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INTRODUCTION

Proposed Facility

- 8.1 This chapter of the Environmental Impact Statement provides supporting information to accompany a Waste Licence Application (WLA) to the Environmental Protection Agency (EPA) by Roadstone Wood Limited to provide for backfilling and restoration of the North Quarry at its Huntstown Quarry complex using inert soil and stone. The proposed waste recovery activity will comprise importation, placement, compaction and capping of approximately 3,850,000m³ of inert soil, stones and rock in the quarry void.
- 8.2 The proposed waste recovery facility is located in the townlands of Kilshane and Huntstown, approximately 2.5km north-west of the Dublin suburb of Finglas and 2km north-west of the interchange between the N2 National Primary Road and the M50 motorway.
- 8.3 The North Quarry void covers an area of approximately 11.2 hectares and lies within an overall application area of 35.9 hectares. The application site comprises a worked-out limestone quarry with perimeter screening / overburden mounds and some existing ancillary site infrastructure (offices, sheds, hardstand areas etc.) shared with existing quarrying and concrete and asphalt production businesses at Huntstown.
- 8.4 The potential impacts of noise emissions generated by the proposed waste recovery activities at Huntstown will essentially comprise
- importation of inert soil waste from external sources (construction sites)
 - stockpiling, placement and compaction of inert and site-won soil
 - placement of minor quantities of imported inert / recovered construction and demolition waste along temporary haul roads
 - stockpiling of topsoil pending final surface restoration works
- 8.5 The duration of the quarry backfilling works is expected to be of the order of 18 years, but is ultimately dependent on the rate of infilling. The location and intensity of associated environmental impacts will vary slightly according as the active backfilling area moves across the application site over time.
- 8.6 The assessment of the potential noise impact has been undertaken with reference to EIA good practice, the EIA Regulations, British Standards and other guidance documents.

Authors

- 8.7 Relevant baseline studies were carried out by Roadstone Wood Ltd., namely:
- Colin Doyle Environmental Technician
- The subsequent impact assessment has been prepared by environmental scientists employed by SLR Consulting Ireland principally:
- Ann McCormack BSc.(Hons) (Environmental Management)

Regulatory Advice and Guidance

British Standard 5228:2009

- 8.1 British Standard 5228:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1 Noise and Part 2: Vibration* set out a methodology for predicting noise and vibration levels arising from a wide variety of construction and related activities. As such, it can be used to predict noise levels arising from the operations of proposed minerals extraction sites. BS5228-1:2009 also sets out tables of sound power levels generated by a wide variety of mobile equipment.
- 8.2 Noise levels generated by the site operations and experienced at local receptors will depend upon a number of variables, the most significant of which are:
- the amount of noise generated by plant and equipment being used for inert soil recovery at the quarry void, generally expressed as a sound power level;
 - the periods of operation of the plant at the quarry void, known as the “on-time”;
 - the distance between the noise source and the receptor, known as the “stand-off”;
 - the attenuation due to ground absorption or barrier screening effects; and
 - the reflection of noise due to the presence of hard vertical faces such as walls, berms, quarry faces, banks.

Environmental Management Guidelines (EPA, 2006)

- 8.3 The *Environmental Management Guidelines for the Extractive Industry (Non-Scheduled Minerals)* present a summary of current environmental management practices for surface workings within the extractive industry. They are based on a review of current environmental management practice in Ireland, the UK and Europe.
- 8.4 The published guidelines are intended to provide general advice and guidance in relation to environmental issues to practitioners involved in the planning, design, development, operation and restoration of surface extractive industry developments and ancillary facilities in Ireland.
- 8.5 In relation to surface extractive industry and ancillary activities, it is recommended that noise from activities on site shall not exceed the following noise emission limit values (ELVs) at the nearest noise sensitive receptor:
- Daytime: 08:00 hrs – 20:00 hrs LAeq (1hr) = 55 dB(A)
Nighttime: 20:00 hrs – 08:00 hrs LAeq (1hr) = 45 dB(A)
- (Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dB(A)).

Guidelines for Planning Authorities- Quarries and Ancillary Activities (DoEHLG, 2004)

8.6 The DoEHLG Planning Guidelines on Quarries and Ancillary Activities are primarily addressed to statutory planning bodies. They provide an overview of environmental issues and best practice / possible mitigation measures associated with surface working of aggregates and associated ancillary activities. The guidelines are routinely referred to by practitioners involved in the planning, design, development, operation and restoration of surface workings and ancillary facilities in Ireland.

Draft Guidelines for Noise Impact Assessment

8.7 The draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics / Institute of Environmental Management and Assessment Working Party have been referenced in relation to the potential changes in noise levels as a result of the proposed activities.

8.8 The findings of the Working Party are draft at present, although they are of some assistance in this assessment. The draft guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise.

8.9 The impact scale adopted in this assessment is shown in Table 8-1 below.

Table 8-1
Impact Scale for Comparison of Future Noise against Existing Noise

Noise Level Change dB(A)	Subjective Response	Significance
0	No change	No impact
0.1 – 2.9	Barely perceptible	Minor impact
3.0 – 4.9	Noticeable	Moderate impact
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact
10.0 or more	More than a doubling or halving of loudness	Major impact

8.10 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

8.11 It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of the operational noise.

RECEIVING ENVIRONMENT

Outline of Baseline Study

- 8.12 The noise impact arising from the proposed quarry backfilling scheme and operation of the inert soil recovery facility is assessed by comparing predicted noise levels from proposed activities with existing levels of ambient noise at the application site. The existing ambient noise environment is characterised by undertaking a baseline noise measurement survey at a number of locations at and immediately beyond the application site.
- 8.13 The objectives of the baseline study are to:
- determine ambient noise levels at the application site
 - identify sources of noise
 - determine impacts on the nearest noise sensitive receptors / residents
 - use the data collected to predict noise levels associated with future activity at the site
 - identify suitable and effective mitigation measures

Sources of Information

- 8.14 Information regarding the proposed backfilling and restoration activities including plant utilisation and working hours is provided in Chapter 2 of this Environmental Impact Statement.
- 8.15 Information on the noise baseline studies for the purpose of this impact assessment was provided by Roadstone Wood Ltd.
- 8.16 Expected noise emission data, in the form of sound power levels have been obtained from Tables provided in BS5228-1:2009.

Baseline Study Methodology

- 8.17 Noise surveys were undertaken on 17th September 2009 and 19th April 2010 as part of the baseline study. Continuous noise monitoring was undertaken by Roadstone Wood Ltd in accordance with International Standard ISO 1996: *Acoustics Description and Measurement of Environmental Noise*. The noise measurements were obtained with a Norsonic Nor118 Sound Level Meter, which was calibrated using a Norsonic 1443.
- 8.18 During the noise survey, 3 environmental noise parameters were measured. These are defined below.
- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an “average” value.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period; this parameter is typically used to quantify traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period; this parameter is typically used to quantify background noise.

- 8.19 A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20µPa.
- 8.20 The monitoring points used are described below and shown on Figure 8-1.
- N1** Located at the eastern boundary of Roadstone Wood's landholding, opposite a residence along the R135 Regional Road, also known as the North Road (the former N2 National Primary Road). This location is at the former entrance to the Huntstown Quarry complex.
 - N2** Located at the south-eastern boundary of Roadstone Wood's landholding, adjacent to an existing residence.
 - N3** Located at the western boundary of Roadstone Wood's landholding, adjacent to the Millenium Business Park.
 - N4** Located at the western boundary of Roadstone Wood's landholding, adjacent to the back entrance to the quarry complex (off the Cappagh Road / Kilshane Road).
 - D5** located in the centre of the Huntstown quarry complex, at the existing construction and demolition (C&D) waste recovery facility.

Results of Baseline Monitoring

- 8.21 The results of the noise monitoring surveys are detailed in Table 8-2 below.

Table 8-2
Noise Monitoring Results 2009-2010

Location	Date	Time	Measured Noise Levels – dB(A)		
			L_{Aeq}	L_{AF10}	L_{AF90}
D5	17/09/2009	12:24 – 13:24	51.0	51.9	48.3
N1	19/04/2010	16:21 – 17:21	56.1	56.0	49.6
N2	19/04/2010	12:26 – 13:26	44.8	45.0	41.3
N3	19/04/2010	14:03 – 15:03	42.2	43.3	39.4
N4	19/04/2010	15:12 – 16:12	48.5	49.1	40.9

Weather Conditions:

- 8.22 The weather conditions during the noise monitoring surveys were as follows:
- | | |
|----------|---|
| 17/09/09 | Dry, calm and overcast. Temperature 16°C. |
| 19/04/10 | Warm and sunny with a light breeze |

Discussion of Results:

8.23 **Location D5**

At the time of the noise survey, the dominant noise source was traffic on the nearby M50 Motorway. Recorded noise levels at this location were also affected by aircraft flying overhead.

8.24 **Location N1**

At the time of the noise survey, noise levels at location N1 were predominantly influenced by traffic on the adjacent high capacity public roads, principally the M50 Motorway, N2 dual Carriageway and North Road. Noise levels at this location were also affected by aircraft flying overhead.

8.25 **Location N2**

At the time of the noise survey, noise levels at location N2 were predominantly influenced by aircraft flying overhead. Noise generated by Roadstone Wood's existing site operations was not audible / distinguishable during the monitoring period at noise monitoring location N2.

8.26 **Location N3**

Noise levels at this location were mainly due to aircraft flying overhead. At the time of the noise survey, noise from Roadstone Wood's existing site operations was not audible / distinguishable at monitoring location N3.

8.27 **Location N4**

Noise levels at this location were mainly due to aircraft flying overhead. At the time of the noise survey, noise from the Roadstone Wood's existing site operations was not audible / distinguishable at monitoring location N4.

8.28 The noise levels recorded at locations D5 and N1 were mainly due to external traffic on the adjoining national road network (the M50 Motorway, the N2 Dual Carriageway and North Road) as shown by the elevated L_{A10} readings. Noise levels at all locations were affected by aircraft regularly flying overhead.

8.29 Allowing for the external traffic noise and air traffic, the noise monitoring results show that the development complies with Condition No. 9 of P. Reg. Ref. No. F03A/1430, PL06F.206789 which states that:

'During the operation and restoration phase of the quarries, the noise level from the operations measured at the boundaries of the respective quarry shall not exceed

(a) *an L_{Aeq} T value of 55dB(A) during the period of 0800hrs to 1800hrs Monday to Saturday;*

(b) *an L_{Aeq} T value of 45dB(A) at any other time'.*

8.30 Noise monitoring data indicates that average ambient noise levels around the Huntstown Quarry Complex typically range between 42 dBA L_{Aeq} and 56 dBA L_{Aeq} . These noise levels are consistent with daytime noise levels which would be expected around suburban parts of the Greater Dublin Area. Noise levels to the south and south-east of the application site will be higher due to traffic noise from the adjacent M50 Motorway and the N2 Dual Carriageway.

IMPACT OF THE PROPOSED WASTE FACILITY

- 8.31 The principal noise impact associated with the future operation of the inert proposed waste recovery facility is a potential increase in noise levels generated at the proposed facility by :
- traffic movements of heavy goods vehicles (HGVs) along the existing access road to the facility and internally across Roadstone Wood Ltd.'s landholding
 - end-tipping and placement of imported inert soil
 - stockpiling, handling and compaction of inert soil
 - operation of plant and equipment within the application site (principally bulldozers and/or mechanical excavators).
 - placement of small quantities of inert / recovered C&D waste
- 8.32 With respect to the potential for noise impacts, the key objective at the application site is to manage activities in order to ensure that any discernable increase in noise levels is prevented and the effect of any increase in noise emissions is minimised.

Short Term Impacts

- 8.33 When the waste recovery facility is operational, the principal sources of noise emanating from the application site will be generally from bulldozer activity and truck movements across the worked-out quarry. Some noise may also be generated on an occasional basis by mechanical excavators. To determine the resultant noise impact at the site, SLR Consulting Ireland carried out a noise prediction assessment, whereby the levels of noise were calculated at the nearest noise sensitive receptors (residences) shown on Figure 8-2.
- 8.34 The noise assessment methodology used was based on BS5228-2:2009. For the purposes of the assessment, a reduction of -10dB(A) for full noise screening has been adopted. A reduction of -5dB(A) has been adopted for partial noise screening. However, monitoring of the noise screening effects of perimeter berms indicates that a reduction of -20 to -25 dB(A) is often more realistic. In addition, for the purpose of this noise assessment, it is assumed that all of the noise sources are active for a 100% of the time at the receptor.
- 8.35 The following noise sources have been considered in the noise assessment for the facility operation:
- Bulldozer
 - HGV truck

The noise assessment assumes that a bulldozer will be used to spread the imported inert natural materials when backfilling and restoring the void. HGV trucks will be used to transport the material onto and around the site.

- 8.36 A small number of existing residences are located in close proximity to the proposed waste recovery facility. The nearest residential property is located

approximately 171m west of the application boundary on the Kilshane Road. A further three residential properties are also located immediately to the west of the site along the Kilshane Road. Within 500m of the site there are a further six residences, all located to the east of the site along the North Road. The existing housing pattern in the vicinity of the site is shown on Figure 8-2.

Noise Impact Assessment

- 8.37 A noise prediction assessment has been undertaken, whereby the levels of noise arising from the development were calculated at the nearest sensitive receptors R1, R2, R3, R4 and R5 shown on Figure 8-2. Detailed noise assessment calculations are provided in Appendix 8-1
- 8.38 The worst case scenario in relation to the above noise sources occurs when quarry backfilling activity takes place closest to each sensitive receptor, when bulldozers spreading and compacting the soil and HGV trucks are at the shortest distance, refer to Figure 8-2.
- 8.39 The noise assessment indicates that the cumulative noise levels arising from the backfilling activities and operation of the bulldozer plant at the nearest noise sensitive receptors will, in the worst case scenario, be as shown in Table 8-3 below :

Table 8-3
Noise Assessment Results

Soil Placement and Compaction - Worst Case	
Receptor	Combined Noise Level
R1	49 dB L _{Aeq}
R2	49 dB L _{Aeq}
R3	45 dB L _{Aeq}
R4	35 dB L _{Aeq}
R5	42 dB L _{Aeq}

Full details of the noise assessment are provided in Appendix 8-1, Tables (i) and (ii):

- 8.40 In relation to noise thresholds, projections show that even in a worst case scenario, the proposed remediation works can progress *without* exceeding the recognised threshold average ambient noise level of 55dBA L_{Aeq} recommended in the EPA (2006) Environmental Management Guidelines for the Extractive Sector at the five closest receptors identified around the application site.
- 8.41 The resultant noise levels identified above are considered to be very much a worst case scenario, as it assumes plant and machinery will be running for 100% of the time, rather than intermittently. In reality this will not occur and average ambient noise levels would be expected to be significantly below those predicted.

- 8.42 Notwithstanding this, it should be noted that the predicted noise levels are comparable or only very slightly elevated above the baseline noise levels recorded in the course of the recent baseline noise survey. Arising out of this assessment and considering recent land-usage at the site and the limited operational life of the proposed waste facility (estimated at 18 years), the noise impact of the proposed waste recovery activities at surrounding residences is assessed as minor (barely perceptible) and negative.
- 8.43 The movement of HGV traffic along the M50 Motorway, N2 Dual Carriageway and North Road will generate an increase in traffic noise levels. However, given existing and historic levels of traffic generated noise along these major transport corridors, the resultant noise impact is assessed as short to medium term, minor and negative (barely perceptible).
- 8.44 Although it is unlikely that a significant proportion of HGV traffic movements to and from the application site will travel along the Kilshane Road, any increase in HGV traffic levels along these roads may have a short to medium term, minor (barely perceptible) negative impact on existing noise levels at residences and businesses fronting onto these roads.

Long-Term Impacts

- 8.45 The nature of the proposed backfilling and restoration scheme is such that there will be no long-term impacts in relation to noise. Once quarry backfilling works are complete there is likely to be significantly less operational and/or traffic noise generated across the application site.
- 8.46 The associated reduction in traffic levels along the internal haul roads and over public roads, coupled with the reduction in waste recovery activity at the application site will result in average ambient noise levels falling back to existing levels, with negligible long-term impact on the local environment.

Interaction with Other Environmental Receptors

- 8.47 Other than those identified above, there are no interactions between noise impacts and other environmental media.

MITIGATION MEASURES

- 8.48 The noise assessment indicates that, with implementation of the existing mitigation measures described below, the development can comply with the daytime noise threshold limit of 55 dB(A), measured at '*sensitive locations*' recommended in the DoEHLG (2004) planning guidelines and the environmental management guidelines for the sector (EPA, 2006).
- 8.49 The following mitigation measures are / will be put in place at the site to ensure noise impacts arising from the proposed waste recovery activities are minimised at each of the noise sensitive receptors. These mitigation measures are in accordance with the '*best practice / mitigation*' measures

described in Section 3.2 of the DoEHLG planning guidelines and Section 3.5 of the EPA Environmental Management Guidelines.

- Regular maintenance of all plant and haulage vehicles is an integral part of site management and is important in helping to minimise noise impact. All plant and equipment conform to noise emission limits set out in S.I. No. 320 of 1998 European Communities Construction Plant and Equipment (Permissible Noise Levels) Regulations, 1998 (as amended by S.I. No. 359 of 1996).
- Preservation of existing external hedgerows and site topography provides acoustic as well as visual screening.
- Internal haul roads and access roads have as low a gradient as possible to reduce engine / brake noise from heavy goods vehicles.

8.50 Should noise monitoring at these locations indicate that threshold average ambient noise limits are exceeded (or likely to be exceeded), provision will be made for a combination of one or more of the following mitigation measures in order to ensure that noise levels are maintained below threshold limits

- construction of temporary screening embankments,
- installation of a temporary noise barrier between noise source(s) and receptor(s)
- reduction of noise emissions at source
- management of activities to minimise vehicular movements and/or duration of activities in the vicinity of affected residences.

8.51 A screening embankment (or noise barrier), should it be required, will serve to reduce the projection of noise beyond the site boundary as well as screen site activities from view.

8.52 Providing the mitigation measures outlined are implemented as required, the predicted residual noise levels at each of the closest receptors will be maintained at or lower than the noise threshold level of 55dBA. This impact is considered acceptable in view of the long-term environmental benefit that accrues by backfilling and restoring the existing quarry.

Monitoring

8.53 It is currently envisaged that noise monitoring will be undertaken at the monitoring locations identified on Figure 8-1 on a quarterly basis while inert waste recovery activities are ongoing. This monitoring regime is in line with standard conditions attaching to EPA licences for waste facilities.

8.54 Average ambient noise levels will be monitored close to residences at the boundaries of the application site as quarry backfilling operations proceed (the proposed noise monitoring locations are shown on Figure 8-1). Environmental monitoring will generally be undertaken by Roadstone Wood's Ltd. in-house staff.

- 8.55 Noise monitoring will be undertaken in accordance with International Standard ISO 1996: *Acoustics Description and Measurement of Environmental Noise*. The noise measurements will be obtained using a Norsonic Nor118 Sound Level Meter (or similar) which will be calibrated on a regular basis using a Norsonic 1443 (or similar).

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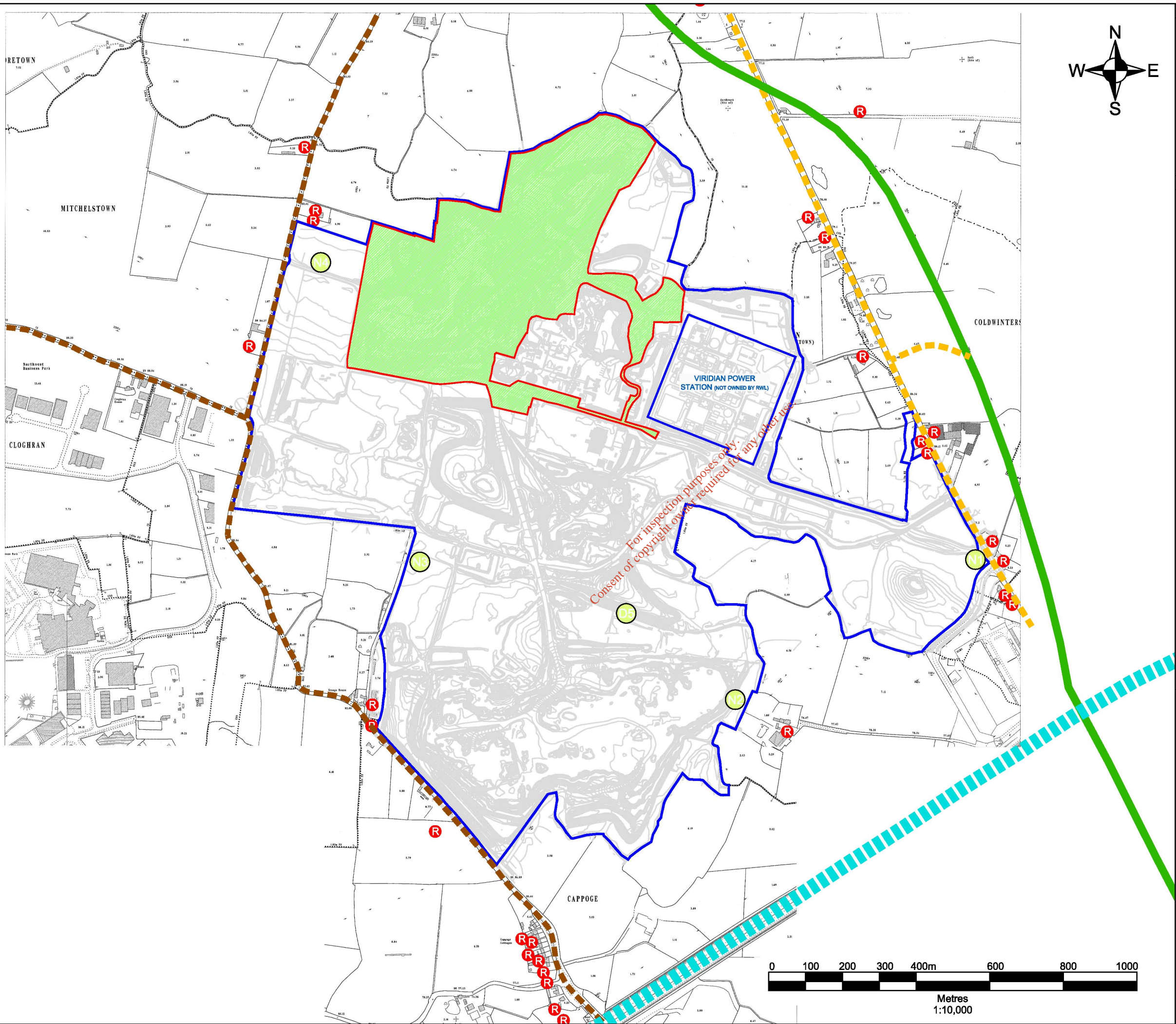
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- **British Standards Institute. 2009.** *BS5228: Part 1 (2009) Code of practice for noise and vibration control on construction and open sites.* British Standards Institute (BSi).
- **Department of Environment, Heritage & Local Government. 2004.** *Quarries & Ancillary Activities: Guidelines for Planning Authorities.* Government of Ireland.
- **EPA, 2000** *Ireland's Environment: A Millennium Report.* Wexford.
- **EPA, 2006** *Environmental Management in the Extractive Industry.* Wexford.
- **International Standards Organisation, 1996** *Acoustics – Description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use.* ISO.

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FIGURES

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- NOTES**
1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B
 2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000711 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND
 3. TOPOGRAPHIC SURVEY PREPARED BY FUGRO BKS BASED ON MAY 2009 AERIAL PHOTOGRAPHY

LEGEND

	ROADSTONE WOOD LTD. LANDHOLDING (c. 201.8 ha)
	WASTE LICENCE APPLICATION AREA (c. 35.9 ha)
	NOISE MONITORING LOCATION
	M50 MOTORWAY
	N2 DUAL CARRIAGEWAY
	NORTH ROAD (R135)
	LOCAL ROAD

Roadstone WOOD
The Right Choice

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F: +353-1-2964676
www.slrconsulting.com

**ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT**

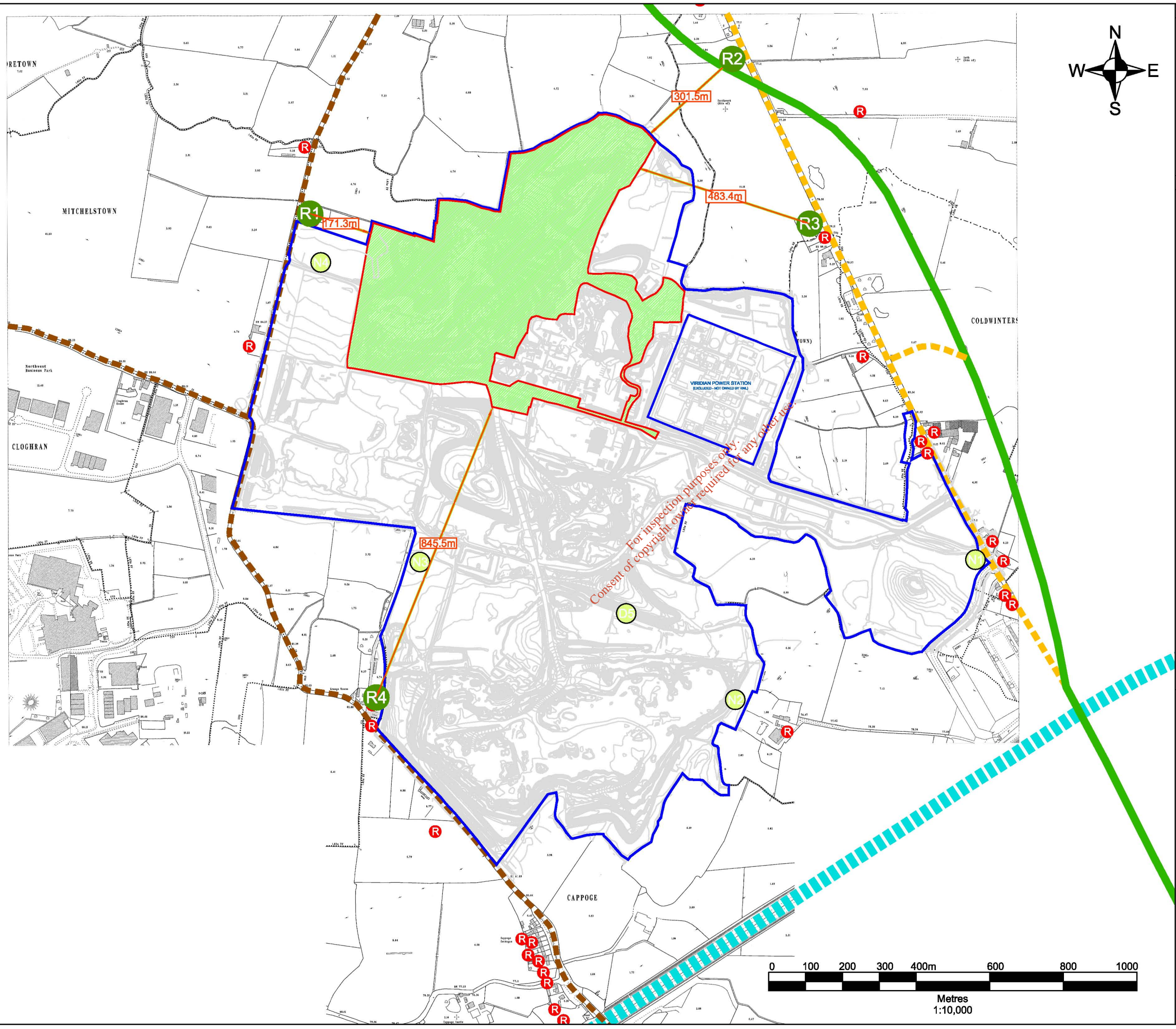
**WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11**

NOISE MONITORING LOCATIONS

FIGURE 8-1

Scale: 1:10,000 @ A3 Date: FEBRUARY 2011

00180.00015.18.8-2.R0.NOISE ASSESSMENT LOCATIONS.dwg



NOTES

- EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B
- ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000711 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND
- TOPOGRAPHIC SURVEY PREPARED BY FUGRO BKS BASED ON MAY 2009 AERIAL PHOTOGRAPHY

LEGEND

	ROADSTONE WOOD LTD. LANDHOLDING (c. 201.8 ha)
	WASTE LICENCE APPLICATION AREA (c. 35.9 ha)
	NOISE MONITORING LOCATION
	RECEPTOR LOCATION
	LOCATION OF NEAREST RESIDENCES
	M50 MOTORWAY
	N2 DUAL CARRIAGEWAY
	NORTH ROAD (R135)
	LOCAL ROAD

Roadstone WOOD
The Right Choice

SLR

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**ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT**

**WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11**

NOISE ASSESSMENT LOCATIONS

FIGURE 8-2

Scale: 1:10,000 @ A3 Date: FEBRUARY 2011

APPENDICES

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APPENDIX 8-1
DETAILED NOISE ASSESSMENT

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Appendix 8-1 – Noise Assessment (Refer to Figure 8-2)

Table (i) Soil placement and compaction - Worst Case

Plant Type	Average L_{Aeq} at 10m (dB(A))	Screening (dB(A))			Reflection (dB(A))			Activity Distance (m)			Attenuation with Distance (dB(A))			Activity L_{Aeq} (dB(A))		
		R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3
Bulldozer	73	-10	-5	-5	+3	+3	+3	171.3	301.5	483.4	25	30	34	41	41	37
HGV/Dumper Truck	80	-10	-5	-5	+3	+3	+3	171.3	301.5	483.4	25	30	34	48	48	44

Combined Noise Level at R1 = 49 dB L_{Aeq}

Combined Noise Level at R2 = 49 dB L_{Aeq}

Combined Noise Level at R3 = 45 dB L_{Aeq}

Table (ii) Soil placement and compaction - Worst Case

Plant Type	Average L_{Aeq} at 10m (dB(A))	Screening (dB(A))		Reflection (dB(A))		Activity Distance (m)		Attenuation with Distance (dB(A))		Activity L_{Aeq} (dB(A))	
		R4	R5	R4	R5	R4	R5	R4	R5	R4	R5
Bulldozer	73	-10	-10	+3	+3	845.5	420	39	32	27	34
HGV/Dumper Truck	80	-10	-10	+3	+3	845.5	420	39	32	34	41

Combined Noise Level at R4 = 35 dB L_{Aeq}

Combined Noise Level at R5 = 42 dB L_{Aeq}