and Change largely filtered by intervening vegetation and/or built form, or viewed obliquely from the visual receptor.
Negligible	Very limited loss or alteration of inconspicuous characteristics of the view from a receptor; Addition of new features or components that are largely inconspicuous and characteristic of the existing site when viewed from a receptor; Changes within the background of the view, viewed as an inconspicuous element within the wider panoramic view from a receptor; and Change almost entirely obscured by intervening vegetation and/or built form.

E2.4.3.3 Significance of effects

As for the determination of landscape effects the determination of the level of visual effect requires the application of professional judgement to weigh the findings of receptor sensitivity and the magnitude of change. Effects may be adverse or beneficial.

The broad criteria that influence the level of significance are shown in Table E2.7. Any one aspect described may result in a categorisation within that level of effect.

Major and moderate effects are considered to constitute a significant effect.

Table E2.7: Significance criteria for assessment of visual effects

Sensitivity	Typical description
Major adverse	A marked deterioration in the existing view.
Moderate adverse	A noticeable deterioration in the existing view.
Minor adverse	A discernable deterioration in the existing view.
Negligible	No perceptible deterioration or improvement in the existing view.
Minor beneficial	A discernable improvement in the existing view.
Moderate beneficial	A noticeable improvement in the existing view.
Major beneficial	A marked improvement in the existing view.

E2.5 Cumulative effects

The general approach to assessing cumulative effects is described in Volume One of the Environmental Statement (ES), paragraphs 5.3.12 to 5.3.13. Only known developments under construction, permitted but not yet implemented or submitted but not yet determined, within the assessment area have been considered.

Cumulative effects during the construction phase may arise from the visibility of construction plant and activity, demolition or site hoardings at multiple sites, increased levels of construction traffic. During the operational phase the presence of multiple developments, together altering the view from visual receptor or the character and/or setting of landscape character areas may result in cumulative effects.

Available information relating to construction and operation (design, height, massing and land use) at other sites has been considered alongside the construction and operation of the proposed development, and professional judgement applied to determine whether:

- Significant effects arising from the proposed development alone would be elevated;
- Non-significant effects arising from the proposed development alone would be elevated to become significant; or
- Non-significant effects arising from the proposed development alone would be elevated but remain non-significant.

E3 Baseline Photography Methodology

Baseline photography was captured by Angus Forbes Photography[5] using a Canon EOS 6D full frame digital SLR camera on a tripod approximately 1.4m above ground level. Baseline photographs were taken on 22nd April 2016 and 23rd June 2016 to capture late winter/spring and summer views respectively. Baseline night time photo graphs have not been taken.

The focal length varied for each photograph. This information together with the cameras Global Positioning System (GPS) location was recorded in the EXIF data associated with each photograph.

[5] Angus Forbes Photography, Kincraig, Newton Street, Blairgowrie, Perthshire PH10 6SU.
Tel: +447961 480485 Email: angusforbesphotography@gmail.com
Web: www.angusforbesphotography.com

E5 List of Figures for Landscape and Visual Impact Assessment

The baseline photographs taken by Angus Forbes Photography and the summer and winter photomontages prepared by TYPOCAD GmbH, Leipzig are presented in Volume 3 as follows:

Figure Number	Figure Name
E5.1	Viewpoint 1 winter – Balunie Drive - Baseline
E5.2	Viewpoint 1 winter – Balunie Drive – Photomontage 50mm
E5.3	Viewpoint 1 winter – Balunie Drive – Photomontage 75mm
E5.4	Viewpoint 1 summer – Balunie Drive - Baseline
E5.5	Viewpoint 1 summer – Balunie Drive – Photomontage 50mm
E5.6	Viewpoint 1 summer – Balunie Drive – Photomontage 75mm
E5.7	Viewpoint 2 winter – Dighty Water, Core Path 1E/Green Circular - Baseline
E5.8	Viewpoint 2 winter – Dighty Water, Core Path 1E/Green Circular – Photomontage 50mm
E5.9	Viewpoint 2 winter – Dighty Water, Core Path 1E/Green Circular – Photomontage 75mm
E5.10	Viewpoint 2 summer – Dighty Water, Core Path 1E/Green Circular - Baseline
E5.11	Viewpoint 2 summer – Dighty Water, Core Path 1E/Green Circular – Photomontage 50mm
E5.12	Viewpoint 2 summer – Dighty Water, Core Path 1E/Green Circular – Photomontage 75mm
E5.13	Viewpoint 3 winter – Traquair Gardens - Baseline
E5.14	Viewpoint 3 winter – Traquair Gardens – Photomontage 50mm
E5.15	Viewpoint 3 winter – Traquair Gardens – Photomontage 75mm
E5.16	Viewpoint 3 summer – Traquair Gardens - Baseline
E5.17	Viewpoint 3 summer – Traquair Gardens – Photomontage 50mm
E5.18	Viewpoint 3 summer – Traquair Gardens – Photomontage 75mm
E5.19	Viewpoint 4 winter – Core Path 23A - Baseline
E5.20	Viewpoint 4 winter – Core Path 23A – Photomontage 50mm
E5.21	Viewpoint 4 winter – Core Path 23A – Photomontage 75mm
E5.22	Viewpoint 4 summer – Core Path 23A - Baseline
E5.23	Viewpoint 4 summer – Core Path 23A – Photomontage 50mm
E5.24	Viewpoint 4 summer – Core Path 23A – Photomontage 75mm
E5.25	Viewpoint 5 winter – Middleton Farm - Baseline
E5.26	Viewpoint 5 winter – Middleton Farm – Photomontage 50mm
E5.27	Viewpoint 5 winter – Middleton Farm – Photomontage 75mm
E5.28	Viewpoint 5 summer – Middleton Farm - Baseline
E5.29	Viewpoint 5 summer – Middleton Farm – Photomontage 50mm
E5.30	Viewpoint 5 summer – Middleton Farm – Photomontage 75mm
E5.31	Viewpoint 6 winter – Dundee Law - Baseline
E5.32	Viewpoint 6 winter – Dundee Law – Photomontage 50mm
E5.33	Viewpoint 6 winter – Dundee Law – Photomontage 75mm
E5.34	Viewpoint 6 summer – Dundee Law - Baseline
E5.35	Viewpoint 6 summer – Dundee Law – Photomontage 50mm
E5.36	Viewpoint 6 summer – Dundee Law – Photomontage 75mm

E4 Visualisation Methodology

Service discription - visualisation Dundee Recycling Facility

Submitted Materials:
Images with the characteristics mentioned by the photographer, a 3D model of the facility to be visualised, information on the geographic positioning of the facility, and of the images to be processed, as well as architectural comparisons with geographic allocation (chimney) were submitted.

Service discription
The heights of the respective camera positions were determined with the help of the given latitude and longitude on the website www.freemaptools.com/elevation-finder.htm.

The 3D model was created in the CAD program ARCHICAD and saved in the file format "pln" - native ARCHICAD file.

With the aid of the information provided, the 3D model in the program ARCHICAD 20 could be supplemented with objects in the size and position of the landmarks.
In addition, virtual "cameras" were located at the positions and the corresponding geographical height in the 3D model. Visualisations of the 3D model including the landmarks were then created, corresponding to the time of day and the time of year.

These visualisations were then integrated into Photoshop CC 2015.5.1 in the photos provided.

The landmarks inserted in the 3D model were used to position and scale the visualisation. The distance between the landmarks was used for scaling purposes. The upper edge of the 70m-high chimney of the nearby industrial plant was used to position and scale the visualisations in the picture.

Appendix F

Socio-economics

MVV Environment Services

Dundee & Angus Community Benefits – Economic Impact Assessment

Final Report

Final | 04 November 2016

Job number 243685-00

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Contents

1 Introduction

1.1 Background to study and update

In 2015, Arup was commissioned by MVV Environmental Services Ltd (MVV) to undertake an Economic Impact Assessment of Community Benefits in relation to its proposals to deliver a residual waste contract for Dundee City Council and Angus Council (the Partnership Councils). The economic impact study was completed in February 2016.

At this time, the Partnership Councils were seeking to procure a residual waste contract for the reception and treatment of MSW collected by or on their behalf. A procurement exercise was underway with MVV being one of four bidders who were successful at the PQQ stage. The Partnership Councils are committed to securing Community Benefits within the residual waste contract – to secure the maximum economic and social benefits of the project. The economic impact study informed the community benefits aspect of MVV's bid submission for the residual waste contract; providing a robust analysis of the potential economic development outcomes.

MVV has competitively tendered for and is the sole remaining bidder the Dundee and Angus Residual Waste Treatment and Disposal Contract, under which they need the proposed EfW CHP facility. An update of the economic impact study has therefore been undertaken to reflect the further development of the scheme. This informs the assessment of the socio-economic effects of the proposed development for the Environmental Impact Assessment (EIA) being prepared as part of the planning application.

The update includes updated scheme parameters (Section 3) and economic impact analysis (Section 5) and conclusions (Section 6). The original baseline analysis remains valid.

1.2 Study objectives

The primary objective of the Economic Impact Assessment of Community Benefits is to address the following question:

What contribution will the proposed community benefits package for the Dundee and Angus Residual Waste Project make to the local economy?

The study specifically explores:

(i) The economic context for the project taking into consideration the economic and social characteristics of the local area; and

(ii) The potential economic development outcomes associated with MVV's proposed community benefits package for the project.

2 Approach

2.1 Methodology

The study methodology has involved a blend of face-to-face meetings, local research and investigations with desk-based analysis distilling the implications for economic development outcomes. The analysis has been shaped with particular appreciation of the objectives of the Dundee Economic Strategy 2013-2017, Angus Economic Strategy 2013-2020 and the Partnership Councils' procurement policies in relation to community benefits.

The study has explored the potential contribution that the proposed community benefits package for the Dundee and Angus Residual Waste Project will make to the local economy. To address this objective, the study involved the following key stages of work:

1. Initial desk based review of proposals
2. Engagement with key local educational institutions
3. Establishment of socio-economic baseline/context
4. Economic impact analysis based on community benefits
5. Drawing out of key conclusions on economic outcomes

In undertaking the study, early discussions were held with MVV, the University of Dundee, Abertay University and Dundee & Angus College. These have been critical in shaping the focus of the study and identifying key areas of collaborative between MVV and local educational institutions.

The economic impact analysis assesses the 'net additional' economic impact associated with the proposed package of community benefits against the established 'reference' case (in which the proposals do not occur). This has been based on working together with MVV to establish an accurate profile of the proposed development and where necessary agreeing suitable assumptions for parameters which are not known at this stage of the project.

The analysis identifies and quantifies where possible the direct and indirect outputs of the proposed package of community benefits. This package comprises of the following elements:

- Local Supplier Contract Spend
- Supplier Development
- Business Mentoring to SMEs and SEOs
- Support to Local Labour
- New Starts Employment Opportunities
- Apprentice – Project Initiated

- Existing Apprentices
- Vacancy Sharing
- Work Experience
- Awareness Raising/Curriculum Support Activities
- Donation of Materials
- Environmental Awareness

The impact analysis focuses on translating community benefits into employment, income (GVA) and skills based outcomes. The net impacts are calculated by incorporating deadweight, leakage, displacement and multiplier effects into the analysis. The range of output indicators is determined by data availability. There is a focus on employment and income effects.

3 The Proposed Project

3.1 Key objectives of the Partnership Councils

The Partner Councils are seeking to procure a contract for the reception and treatment of MSW collected by or on behalf of the Partnership Councils.

The successful contractor will be required to accept and treat all Contract Waste from the Interim Services Date or Full Services Date if there are no Interim Services. The Contract will have a full operational period of between 20 and 25 years that may be preceded by an Interim Services Period of up to 3 years.

Each Partnership Council aims to be able to recover for recycling approximately 55-60% of their total collected waste from its individual collection activities by 2016. Therefore it is anticipated, based on current projections that the successful Bidder will receive between 70,000 tonnes and 90,000 tonnes of Contract Waste per year. A Guaranteed Minimum Tonnage (GMT) is being offered as part of the procurement. The GMT will be agreed per Contract Year and will be discussed during Dialogue.

The potential for a heat offtake project at Baldovie has also been identified by the Partnership Councils as part of the contract. The Scottish and UK Governments are keen to support the development of heat supply strategies that link generators, specifically low carbon, and consumers to deliver financial, social and environmental benefits. A key part of this is connecting industrial operations where major step changes can be achieved through supply of heat and power between facilities.

The Partnership Councils are committed to securing Community Benefits within the Contract and will require the successful contractor to work with them in transforming the community in a real and sustainable manner.

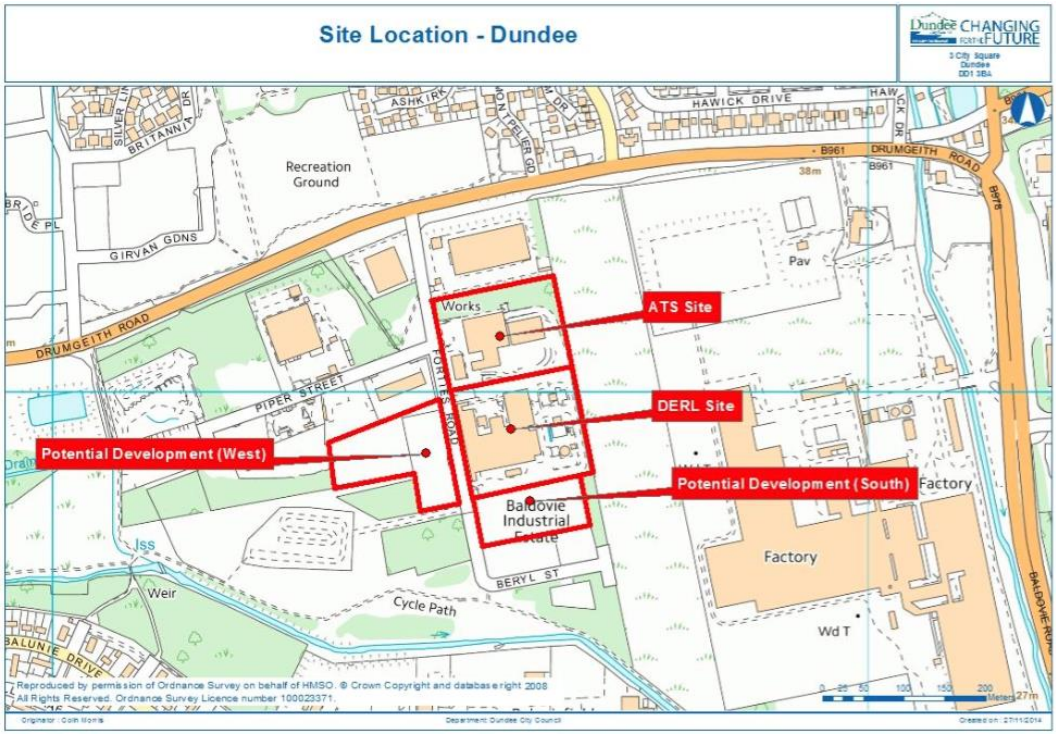
3.2 Project location

The site is located at Baldovie in Dundee as shown in Figure 3.1 and configured as shown in Figure 3.2.

Figure 3.1: Site location

Source: Google maps

Figure 3.2: Site layout



Source: ITPD Volume 1

3.3 Proposed scheme description

MVV has competitively tendered for and is the sole remaining bidder the Dundee and Angus Residual Waste Treatment and Disposal Contract, under which they need the proposed EfW CHP facility. MVV has further developed the parameters of its proposed scheme. These are outlined in full in Section 3 of the Environmental Statement Volume 1. A summary of the aspects most relevant to the economic impact assessment is provided below.

In summary, the primary purpose of the EfW CHP facility will be to treat the waste from the Dundee and Angus area that has not been recycled, reused or composted (residual waste). The facility will therefore primarily deal with household waste provided by the Dundee and Angus Councils under the Dundee and Angus Residual Waste (D&ARW) treatment contract. The remaining processing capacity will be used to process similar commercial and industrial (C&I) waste from local businesses in the surrounding area.

The EfW CHP facility is designed to treat 110,000 tonnes of waste per annum.

The waste will be combusted and the heat will be used to generate steam. The steam will drive a steam turbine and generate renewable electricity for use at the facility, to supply the Michelin tyre factory and for export to the grid. Steam will also be extracted from the turbine and fed into the Michelin tyre factory steam network to be used for process and heating purposes. The EfW CHP facility will therefore incorporate CHP technology.

In addition to the principal components of the main building, the new EfW CHP facility will share the existing DERL access road and trafficked areas for operational purposes; weighbridges and gatehouse; drainage and some of the connections to infrastructure. As well as the operational plant delivering the service requirements of the D&ARW treatment contract, facilities will be provided for use by the public, including a visitor centre within the administration building.

The Proposed Scheme will take over waste collection from the existing ATS plant. There will be no concurrent operation of the two facilities; instead the transition between DERL and the new EfW CHP facility will be almost instantaneous, with the shut-down of DERL preceding the start-up of the new facility.

3.4 Proposal by MVV

The proposal by MVV includes the following package of community benefits:

- Local Supplier Contract Spend
- Supplier Development
- Business Mentoring to SMEs and SEOs
- Support to Local Labour
- New Starts Employment Opportunities
- Apprentice – Project Initiated
- Existing Apprentices

- Vacancy Sharing
- Work Experience
- Awareness Raising/Curriculum Support Activities
- Donation of Materials
- Environmental Awareness

The specific parameters of this package are detailed as part of the economic impact analysis in Section 5 and the Community Benefits Method Statement document.

4 Economic Context

4.1 Overview

This section reports the findings of the socio-economic baseline developed for the study. The baseline acts as a solid foundation for the assessment of impacts.

The baseline is intended to be succinct and focused, covering the aspects that are considered to be of most significance to the assessment. This includes population, employment, economic activity, industrial base, skills and measures of economic deprivation. The data has been sourced primarily from the Office for National Statistics (ONS), Scottish government and the relevant local authorities.

An important part of the baseline has also been to develop an understanding of the area in terms of regeneration plans and other development activity.

4.2 Study area

Where availability allows, the baseline analysis compares key economic and social indicators at the following geographies:

- Core study area
- Wider study area
- Angus
- Dundee
- Scotland

For the purposes of the analysis, a core study area and wider study area have been identified. These are defined using geographical units adopted by Scottish Neighbourhood Statistics.

Scottish Neighbourhood Statistics has introduced two new, small-area statistical geographies to complete the Scottish statistical geography hierarchy. Data zones and intermediate zones build on the well-established postcode and census geographies, and are now the key geographies for disseminating government statistics and for supporting policy making.

The data zone is the key small-area statistical geography in Scotland. The data-zone geography covers the whole of Scotland and nests within local authority boundaries. Data zones are groups of 2001 Census output areas and have populations of between 500 and 1,000 household residents. Where possible, they have been made to respect physical boundaries and natural communities. They have a regular shape and, as far as possible, contain households with similar social characteristics. Not all statistics are suitable for release at the data-zone level because of the sensitive nature of the statistics, or for reasons of reliability.

Table 4.1 details the data zones used to defined the core and wider study areas. A brief description of these areas follows.

Table 4.1: Study area definitions

Core study area - data zones				
S01000569	S01001139	S01001183	S01001209	S01001233
S01000570	S01001142	S01001184	S01001210	S01001235
S01000572	S01001143	S01001185	S01001212	S01001238
S01000573	S01001147	S01001186	S01001213	S01001239
S01000576	S01001148	S01001189	S01001214	S01001240
S01000598	S01001149	S01001190	S01001216	S01001241
S01001108	S01001153	S01001191	S01001217	S01001242
S01001112	S01001154	S01001192	S01001218	S01001244
S01001117	S01001155	S01001193	S01001219	S01001248
S01001119	S01001156	S01001194	S01001220	S01001249
S01001120	S01001157	S01001197	S01001223	S01001250
S01001121	S01001158	S01001199	S01001224	S01001251
S01001124	S01001159	S01001200	S01001225	S01001252
S01001131	S01001160	S01001202	S01001226	S01001253
S01001133	S01001161	S01001203	S01001227	S01001258
S01001134	S01001162	S01001204	S01001230	S01001260
S01001136	S01001181	S01001205	S01001231	S01001264
S01001138	S01001182	S01001206	S01001232	
Additional data zones included in the wider study area				
S01001090	S01001113	S01001167	S01001222	S01001266
S01001091	S01001114	S01001168	S01001228	S01001267
S01001092	S01001115	S01001169	S01001229	S01001268
S01001093	S01001118	S01001171	S01001234	S01000569
S01001094	S01001122	S01001172	S01001236	S01000570
S01001095	S01001123	S01001174	S01001237	S01000572
S01001096	S01001127	S01001177	S01001243	S01000573
S01001097	S01001132	S01001178	S01001245	S01000574
S01001098	S01001137	S01001179	S01001246	S01000576
S01001099	S01001140	S01001180	S01001247	S01000594
S01001100	S01001141	S01001188	S01001254	S01000598
S01001101	S01001145	S01001195	S01001255	S01000600
S01001102	S01001146	S01001196	S01001256	S01000602
S01001104	S01001151	S01001201	S01001257	S01000632
S01001105	S01001152	S01001207	S01001259	
S01001107	S01001163	S01001208	S01001261	
S01001109	S01001164	S01001211	S01001262	
S01001110	S01001165	S01001215	S01001263	
S01001111	S01001166	S01001221	S01001265	

Source: Arup

Core Study Area

The Core Study Area is approximate to a 3-mile radius around the project site. This is commensurate with a reasonable walking distance of the site.

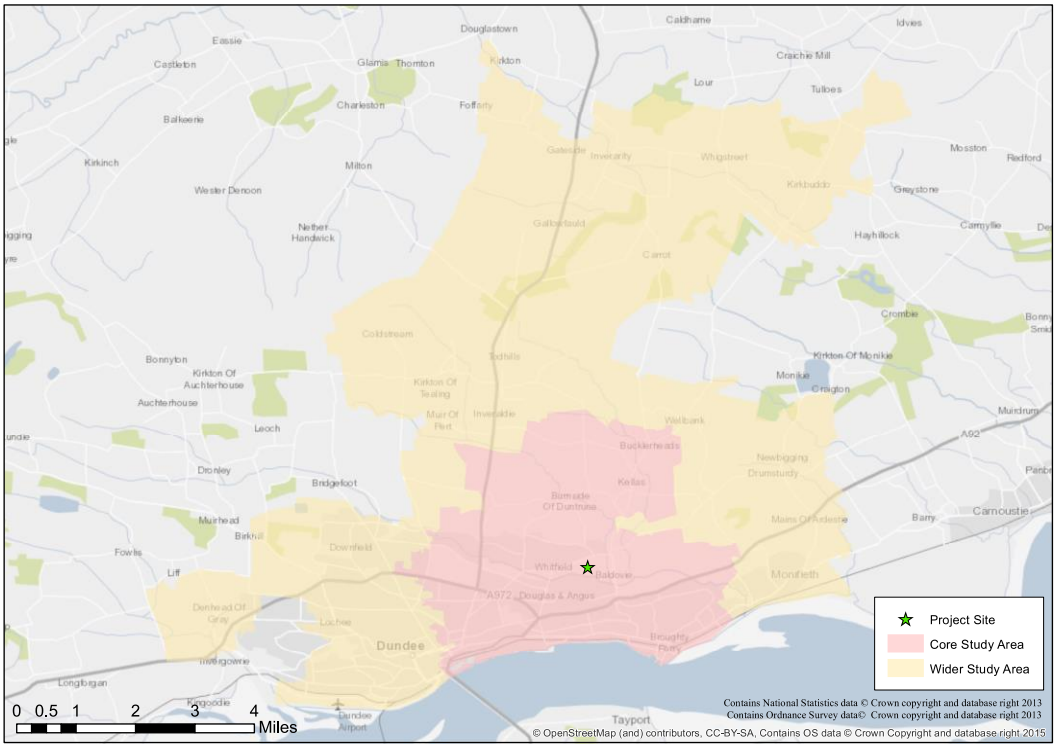
The Core Study Area is defined using data zones within Dundee and Angus local authorities.

Wider Study Area

The Wider Study Area extends further to include a greater area of Angus. Again, it is defined using data zones within Dundee and Angus local authorities.

Figure 4.1 shows the core and wider study areas.

Figure 4.1: Map of core and wider study areas



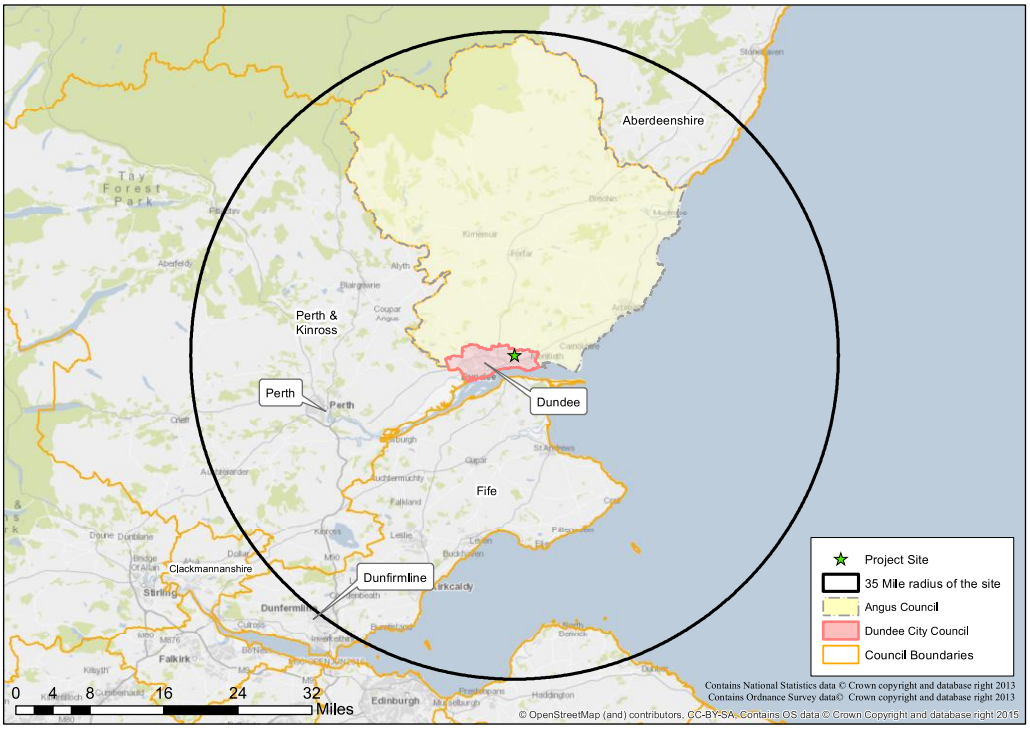
Source: Arup

Definition of 'local' in Partnership Councils' bid guidance

It is also useful to consider the geographical area commensurate with the Partnership Councils' definition of 'local' in relation to some community benefit impacts. This is relevant to the impact analysis reported in Section 5, and in particular in relation to employment and skills activity. For example, in relation to the use of local labour, 'local' is defined as 'individuals ordinarily resident within 35 miles of the location of the Facility, evidenced by his/her postcode'.

Figure 4.2 shows the 35-mile radius around the project site. This area extends into the local authority areas of Perth & Kinross to the west, Fife to the south and Aberdeenshire to the north.

Figure 4.2: Map of 35-mile radius from project site



Source: Arup

4.3 Economic policy and development

4.3.1 National policy

National policy documents set the overarching strategy for economic development across Scotland. The key document is Scotland's Economic Strategy.

Scotland's Economic Strategy

Scotland's Economic Strategy[1] sets out how the Government will deliver on the vision for Scotland. It brings increased focus to the dual objectives of boosting competitiveness and tackling inequality, and sets out the priorities we will target to achieve these mutually reinforcing goals.

The Scottish Government's agencies play an integral part in the delivery of the Economic Strategy under existing devolved powers including Scottish Enterprise.

Scottish Enterprise is Scotland's main economic development agency and aims to deliver a significant lasting effect on the Scottish economy. Its role is to help identify and exploit the best opportunities for inclusive economic growth. The Business Plan (2015-2018)[2] outlines how Scottish Enterprise aims to focus on helping Scottish growth companies and niche sectors to compete globally. Key objectives are set out across internationalisation, innovation, investment and inclusive growth. The measures underpinning these objectives are outlined below.

Internationalisation - increase Scotland's impact, presence and visibility in overseas markets:

- Integrated support for ambitious companies
- Specialist support for exporters
- Opportunities in Scotland's sectors
- Building Scotland's international reputation
- Attracting international investment

Innovation - drive growth and competitiveness for companies and industries:

- Support for innovators
- Improving Scotland's innovation 'system'
- Innovative sectors
- Developing Scotland's low carbon opportunity

Increased investment in Scotland's growth companies and business infrastructure is central to increasing sustainable economic growth:

- Investment for company growth

[1] Scottish Government (2015) Scotland's Economic Strategy. Available online at http://www.gov.scot/Publications/2015/03/5984/downloads
[2] Scottish Enterprise (2013) Scottish Enterprise Business Plan. Available online at http://www.scottish-enterprise.com/about-us/what-we-do/business-plan

- Building Scotland's business infrastructure
- Attracting international investment
- Developing Scotland's economic assets

Inclusive growth - Scotland's international competitiveness is underpinned the development of people and talent:

- A productive workforce
- Leadership as a strong driver for growth
- Addressing the jobs challenge
- Addressing people issues within sectors

A key objective of the Business Plan is to develop Scotland's low carbon future and to be recognised as a driver for innovation. The market opportunities relating to low carbon are continuing to grow and to provide a platform for innovation for Scottish companies (p.8). Scottish Enterprise will collaborate with partners to accelerate the development and delivery of low carbon projects across Scotland that attract new investment into the sector (p.10).

4.3.2 Local policy

Local policy documents set the strategy for economic development in unitary authorities in Scotland. The key documents for Dundee and Angus authorities are their respective economic strategies.

Dundee Economic Strategy

The Dundee Economic Strategy [3] and Action Plan sets out the Dundee Partnership's programme for development of the city's economy over the period 2013-2017. The Strategy and Action Plan underpins the Dundee Single Outcome Agreement 2013 – 2017 and articulates how partners across the city will work collaboratively to deliver better economic outcomes for the city and its people.

The objectives of the Strategy are to ensure Dundee will:

- Have a strong and sustainable city economy that will provide jobs for the people of Dundee, retain more graduates and make the city a magnet for new talent;
- Offer real choice and opportunity in a city that has tackled the root causes of social and economic exclusion, creating a community which is healthy, safe, confident, educated and empowered; and
- Be a vibrant and attractive city with an excellent quality of life where people choose to live, learn, work and visit.

The Strategy and Action Plan recognises that development of the local economy and achievement of better economic outcomes can best be achieved through

[3] Dundee Economic Partnership (2013) Dundee Economic Strategy. Available online at http://www.dundeepartnership.co.uk/sites/default/files/Dundee%20Partnership%20Economic%20Strategy%20&%20Action%20Plan%20Final.pdf

mobilisation of the collective assets, activities and resources of a range of partner organisations working together in the city.

The strategic priorities include:

- Economic growth through a focus on key sectors, growth companies, business start-ups and inward investment;
- Effective pathways to employment which enable people to progress into sustainable jobs;
- Tackle of youth unemployment by moving more young people into positive destinations;
- Physical infrastructure supports and enables sustainable economic growth;
- Dundee's Waterfront underpins the city's economic growth and enables the creation of new local employment opportunities;
- Improved image and perception of the city and its region;
- Dundee and its region is established as an internationally recognised visitor destination enhanced by V&A at Dundee;
- Dundee is a leading centre for the offshore renewables industry in the UK; and
- Higher and Further Education institutions drive growth in teaching and research and through supporting knowledge intensive industries.

Angus Economic Strategy

The Angus Economic Strategy [4] for 2013-2020 outlines how the Angus Community Planning Partnership intends to develop the area to 2020.

The Strategy provides a framework for improving the quality of life of Angus residents through developing a supportive business environment, nurturing emerging sectors and ensuring that all international and national opportunities are used to benefit the area. It also sets out the key priorities, challenges, opportunities and how progress will be measured.

The key target areas of the Strategy include:

Supporting Enterprise & Infrastructure

Offering good business advice to companies and support the development of local infrastructure and physical regeneration. This will help to create favourable market conditions that assist with the prosperity and sustainability of the local Economy.

Supporting Pride in Place

Civic pride and promotion of the local area helps to build strong and vibrant communities. Attracting visitors to the area and developing international markets will help create a welcoming environment.

[4] Angus Community Planning Partnership (2013) Angus Economic Strategy. Available online at www.angus.org.uk/pdfs/AEDPEconomicStrategy.pdf

Supporting Communities

The personal wellbeing and health of people are at the heart of any community. It is essential communities are supported to help distance them from poverty and inequalities.

Supporting Skills

Matching local people with employment opportunities and investing in their future is important to ensure there is a skilled workforce that is well equipped for employment.

The Strategy (p.11) recognises that the potential of Angus to increase the low carbon energy sector including heat.

4.4 Key economic indicators

Population

Table 4.2 outlines the total population for the Core Study Area, Wider Study Area, Dundee and Angus local authorities and Scotland.

The Core Study Area contains 75,087 people, whilst the Wider Study Area has 143,435. At the local authority level, Dundee covers a smaller geographical area but has a higher population compared to Angus.

Table 4.2: Total population, 2011

Area	Population (2011)[5]
Core Study Area	75,087
Wider Study Area	143,435
Angus	115,978
Dundee City	147,268
Scotland	5,295,403

Source: 2011 mid-year estimates and Census 2011

Table 4.3 outlines the age structure of the Core Study Area, Wider Study Area, Dundee and Angus local authorities and Scotland as a whole.

The Core Study Area has a higher proportion of under 16s (18.0%) and a lower proportion of 60-74 year olds (24.2%) compared to the Scotland national average. The Wider Study Area has a lower proportion (23.0%) of individuals at retirement age (60+) compared to the national average.

Dundee has a significantly higher proportion of 16-29 year olds (24.6%) compared to the national average (18.5%). It has a lower proportion of 30-44 year olds (17.8% compared with 20.0% nationally) and 45-59 year olds (19.1% compared with 21.1% nationally). Angus has a higher proportion of the population aged 60+ compared to the Scotland average (27.4% compared with 23.2% nationally).

[5] 2011 Census Population Data (2011) Scottish National Statistics

Table 4.3: Age structure, 2011

Age	Core Study Area[6]	Wider Study Area[7]	Angus[8]	Dundee[9]	Scotland[10]
% 0 to 15 years old	18.0	16.0	17.4	16.1	17.3
% 16 to 59 years old	57.7	61.0	55.1	61.5	59.6
% 60+ years old	24.2	23.0	27.4	22.5	23.2

Source: 2011 mid-year estimates and Census 2011

Employment

Total Employees

Table 4.4[11] provides an overview of the trends in total employee numbers in the Core Study Area, Wider Study Area, Dundee and Angus local authorities and Scotland over the period 2009-2014.

Total employee numbers in the Core Study Area increased by +1.1% in 2009 to 2014. They decreased over the same period in the Wider Study Area (-3.9%), Angus (-2.0%) and Dundee (-2.9%). This is in contrast to national trends where the level has increased slightly.

Table 4.4: Total employees, 2009-2014

Year	Core Study Area	Wider Study Area	Angus	Dundee	Scotland
2009	22,700	74,800	35,812	77,369	2,523,054
2010	22,200	73,100	34,151	74,805	2,435,314
2011	21,500	72,100	35,400	74,008	2,472,564
2012	21,500	71,500	33,707	73,192	2,428,439
2013	21,800	71,800	34,052	73,503	2,461,055
2014	23,000	71,900	35,095	75,152	2,540,188
% change 2009-2014	**1.1%**	**-3.9%**	**-2.0%**	**-2.9%**	**0.7%**

Source: BRES

Note: Numbers to nearest 100 jobs for core and wider study areas (in line with BRES disclosure guidance)

[6] 2011 Mid-Year Estimate (Age) (2011) Scottish Neighbourhood Statistics
[7] 2011 Mid-Year Estimate (Age) (2011) Scottish Neighbourhood Statistics
[8] 2011 Census Population Data (Age) (2011) Scottish Neighbourhood Statistics
[9] 2011 Census Population Data (Age) (2011) Scottish Neighbourhood Statistics
[10] 2011 Census Population Data (Age) (2011) Scottish Neighbourhood Statistics
[11] 2014 NOMIS (2014) Business Register and Employment Survey

Employees by Broad Industrial Sector

Figure 4.3[12] outlines a breakdown of employees by broad industrial sector

In the Core Study Area, health accounts for the largest proportion of employment (15.6%). The manufacturing and retail sectors are also important, accounting for 12.2% and 12.0% of employment respectively – and account for a greater proportion of employment than nationally.

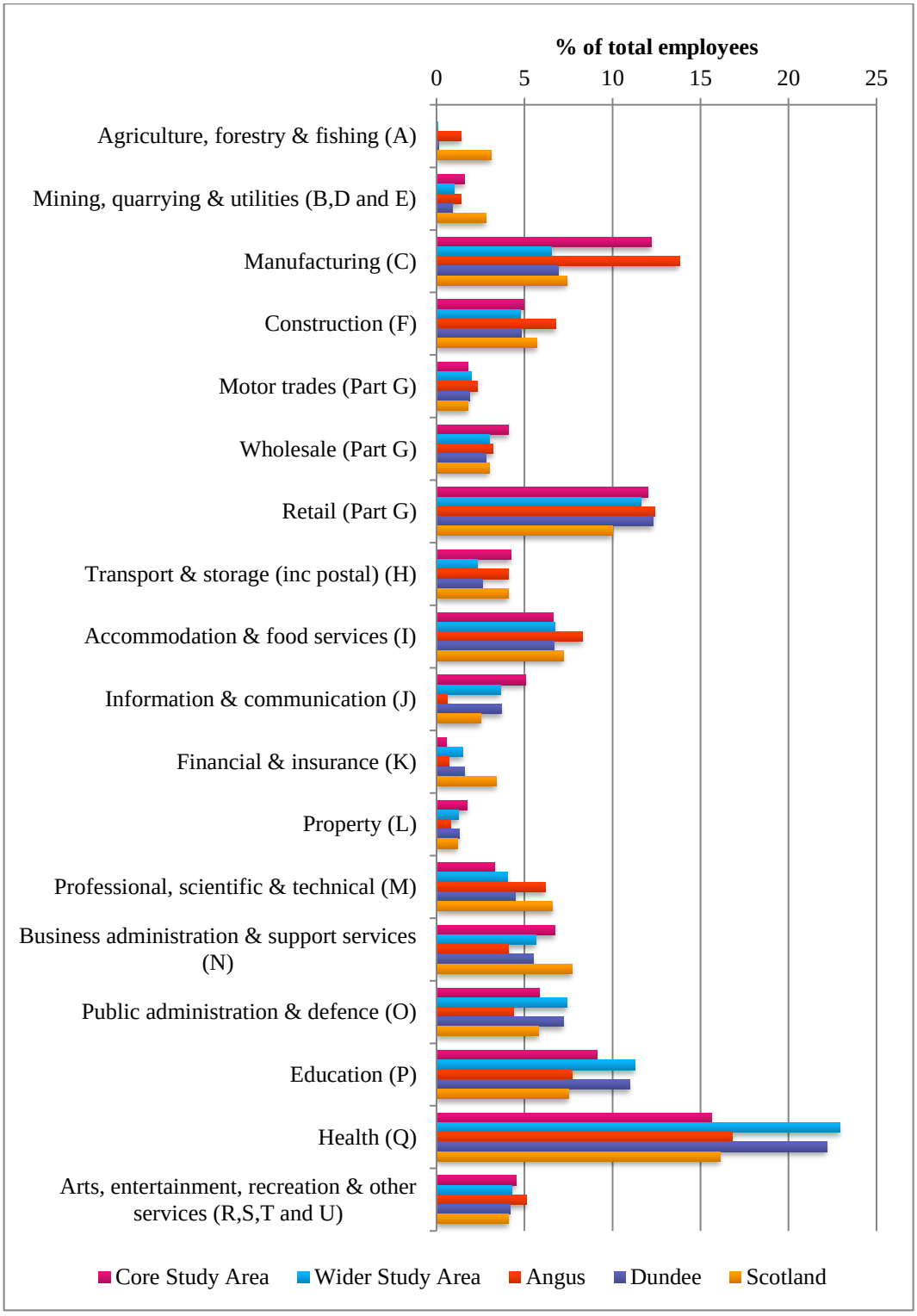
In the Wider Study Area, the health sector again accounts for the largest proportion of employment (22.9%), significantly higher than the respective figure for Scotland (16.1%). Retail and education are also important in the Wider Study Area, accounting for 11.6% and 11.3% of employment respectively.

Examining recent trends over the period 2009-2014, the mix of employment across sectors in Dundee has been fairly stable. The proportion of employment accounted for by the professional, scientific & technical sector increased the most in percentage point terms - from 3.6% to 4.5%. The health (increasing from 21.8% to 22.2%) and retail (increasing from 12.0% to 12.3%) sectors were also sources of growth.

In Angus, the proportion of employment accounted growth for by the agriculture, forestry and fishing sector experienced increased the most in percentage point terms; from 0.4% to 1.4%. The proportion of employment accounted for by the health sector decreased from 18.0% to 16.8%.

[12] 2014 NOMIS (2014) Business Register and Employment Survey

Figure 4.3: Employees by broad industrial sector, 2014



Source: BRES

Labour market and skills

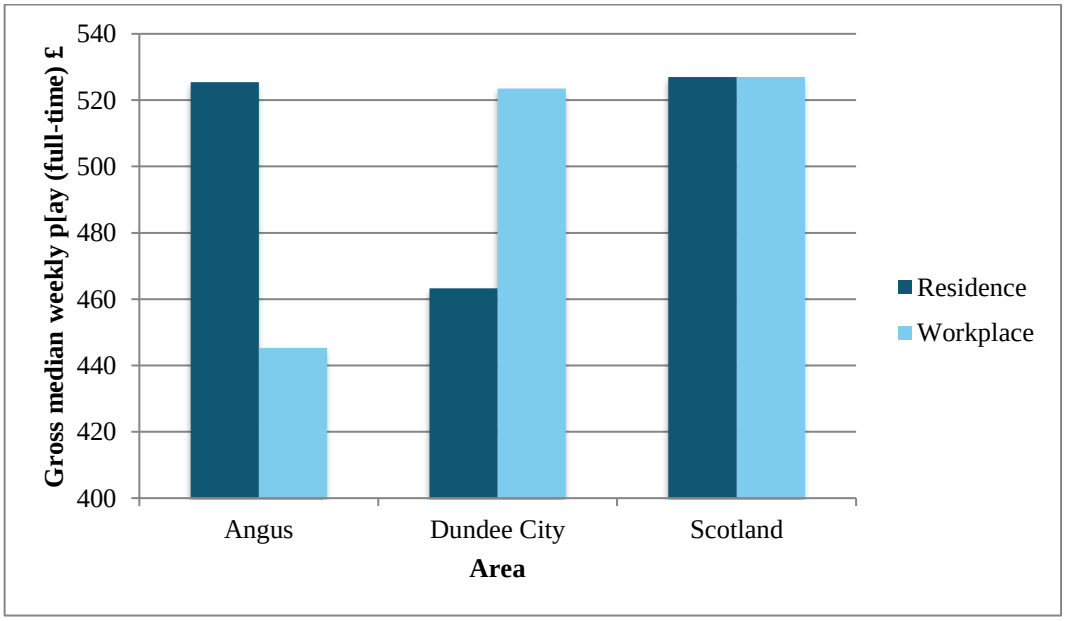
Wages

Figure 4.4 [13] shows residence and workplace based weekly full-time median average wages for the Dundee and Angus Local Authority areas compared to the Scotland.

On a residence basis, Dundee (£463.30) falls below the national average (£527.00). Angus (£525.40) is broadly in line with the national average. On a workplace basis [14], Dundee wages are slightly below (£523.50) the national average (£527.00). In contrast, wages in Angus Local Authority are significantly lower (£445.30).

The analysis of wages illustrates that the workplace-based wages in Angus are lower compared to Dundee and the national average. Workplace based wages for Dundee are also significantly higher than residence based wages. Residence based wages in Dundee are significantly lower than the comparable figures in Angus and Scotland. This may suggest that in commuters from outside Dundee are taking up higher paid posts within Dundee.

Figure 4.4: Average weekly wages, 2015



Source: ASHE

[13] NOMIS (2015) Annual Survey of Hours and Earnings - Resident Analysis
[14] NOMIS (2015) Annual Survey of Hours and Earnings - Workplace Analysis

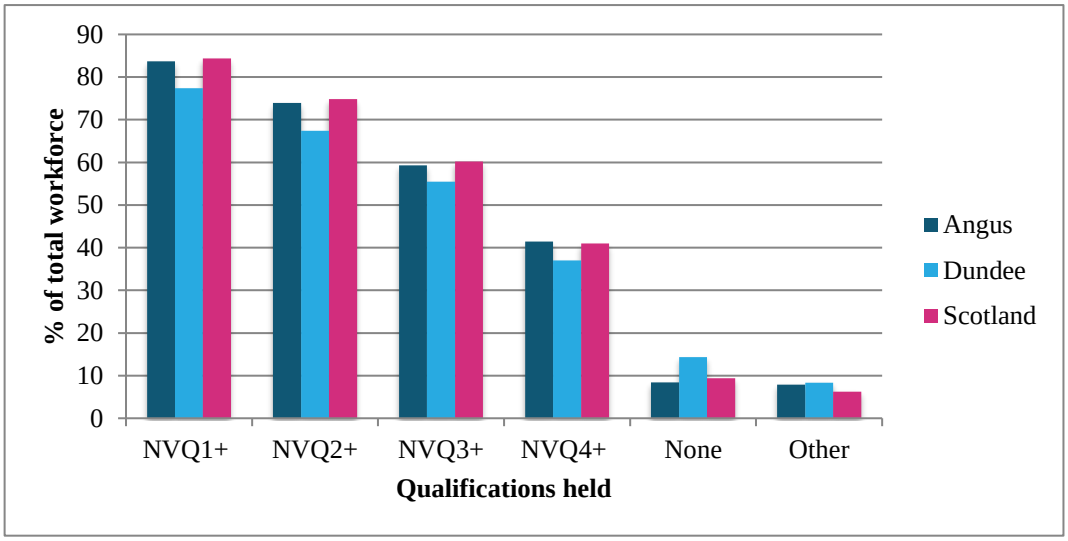
Qualifications

Figure 4.5 shows the qualification levels of the working age population.

The proportion of the workforce aged 16-64 with higher-level qualifications (NVQ4+)[15] in Angus (41.1%) just above the Scotland national average, whilst in Dundee it is lower (37.0%). The proportion of individuals with no qualifications is also higher in Dundee (14.3%) than in Scotland as a whole (9.4%). In contrast, the proportion in Angus (8.4%) is slightly lower than national average.

The data shows that the proportion of the population holding NVQ 1-4 qualifications is lower in Dundee than in Angus and Scotland as a whole.

Figure 4.5: Workforce qualification levels, 2014



Source: APS

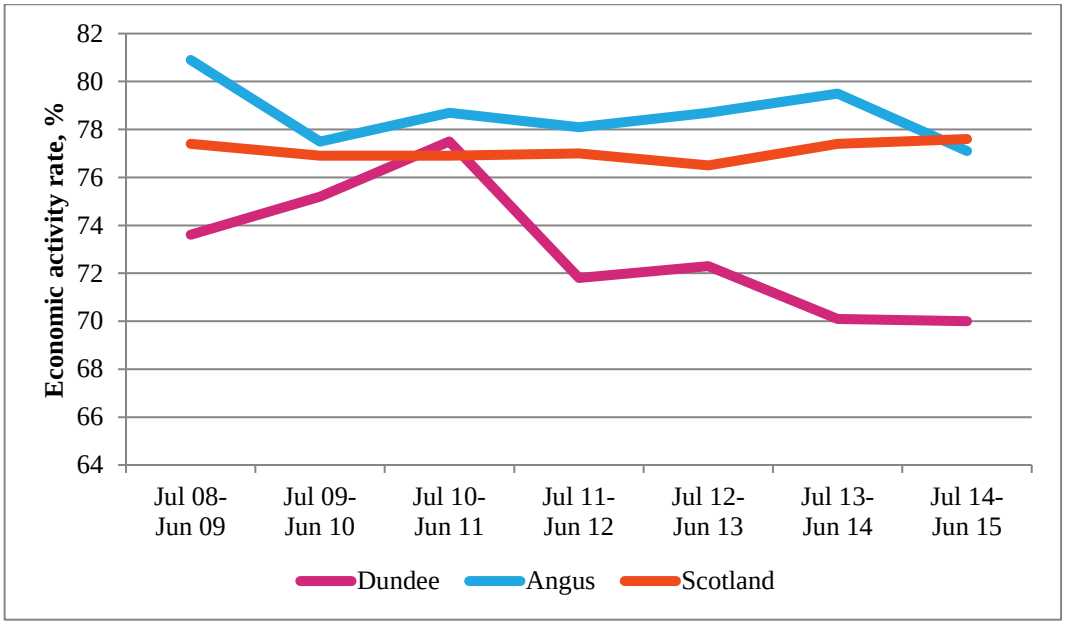
Economic Activity

Figure 4.6 shows the economic activity rate[16] for those aged 16-64 in the period 2008-2015.

This shows that since June 2011, economic activity rates in Dundee have been significantly lower than the Scotland national average. This gap in performance has also increased over time. In the latest year (July 2015-June 2015), the economic activity rate was 70.0% in Dundee compared with 77.6% in Scotland as a whole. Economic activity rates in Angus have been slightly above national average until the decline experienced in the most recent year.

[15] NOMIS (2015) Annual Population Survey Jan 2014-Dec 2014
[16] NOMIS (2015) Annual Population Survey - Economic Activity Rate - Jul 2008 – Jun 2015

Figure 4.6: Economic activity rate, 2008-2015



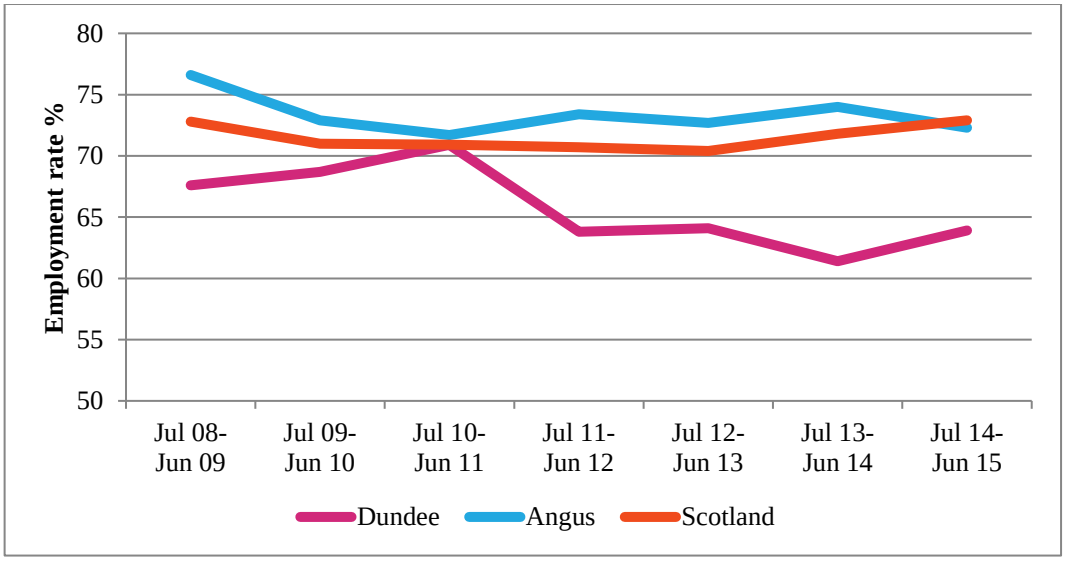
Source: APS

Employment Rate

Figure 4.7 shows the employment rate[17] for those aged 16-64 in the period 2008-2015.

The employment rate in Dundee has been consistently lower over the period than the Scotland national average. In contrast, with the exception of the most recent year, the rate in Angus has exceeded the national average. Data for the most recent year (July 2014-June2015) indicates that there is a significant gap in the employment rate in Dundee (63.9%) compared with Angus (72.3%) and Scotland as a whole (72.9%).

Figure 4.7: Employment rate, 2008-2015



Source: APS

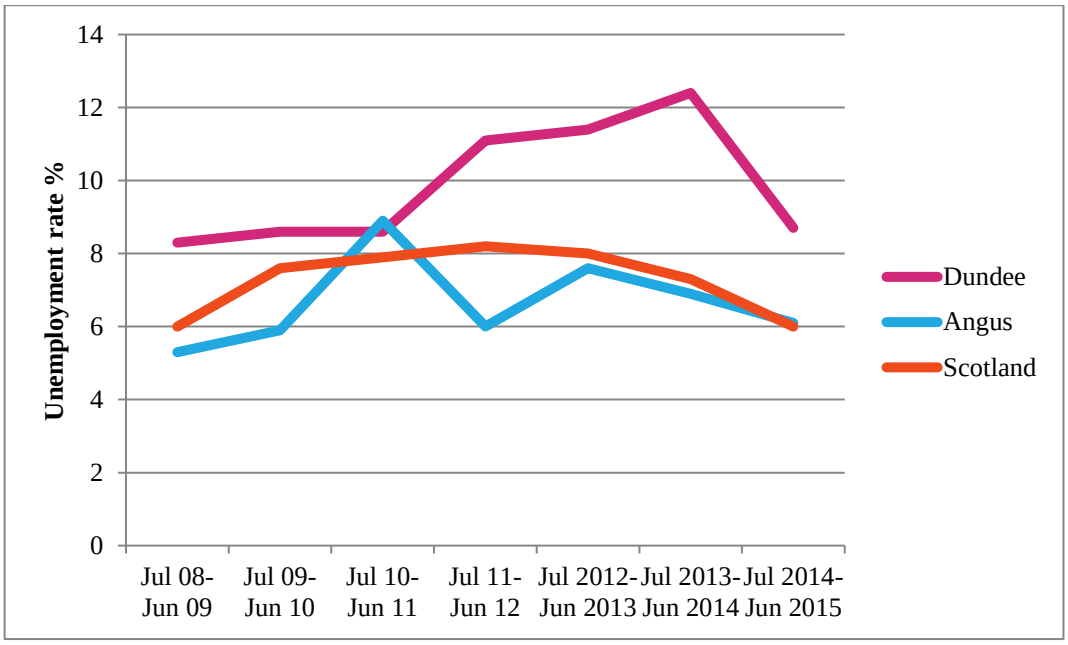
[17] NOMIS (2015) Annual Population Survey – Employment Rate - Jul 2008 – Jun 2015

Unemployment Rate

Figure 4.8 shows the unemployment rate[18] for those aged 16-64 in the period 2008-2015.

The unemployment rate in Dundee has been consistently higher over the period than the Scotland national average. In contrast, the rate has been largely lower than the national average in Angus. Data for the most recent year (July 2014-June 2015) indicates that there is a significant gap in the unemployment rate in Dundee (8.7%) compared with Angus (6.1%) and Scotland as a whole (6.0%). This gap has narrowed from its peak in July 2013 to June 2014 however, at which time it the unemployment rate was almost twice that of Angus.

Figure 4.8: Unemployment rate, 2008-2015



Source: APS

Occupational Profile

Figure 4.9 shows the occupational profile of the resident workforce[19].

Dundee has a smaller proportion of managers, directors and senior officials (6.2%) compared to the Scotland national average (8.4%). Also, a smaller proportion of skilled trades (10.5%) compared to the Scotland national average (12.5%). The city has a higher proportion of its resident workforce in sales and customer service (12.2%, compared to 9.3% in Scotland) and elementary occupations (13.6%, compared to 11.6% in Scotland).

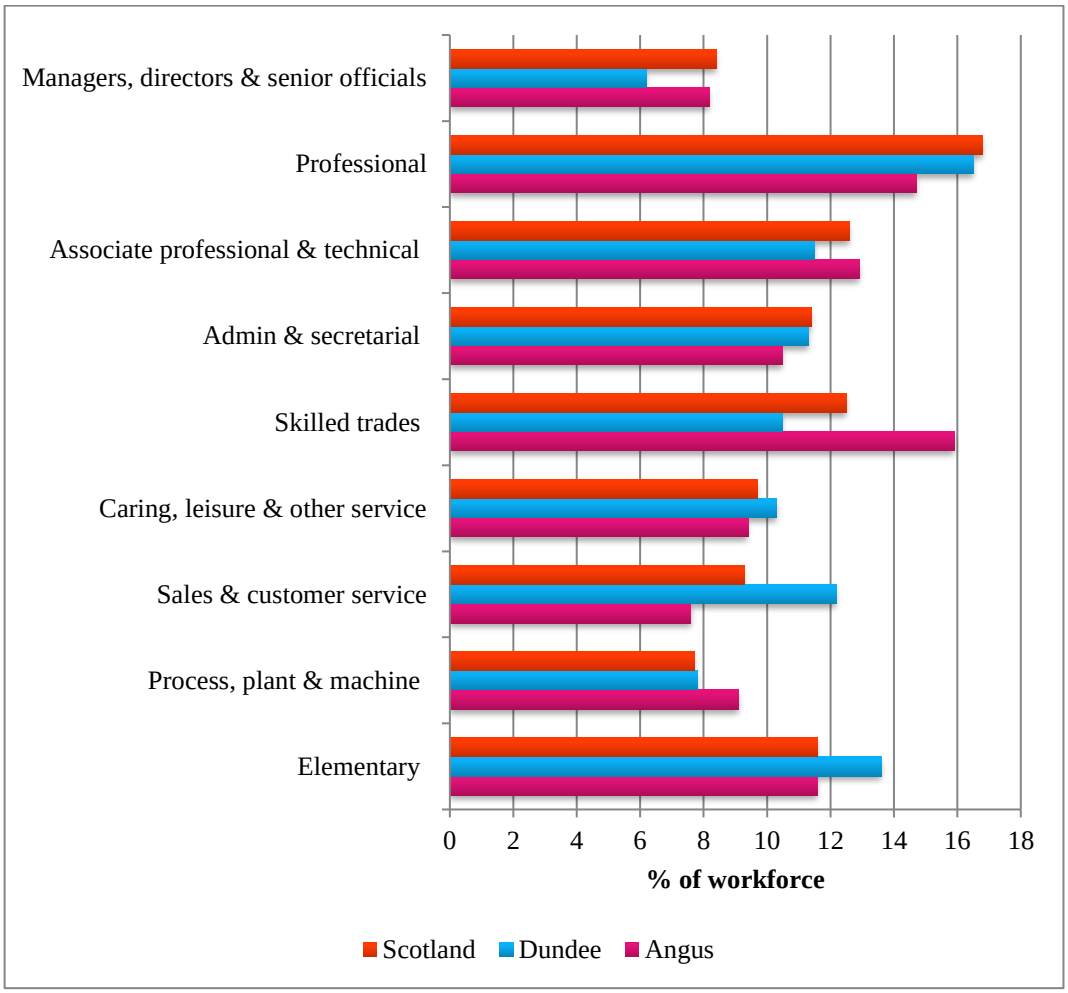
This illustrates that Dundee has a higher amount of lower and non-skilled trades and less managerial and skilled trades compared to the national average.

Angus has a smaller proportion of professional occupations (14.7%, compared to 16.8% in Scotland) and sales and customer service occupations (7.6%, compared to 9.3% in Scotland). It has a higher proportion of skilled trades (15.9%,

[18] NOMIS (2015) Annual Population Survey – Unemployment Rate - Jul 2008 – Jun 2015
[19] Scottish Neighbourhood Statistics (2011) Occupational Profile

compared to 12.5% in Scotland) and process, plant and machine operators (9.1%, compared to 7.7% in Scotland). This illustrates that Angus has a smaller proportion of professional trades and a higher proportion of skilled and machine trades compared to the national average.

Figure 4.9: Occupational profile of resident workforce



Source: Census 2011

Key Local Employers

The key local employers within Dundee include:

- NHS Tayside;
- Dundee City Council;
- University of Dundee;
- Tesco;
- D. C. Thomson & Co (media); and
- BT.

Wider trends toward reduced employment in some of the sectors in which these firms operate (e.g. publishing) present a challenge to employment opportunities in Dundee.

Deprivation

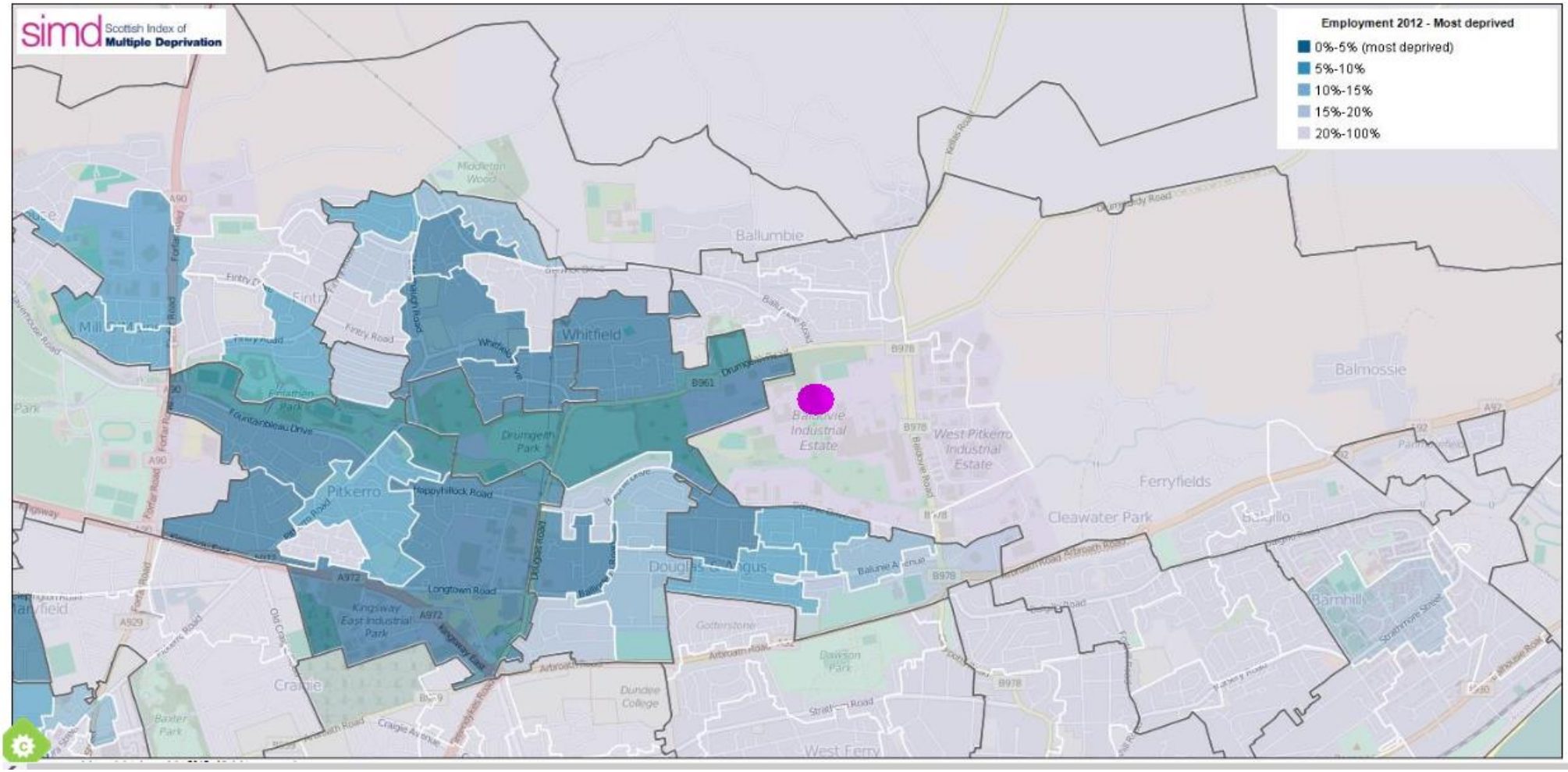
Employment

Figure 4.10[20] provides an outline of employment deprivation within the areas surrounding the site. The approximate site location is denoted by a dot.

The areas to the west and south west of the site are some of the most deprived areas in Scotland (within the 0-5% most deprived).

[20] Scottish Neighbourhood Statistics (2012) Scottish Index of Multiple Deprivation – Employment

Figure 4.10: Employment deprivation



Source: Scottish IMD

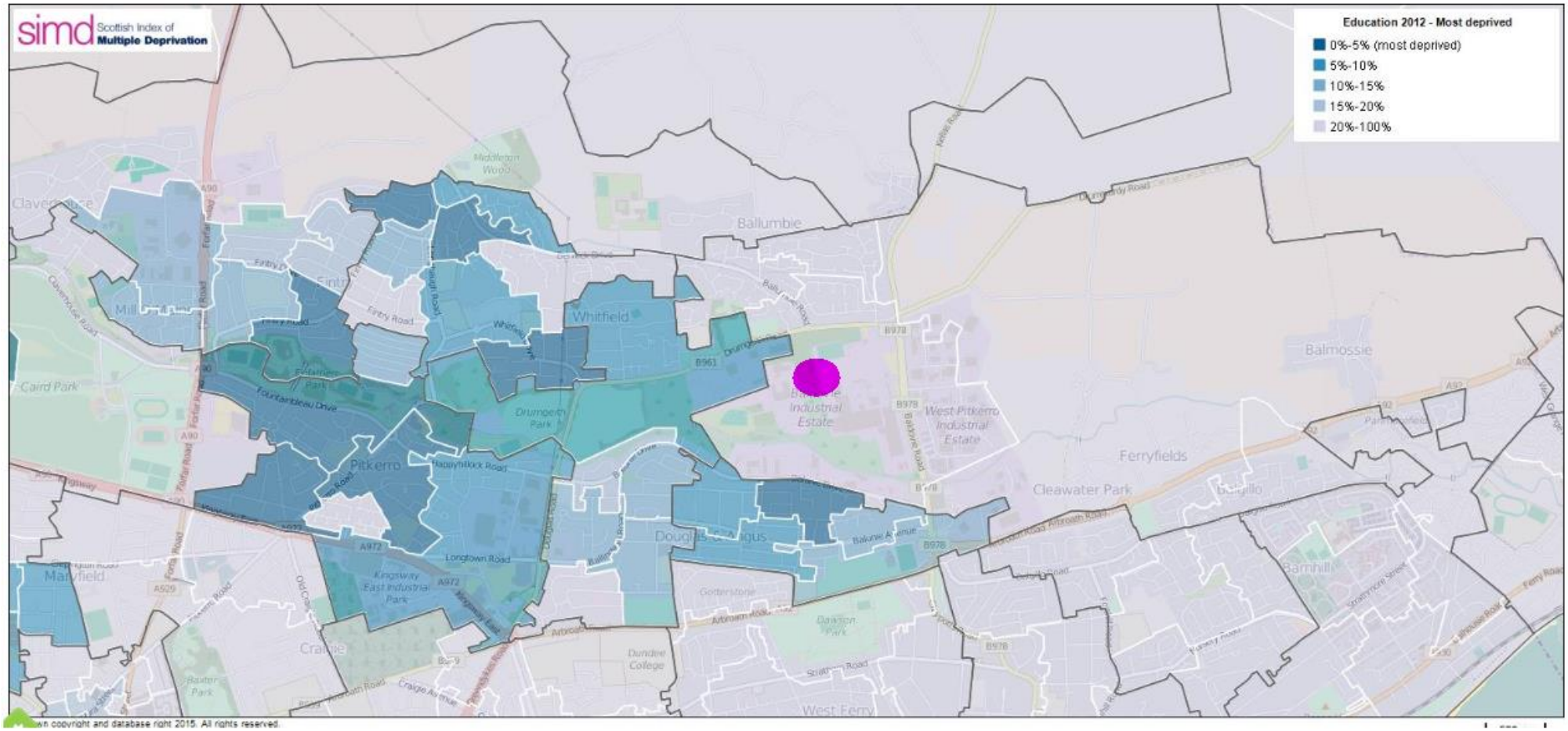
Education

Figure 4.11 [21] provides an outline of education deprivation within the areas surrounding the site.

The area to the south of the site is one of the most deprived areas in Scotland (within the 0-5% most deprived).

[21] Scottish Neighbourhood Statistics (2012) Scottish Index of Multiple Deprivation – Education

Figure 4.11: Education deprivation



Source: Scottish IMD

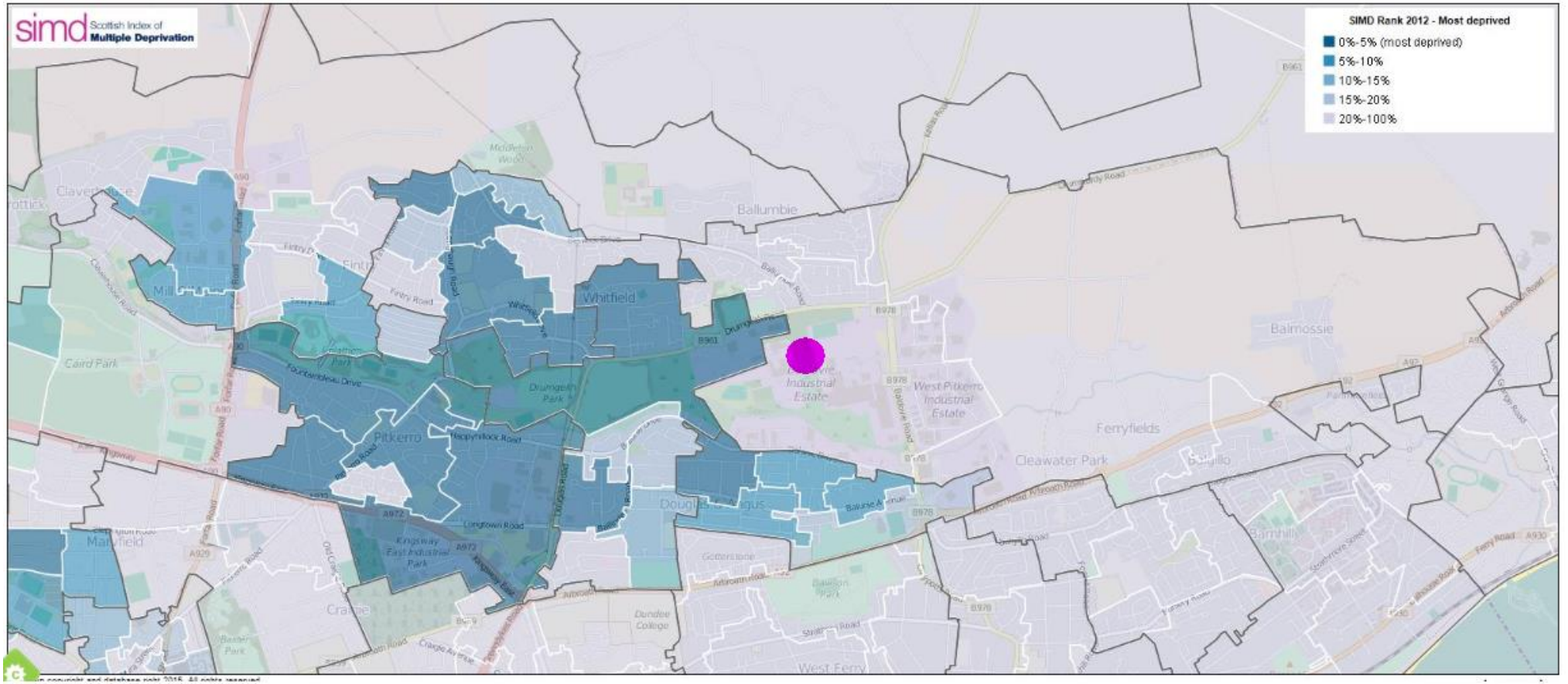
Overall

Figure 4.12 [22] provides an outline of overall deprivation within the areas surrounding the site.

The areas to the west and south west of the site are some of the most deprived areas in Scotland (within the 0-5% most deprived).

[22] Scottish Neighbourhood Statistics (2012) Scottish Index of Multiple Deprivation – Overall

Figure 4.12: Overall deprivation



Source: Scottish IMD

4.5 Key findings and implications

- The local economic strategies for the area place priority on pathways to employment, tackling youth unemployment and the role of higher/further education institutions in driving growth;
- Dundee has a significantly higher proportion of 16-29 year olds and the Core Study Area a higher proportion of under 16s compared to the Scotland average;
- Whilst total employee numbers in the Core Study Area increased by +1.1% in 2009 to 2014, they decreased by -3.9% in the Wider Study Area, -2.0% in Angus and -2.9% in Dundee. This is in contrast to national trends where the level has increased slightly;
- Residence based wages in Dundee are significantly lower than the comparable figures in Angus and Scotland;
- Workplace based wages in Dundee are significantly higher than residence based wages. This may suggest that in commuters from outside Dundee are taking up higher paid posts within Dundee due to skills issues;
- The health sector accounts for the largest proportion of employment in the Core Study Area (15.6%). The manufacturing and retail sectors are also important, accounting for 12.2% and 12.0% of employment respectively – and account for a greater proportion of employment than nationally;
- Wider trends toward reduced employment in some of the sectors in which some of Dundee's largest employers operate (e.g. publishing) present a challenge to future employment opportunities in Dundee;
- The proportion of the population holding NVQ 1-4 qualifications is lower in Dundee than in Angus and Scotland as a whole;
- There are a higher proportion of individuals with no qualifications in Dundee which could be limiting access to employment opportunities for local people;
- Economic activity rates in Dundee have been significantly lower than the Scotland national average since June 2011. This gap in performance has also increased over time;
- There is a significant gap in the employment rate in Dundee compared with rates in Angus and Scotland as a whole;
- Dundee has a higher amount of lower and non-skilled trades and less managerial and skilled trades compared to the national average; and
- The proposed project site is within close proximity of communities that are some of the most deprived in Scotland on employment, education and overall IMD measures.

5 Economic Impact Analysis

5.1 Overview

This section reports the findings of an economic impact analysis to estimate the potential economic development outcomes associated with MVV's proposed community benefits package for the project.

The economic impact analysis is concerned with the proposed community benefits package; it does not represent a full assessment of the energy from waste plant that the residual waste contract will procure.

The analysis is based on the proposed package of community benefits as discussed with MVV at the time of this study. The specific parameters of this package are detailed as part of the economic impact analysis findings reported in this section. The Community Benefits Method Statement document details MVV's proposed approach to delivering the community benefits package. This includes the Local Employment Scheme (LES) that MVV will operate for both the works (construction) and delivery (operation) of the Baldovie Energy from Waste/Combined Heat and Power facility.

The Community Benefits Method Statement document should be taken as the definitive document in terms of the proposed package of community benefits.

In line with the structure of the Partnership Council's tender documentation for the contract, impacts are reported separately for the works and delivery periods. The community benefits and outcomes align with those in Appendix 3 of the IPD Volume 1 document. These are under the following four headings:

- Supplier development
- Employment and skills activity
- Community and awareness raising activity
- Environmental awareness

Impacts are reported on a per annum basis for the works and delivery periods.

5.2 Works period (construction)

The construction of the new plant is expected to occur between late 2017 and late 2020 and take approximately 35 months (including the mobilisation, main construction and commissioning phases).

MVV's proposed community benefits package includes a number of measures during this period.

5.2.1 Supplier development

Activities under supplier development refer to the development of the Small to Medium Enterprise (SME) sector and Social Enterprise Organisations (SEOs). This objective is achieved by maximising SME exposure to procurement opportunities and recognising the potential role that SEOs can play in creating a strong, sustainable and inclusive economy.

The outcomes of the community benefits supporting supplier development outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Local supplier contract spend - £ (*Note - not part of current bid stage)*

This refers to spend during the construction period that goes to local suppliers. For the purposes of the tender process, 'local' is defined as a supplier or sub-contractor whose headquarters is located within 35 miles of the facility.

The total estimated cost of construction of the facility is £100 million. It is estimated that 30% of this spend will go to local suppliers (£30 million). These costs are based on approximate estimates available at the time of this study. Using Scottish Input-Output data[23] for the construction sector, this change in output can be expressed in GVA and its total impact on the economy estimated. The GVA equivalent of the local impact is approximately £24 million. Applying the GVA multiplier for construction (2.1) indicates that the **total expected change in GVA including indirect and induced multiplier effects is in order of £50 million.**

Opportunities for local SME contractors and SEOs to become involved during the construction period will include acting as Sub-Contractors to for both the civil engineering and technical Works, and to win some of the stand-alone contracts.

There are also expected to be broader opportunities for local companies, particularly SMEs, to provide services such as accountancy, personnel recruitment, printing, consultancy, accommodation and transport.

Supplier development - Events

This refers to support for SMEs, local business and social enterprises. It includes Meet The Buyer events, presentation at the Supplier Development Programme events or other Business Development Events.

[23] http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

The LES proposed by MVV will include at least **1 event per annum**[24]. This will contribute toward improving access to potential project contracts for local businesses.

Business mentoring for SMEs and SEOs - Hours

This refers to business mentoring support for SMEs and SEOs.

The LES proposed by MVV will include at least **24 hours of business mentoring per annum**. This activity will support the local business base and maximise their ability to access relevant contract opportunities arising from the project.

5.2.2 Employment and skills activity

Activities under employment and skills refer to the use of local labour, new employment opportunities and skills development.

The outcomes of the community benefits supporting employment and skills outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Local Labour - % (*Note - not part of current bid stage)*

This refers to the extent to which the construction expenditure of the project benefits local labour. For the purposes of the tender process, 'local' is defined as individuals ordinarily resident within 35 miles of the facility.

MVV will seek to ensure that not less than **70%** of the workers employed in relation to the construction of the development live within the wider locality.

New Start Employment Opportunities - Jobs

This refers to the number of positions that can be created during the works phase that is previously unemployed or new starts.

Based on MVV's experience with other projects, **the construction of the plant will require in excess of 500 people to work on the construction contract over the 3-year period with up to 300 on site at any one time**. The range of skills will vary from basic labourers and banksmen with no specific skills, but aptitudes for particular roles, to highly skilled operatives who will have particular qualifications but who may not have a current job

MVV will operate a Local Employment Scheme (LES) for the construction of the facility. **The LES will deliver 4 new start employment opportunities**. Applying average GVA per employee in the construction sector in Scotland, this is **equivalent to gross additional GVA of approximately £197,000 per annum**.

Apprentices - No.

This refers to the proposed apprentice opportunities created during the construction period of the plant.

Through its community benefits package, MVV will provide sponsorship of up to £3,000 per annum comprising of:

[24] One event prior to commencing construction, others as appropriate.

- **5 Construction Trade Apprenticeship roles (project initiated)** – created with a contractor or sub-contractor;
- **1 Construction Trade Apprenticeship roles (project initiated)** – created with a sub-contractor where the sub-contractor agrees to the LES and the sub-contract is over a threshold value; and
- **4 Apprenticeship roles (existing)** – on a recognised framework already employed by the contractor or sub contractor.

There is a particular opportunity for MVV to work collaboratively with Dundee and Angus College in the provision of apprenticeships and training. The College has a strong focus on working with Dundee City Council and Angus Councils in creating training opportunities for young people. In terms of potential beneficiaries, the College's construction course offer has approximately 441 FE students and 174 HE students. This offer also includes civil engineering. The College also delivers courses on Marketing and PR with current numbers around 18 FE students and 95 HE students.

There is also the potential for an agreement with Michelin Tyre Company for the training of apprentices in relevant engineering skills who could work on the construction project. Michelin currently operate an apprentice training school and provide apprentice training for other employers.

Estimating the economic value of apprenticeships is challenging since a significant part of their contribution is qualitative (for example, through improving the confidence and work readiness of students). An analysis of the £ value benefits that organisations can expect to realise after any training or wage costs are deducted has been produced by the Centre for Economics and Business Research (CEBR) however. This estimates the average value of each apprenticeship in the UK is £1,845.

Applying this to the number of apprenticeships for the project implies an equivalent **gross addition to the economy of approximately £18,000 per annum**.

Vacancy Sharing, % (*Note - not part of current bid stage)*

This refers to jobs advertised through the Construction Skills Bank.

The Construction Skills Bank has been developed by Dundee's employability partnership (Discover Opportunities) and is managed by Jobcentre Plus. This provides a vacancy management service by matching employers' vacancies with unemployed clients who are actively seeking work in the construction industry.

The LES will, where appropriate, use the Construction Skills Bank – targeting **100%.** This will contribute to improving the matching of project opportunities with the local workforce.

Work Experience Placements - No.

This refers to the provision of work experience opportunities for young people, trainees or job seekers.

Through its community benefits package, MVV will provide **6 work experience placements (employability programmes**). These will be a mix of Graduate Employment Work Experience Placements and Employability Work Placement

for students on employability programmes including Employability Fund, Jobcentre Plus programmes, College and University Programmes and other employability programmes or courses relevant to the operation of the DERL Facility and the EfW CHP Facility.

A study published by the DWP suggests that work experience had a strong and beneficial impact on:

(i) the likelihood of a participant receiving benefit compared to the impact if they had not participated - participants became much less likely to be on benefit than non-participants; the central estimate is -6 percentage points by week 13; and

(ii) the likelihood of a participant being in employment compared to non-participants - participants were more likely to be in employment than non-participants: the central estimate reached +8 percentage points.

It is therefore expected that the project's provision of work experience will contribute toward increased employment rates and lower claimant activity in the local economy.

5.2.3 Community and awareness raising activity

Activities under community and awareness raising refer to measures aimed at engaging with the local community and raising awareness of waste.

The outcomes of community benefits supporting community and awareness raising activity outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Awareness Raising/Curriculum Support Activities - Events

This relates to the delivery of Awareness Raising Events or Curriculum Support Events.

For the purpose of the construction phase **there will be available a suitable area established within the DERL Facility, or the RWT Facility temporary construction camp area to welcome all visitors to the site** and carry out health and safety inductions. No visitors will be allowed on site unless it is pre-arranged due to health and safety.

As outlined in more detail under operational impacts, MVV will employ a **dedicated Community Liaison Manager** to communicate and raise public awareness of waste management and assist in positive change in attitude and behaviour. The community Liaison Manager will manage and contribute to a number of events that raise awareness amongst the local community.

It is proposed that **4 events** will be held.

Donation of Materials - Approach (*Note - not part of current bid stage)*

This relates to the donation of new and recycled materials in a re-useable condition, through the Partnership Councils' social enterprise partner or other nominated social enterprise partner. These materials can generate benefit through being reconditioned for resale on a social enterprise basis.

Where material is identified which is surplus to requirements, contractors and sub-contractors will be encouraged to donate this to SEOs and other community groups, making use of the existing reuse facilities in place within each of the Partnership Council areas such as the Reuse Hub at Baldovie Recycling Centre which operates in partnership with a number of third-sector organisations. This may offer potential value to social enterprise organisations in the local area.

Summary – Works period

- Local contractor spend – total GVA impact £50 million
- 1 supplier development event and 24hrs business mentoring p.a
- 70% local labour target for construction workforce
- Construction employment – approx. 500 jobs, peaking at 300 on site
- 4 new start employment opportunities – GVA impact £197,000 p.a.
- Construction Trade Apprenticeships (6 project, 4 existing) – GVA impact £18,000 p.a. with potential benefits to D&A College students
- 100% vacancy sharing with Construction Skills Bank
- 6 work experience placements (employability programme)
- Visitor area
- Community Liaison Manager
- 4 awareness raising/curriculum activity events
- Encouragement of contractors and sub-contractors to donate surplus materials to benefit social enterprises

5.3 Delivery period (operation)

The operation of the new plant is expected to start in late-2020. MVV's proposed community benefits package includes a number of measures during this period.

5.3.1 Supplier development

Activities under supplier development refer to the development of the Small to Medium Enterprise (SME) sector and Social Enterprise Organisations (SEOs). This objective is achieved by maximising SME exposure to procurement opportunities and recognising the potential role that SEOs can play in creating a strong, sustainable and inclusive economy.

The outcomes of community benefits supporting supplier development outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Local supplier contract spend - £ (*Note - not part of current bid stage)*

This refers to spend during the operation period that goes to local suppliers. For the purposes of the tender process, 'local' is defined as a supplier or sub-contractor whose headquarters is located within 35 miles of the facility.

The operation of facility will be associated with annual spending on goods and services. This may support the local economy by providing opportunities for local businesses to supply goods and services to the facility. The level of this spending is not known at this stage and the economic impact has not been quantified. It is expected however that the spending will include areas that could potentially be served by local businesses (e.g. security and sundry supplies), in turn supporting local employment and income.

Supplier development - Events

This refers to support for SMEs, local business and social enterprises. It includes Meet The Buyer events, presentation at the Supplier Development Programme events or other Business Development Events.

An Industry and Suppliers Day will be held either on site or at a local College, hotel or conference centre, to inform local businesses and SEOs about both the new EfW CHP Facility and DERL Facility, this will provide suppliers with the opportunity to meet the operations and maintenance teams and to explain the types of contract which would be available during the operational life of the facilities.

The LES proposed by MVV will include at least **1 event per annum**. This will contribute toward improving access to potential project contracts for local businesses.

Business mentoring for SMEs and SEOs – Hours

This refers to business mentoring support for SMEs and SEOs.

An Industry and Suppliers' Day will be held at which there would be seminars on the operation of the facility; the range of support services that would be required; and how to bid for contracts. In addition further training and mentoring events, including site visits, would be held periodically over the 25 year operation of the Facilities to keep local SMEs and SEOs informed of the contracts and sub-

contracts which would be available and to help them improve their bid documents and chances of winning contracts.

The LES proposed by MVV include at least **24 hours of business mentoring per annum**. This activity will support the local business base and maximise their ability to access relevant contract opportunities arising from the project.

5.3.2 Employment and skills activity

Activities under employment and skills refer to the use of local labour, new employment opportunities and skills development.

The outcomes of community benefits supporting employment and skills outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Local Labour - % (*Note - not part of current bid stage)*

This refers to the extent to employment posts associated with the operation of the facility are fulfilled using local labour. For the purposes of the tender process, 'local' is defined as individuals ordinarily resident within 35 miles of the facility.

During the Operational Phase there will be a need to replace skilled engineering staff who either retire or who move on to work for other employers. There will also be a need to recruit unskilled and semi-skilled waste operators who are likely to move on to other employment more frequently and who will need to be replaced on a regular basis.

Waste operators are more likely to be "new starters" who will need training on the job and who will be encouraged to acquire skills and qualifications to help them undertake a full range of activities on site associated with their role and which will probably encourage many of them to progress and apply for other employment elsewhere.

The majority of the new recruits to the permanent staff will be expected to be local staff as a result of the recruitment policy of advertising vacancies in the local media, using local agencies, local universities and colleges and the Michelin Training Centre as well as community contacts and advertising on the Contractor's web site.

MVV will seek to ensure that not less than **70%** of the workers employed live within the wider locality.

New Start Employment Opportunities – Job

This refers to the number of positions that can be created during the operation phase that comprises previously unemployed or new starts.

The current operations at the Baldovie EfW plant support around 45 jobs. It is noted that the number of posts has varied from year to year however.

The operation of the proposed new facility will provide employment for 37 staff; comprising 33 technical staff and 4 waste operatives. Work will organised on a shift pattern with 5-6 shifts of 2 staff. It is expected that there will be a maximum of 15 people on site at any one time.

The steady-state operation of the plant will also support further jobs indirectly. This will create opportunities requiring engineering skills across steam, electrical

and mechanical aspects. Alongside this requirement, there will also be broader opportunities requiring computing, environmental and media based skills.

Applying the median annual full-time wage in Dundee and converting to GVA using input-output data for the waste sector – the 37 direct posts are equivalent to an annual GVA contribution of approximately £1 million per annum. **Taking into account indirect and induced multiplier effects[25] the equivalent total GVA impact is in order of approximately £1.3 million per annum.**

In addition to employment opportunities in core operational periods, there will also be further opportunities when the facility is required to go off-line for maintenance. It is anticipated the facility will need to go offline for maintenance for 3-weeks each year with a longer outage required every 3 years. **Outage periods will provide additional employment of approximately 70 jobs through operations sub-contractors**. These are opportunities that are potentially well suited to local companies requiring skills such as scaffolding, painting and general engineering.

MVV will operate a Local Employment Scheme (LES) for the operation of the facility. **The LES will deliver 4 new start employment opportunities**. Applying median full time wages per employee in Dundee and converting to GVA, this is **equivalent to gross additional GVA of approximately £74,000 per annum**.

The Contractor will work closely with recognised community groups, SEOs, Job Centre Plus, Dundee City Council's Economic Development team, and the Construction Skills Bank providing them with information about roles available and the qualifications required so that those who are not in employment and are classed as "new starters" will be able to obtain employment on the project. There will also be opportunities for skilled or semi-skilled workers who have been laid off in other industries such as the oil industry, or on other major construction projects in the Dundee area which have been completed, to apply for vacancies in permanent positions with DERL or the EfW CHP Facility.

Apprentices - No.

This refers to the proposed apprentice opportunities created during the operation period of the plant.

Through its community benefits package, MVV will support 6 Apprenticeship roles (2 project initiated, 4 existing) within the waste and engineering or related industries.

This exceeds the minimum stated requirement for the contract. These roles will be within the waste or engineering and related industries. Recruitment would start to coincide with commencement of operation of the plant in 2020.

Estimating the economic value of apprenticeships is challenging since a significant part of their contribution is qualitative (for example, through improving the confidence and work readiness of students). An analysis of the £ value benefits that organisations can expect to realise after any training or wage costs are deducted has been produced by the Centre for Economics and Business

[25] Using the Scottish GVA multiplier for the waste sector of 1.9 from http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Research (CEBR) however. This estimates the average value of each apprenticeship in the UK is £1,845.

Applying this average value, the apprenticeships are **equivalent to a gross addition to the economy of approximately £11,000 per annum**. This reflects the £ value benefits that organisations can expect to realise after any training or wage costs are deducted.

There is a particular opportunity for MVV to work collaboratively with Dundee and Angus College in the provision apprenticeships and training. The College has a strong focus on working with Dundee City Council and Angus Councils in creating training opportunities for young people. It works closely with Skills Development Scotland to develop practical training courses that meet the needs of both students and employers. The College has achieved the best results in Highers for their students in 2013/14 and was second in the grades achieved by any College the grades achieved by students.

Discussions with the College prospectus indicate that the opportunities provided by the facility are most aligned with courses within the following subjects:

- Construction & Technology
- Engineering
- Marketing

MVV would also welcome the opportunity to work with Dundee and Angus College on the Skills for Growth Project and as a member of the Industry Advisory Boards which the College is establishing to help to develop and shape the course which the College offers to meet the need so employers and to improve the employment opportunities of students. The Skills for Growth project aims to help small businesses with 5 to 250 employees to achieve their objectives with knowledgeable, skilled and motivated employees by combining free consultancy from Investors in People with free support from SDS Employer Engagement Advisers. The advisers work with companies to identifying priorities, objectives and challenges for the organisation and producing a people and training action plan aligned to their business objectives.

Vacancy Sharing - % (*Note - not part of current bid stage)*

This refers to jobs advertised through employability partner.

The LES proposed by MVV will, where appropriate, use the employability partner – targeting **100%**. This will contribute to improving the matching of project opportunities with the local workforce.

Work Experience Placements – No.

This refers to the provision of work experience opportunities for young people, trainees or job seekers.

MVV will provide **1 work experience placement (employability programmes) per annum** – working collaboratively with the University of Dundee, Abertay University and Dundee & Angus College. Further, it will use reasonable endeavours to maintain links with local secondary schools in order to provide work experience opportunities and bursaries or sponsorship for students of the

schools to attend waste or engineering courses relevant to the operation of the Facilities up to a limit of five thousand pounds (£5,000) per annum.

The work experience placements to students on employability programmes will cover occupations relevant to the operation of the plant.

In terms of beneficiaries, these opportunities provide good alignment with a number of courses at Abertay University. Table 5.1 provides an outline of these course areas and the current numbers of students on roll.

Table 5.1: Courses at Abertay University with alignment to work experience at the facility

Course	Year				Total
	1st	2nd	3rd	4th	
BSc Civil Engineering and Construction / Civil and Environmental Engineering	25	30	40	40	**135**
MSc Energy, Water and Environmental Management / Construction Management	n/a				**20**

Source: Discussion held with Abertay University

Abertay University have been already been involved with the Baldovie facility in the past, taking students on visits there and facilitating student work placements and projects based on the operation of the plant. Discussions with the University indicate that they would be keen to develop those contacts further and to take advantage of the opportunities to enhance the learning experience for their students and to explore opportunities to develop career opportunities.

The University has a programme of work placements during the 3rd year of the Engineering Course which operates successfully but the ability to have placements in Dundee would make them more attractive to students enabling them to retain their accommodation in Dundee during the 6 month placement and to travel to work by public transport.

In addition to work placements, there may also be opportunities for site visits and guest lectures.

The work placement opportunities at the facility also provide good alignment with a number of courses at the University of Dundee. Table 5.2 provides an outline of these course areas and the current numbers of students on roll.

Table 5.2: Courses at the University of Dundee with alignment to work experience at the facility

Course	Total
Town Planning and Environmental Sustainability (including joint degrees)	80
Mechanical Engineering (including joint degrees)	280
Electrical Engineering (including joint degrees)	30
Graphic Design (2nd to 4th years)	70

Source: Discussion held with the University of Dundee

Note: Numbers are approximate and can vary year to year

Discussions with the University indicate that it is keen to create opportunities for its students to visit the site to become familiar with the operation of the facility and to participate in placements and work experience opportunities which could lead to full time career opportunities and practical based dissertation and research projects.

Analysis by the DWP suggests that work experience had a strong and beneficial impact on:

(i) the likelihood of a participant receiving benefit compared to the impact if they had not participated - participants became much less likely to be on benefit than non-participants; the central estimate is -6 percentage points by week 13; and

(ii) the likelihood of a participant being in employment compared to non-participants - participants were more likely to be in employment than non-participants: the central estimate reached +8 percentage points.

It is therefore expected that the project's provision of work experience will contribute toward increased employment rates and lower claimant activity in the local economy.

5.3.3 Community and awareness raising activity

Activities under community and awareness raising refer to measures aimed at engaging with the local community and raising awareness of waste.

The outcomes of community benefits supporting community and awareness raising activity outlined in Appendix 3 of the IPD Volume 1 document are explored below.

Awareness Raising/Curriculum Support Activities - Events

The local community will be continually engaged and an integrated approach will be developed through in order to present a positive image regarding the impact of the new EfW CHP Facility. This will be undertaken formally through scheduled community engagement meetings and informally through the Community Liaison Manager.

A minimum of 2 Awareness Raising activities or visits per annum over the lifetime of the project will be delivered.

The role of the Community Liaison Manager will also be to work with established organisations across Dundee and Angus such as the Dundee & Angus College, the University of Dundee and Abertay University, Jobcentre plus and Employability partners from Partnership Councils to promote awareness of the project and work with the groups to help local people find employment on the project and in other related developments by preparing them for the work environment and helping them to acquire relevant skills and qualifications, and IT competence, so that even those who have left school with minimum qualifications can find employment opportunities the project and prepare for positions such as Tipping Hall operatives, fork lift drivers and weighbridge operators as they become available.

The Community Liaison Manager will initiate and facilitate visits to the existing DERL Facility and the EfW CHP Facility during the Operational phase for local community and interest groups; students from secondary and further education institutions and from professional bodies to understand how the recovery of energy from waste can contribute to a sustainable and circular economy and operate without adversely affecting air quality or human health and play a significant role in sustainable development.

Donation of Materials (*Note - not part of current bid stage)*

Not applicable to operation phase.

5.3.4 Environmental Awareness

This refers to activities that promote increased public awareness of waste management issues.

Awareness Raising/Curriculum Support Activities - Events

Education and support can contribute towards positive changes in attitudes and behaviour by assisting individuals to make conscious decisions to avoid generating waste and for waste that they do generate to either re-use or recycle the material.

The Community Liaison Manager will initiate and facilitate visits to the EfW CHP Facility during the Operational phase for local community and interest groups; students from secondary and further education institutions and from professional bodies to understand how the recovery of energy from waste can contribute to a sustainable and circular economy and operate without adversely affecting air quality or human health and play a significant role in sustainable development.

The Community Liaison Manager will assist the Partnership Councils in relevant environmental awareness-raising and community events throughout the duration of the Contract including:

- Delivering a minimum of **10 "Environmental Events" for each year** of the contract, such as facility open days, attendance at local gala days;
- Activities to raise public awareness of waste management and assist in positive change in the community's attitudes and behaviour;
- Liaison meetings with local community; i.e. tenants & residents groups;

- Develop the potential to link to existing local initiatives to deliver small scale environmental improvement projects;
- Promote environmental awareness and information stands at community roadshows and at major events such as the Dundee Flower & Food Festival and similar events in Angus;
- Provide outreach education and site tours for schools, colleges, residents groups, professional groups which will continue in the EfW CHP Facility once operational.
- Understanding of the relationship between large waste management facilities and small local businesses; and
- Promoting training and employment opportunities for both skilled and unskilled residents.

Summary – Delivery period

- Local operational contractor spend – creation of opportunities for local suppliers of goods and services
- 1 supplier development event and 24hrs business mentoring p.a
- 70% local labour target for workforce
- Operational employment – 37 direct jobs with equivalent total GVA impact of £1.3 million p.a. including indirect and induced effects
- 4 new start employment opportunities – GVA impact £74,000 p.a.
- Apprenticeships (2 project, 4 existing) in waste, engineering and related industries – GVA impact £11,000 p.a. with potential benefits to D&A College students
- Work will D&A College on 'Skills for Growth' project
- 100% vacancy sharing with employment partner
- 1 work experience placement (employability programme) and potential work placement beneficiaries from Abertay University and the University of Dundee.
- £5,000 p.a contribution to work placements with local secondary schools
- Community Liaison Manager
- 2 awareness raising activities or visits p.a.
- 10 environmental events p.a.

6 Conclusions

This study has undertaken an economic impact assessment of MVV's proposed package of Community Benefits for delivery of the residual waste contract at Baldovie. In particular, it has focused on first understanding the economic issues and needs of the surrounding communities in Dundee and Angus. It has then explored how MVV's proposed package of community benefits could generate positive economic outcomes for the local economy.

Discussions held with MVV, the University of Dundee, Abertay University and Dundee & Angus College have been an important part of the study.

The key findings of the assessment are summarised below:

- The proposed project site is within close proximity of communities that are some of the most deprived in Scotland on employment, education and overall IMD measures;
- Access to employment, in particular due to low skills levels, is a significant issue for local communities in Dundee;
- There is a significant gap in the employment rate in Dundee compared with rates in Angus and Scotland as a whole;
- There has been a contraction in employee numbers in 2009 to 2014 in the Wider Study Area and in Dundee as a whole. This is in contrast to national trends where employee numbers have increased;
- There is high youth unemployment in Dundee and a need for effective pathways into work;
- The local educational institutions including the University of Dundee, Abertay University and Dundee & Angus College are important assets to the local area and play an important role in skills development, access to employment and local economic growth;
- MVV is proposing to work closely with these institutions in order to deliver a package of community benefits as part of the residual waste contract;
- Initial discussions held with these institutions during this study indicates that there is a good fit between the occupational areas covered and the requirements of the proposed plant;
- The potential economic value of the community benefits proposed by MVV is expected to be significant to the local economy;
- During the works phase, the local supplier contract spend associated with construction of the facility is expected to contribute in order of £50 million in GVA to the economy including indirect and induced multiplier effects;
- The timing of the works relative to other construction activity in Dundee could be beneficial with opportunities on the project coming on as opportunities at other sites tail off (e.g. the V&A on the waterfront);
- Based on MVV's experience with other projects, the construction of the plant is expected to create up to 500 jobs with a peak of 300 on site. These will

include opportunities in construction related disciplines, for example civil engineering which is relatively accessible to the local labour force.

- MVV will operate a Local Employment Scheme (LES) for the construction of the facility. The LES will deliver 4 new start employment opportunities - equivalent to gross additional GVA of approximately £196,000 per annum.
- Construction Trade Apprenticeship roles will also be created during the works phase. There is a particular opportunity for MVV to work collaboratively with Dundee and Angus College in the provision of apprenticeships and training;
- During the operational phase, the plant is estimated to support 37 direct jobs – with an equivalent total GVA impact in order of approximately £1.3 million per annum including indirect and induced effects. The facility will support further employment indirectly - creating opportunities requiring engineering skills across steam, electrical and mechanical aspects;
- In addition to employment opportunities in core operational periods, outage periods will provide additional employment of approximately 70 jobs through operations sub-contractors. These are opportunities that are potentially well suited to local companies requiring skills such as scaffolding, painting and general engineering;
- The LES will deliver 4 new start employment opportunities - equivalent to a gross additional GVA of approximately £74,000 per annum;
- 6 Apprenticeship roles (2 project initiated, 4 existing) within the waste and engineering or related industries will be supported; and
- Work experience placement opportunities will also be created with particularly strong alignment with courses at Abertay University and the University of Dundee. This will contribute toward increased employment rates and lower claimant activity in the local economy.

In conclusion, the proposed package of community benefits will make a significant positive contribution to the local economy. The project will provide up skilling and employment opportunities that are particularly valuable to the local population that suffers from acute deprivation. The construction phase will also provide a substantial injection of income into the local economy which whilst temporary in nature will come at an advantageous time with the expected completion of other major construction projects in Dundee.