EMISSIONS IMPACT ASSESSMENT REPORT

AIR EMISSION IMPACTS

The information / air emission impact assessment presented herein is based on that presented in Chapter 8 (Air Quality) of the EIAR which accompanies this waste licence application. Details of the baseline air environment and a description of the methodologies employed for the purposes of this impact assessment are presented in the EIAR .

Particulate matter arising from waste recovery activities at the application site has the potential to affect existing sensitive receptors in the area due to a potential increase in airborne dust deposition. The significance of impacts arising from site emissions is dependent upon the magnitude of the emissions, the prevailing meteorological conditions for the location and the proximity of sensitive locations to the emission sources. Each of the activities associated with this application have been assessed for potential air quality impacts including:

- emission from separation of soil and stone, soils placement and storage (including trackout);
- PM_{10} contribution from operational activities;
- traffic exhaust emissions.

Trackout - Assessment

In the course of recovery activities at the Halverstown, incoming / outgoing HGV traffic will follow established haul routes within the application site, much of which are paved around the site entrance / egress and the shared infrastructure area (where the site office, welfare facilities, staff canteen, weighbridge, wheelwash etc. are located). Given that HGVs travel over a relatively limited length of unpaved haul road in the centre of the quarry and over paved roads around its access / egress point, the trackout dust risk category is considered to be 'negligible'.

While the overall risk category has been assessed as 'negligible', if the activities were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in dust nuisance immediately around the application area. However, these are not considered to be significant given the limited duration of such meteorological conditions and the limited change in the extent and scale of proposed activities.

Soil Importation and Handling – Assessment

An overview of the sources and processes associated with the facility activities, and their respective potential for particulate dust emissions is presented in Table 1 below.

Table 1
Facility Activities: Sources of Particulate Emissions

Activity	Source	Emission Potential	Comments
Separation of Soils	Excavator / Dozer/ HDV	High - dry or fine materials during strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		Low – coarse or wet materials during conditions of low wind speed	

Activity	Source	Emission Potential	Comments
Soils Stockpiling	Excavator / Stockpiles	High - dry or fine materials during strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		Low – coarse or wet materials during conditions of low wind speed	
Handling & Compaction of Soils	Excavator/ Dozer	High - dry or fine materials during strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		Low – coarse or wet materials during conditions of low wind speed	

Table 2 below identifies receptors within the 500m study area around the application site. There are 18 receptors rated as being of medium sensitivity within 500m of the site boundary. Using the tiered assessment methodology (refer the accompanying EIAR), receptors located within 500m were progressed to a Tier 2 assessment as they were considered to have greater potential risk of exposure to dust impact.

Each receptor identified in Table 2 and shown in Figure 7-1-3-3A is assessed against the frequency of exposure and the distance from the source to the receptor (i.e. the pathway). The frequency of exposure of each receptor is based upon the frequency of winds capable of carrying dust particles blowing in the direction, from the source to the receptor, on days when rainfall does not inhibit dust from becoming airborne.

The potential for the generation of airborne dust will increase with wind speed, with winds greater than 3 m/s capable of carrying airborne dust. For the purposes of this impact assessment, wind patterns at the application site were assumed to be similar to those at the Baldonnel Aerodrome Meteorological Station approximately 30km to the north-east.

Published data (in the form of a wind rose) identifies the frequency of winds at wind speeds of greater than 2 m/s, with the individual frequencies for each 10 degree compass sector used within the assessment. Wind speeds over 2 m/s were used for the purposes of this impact assessment, as this is how the data on percentage occurrence of wind frequency and wind speed is calculated and presented for Baldonnel Aerodrome by Met Eireann. For this reason therefore, the impact assessment presented herein is conservative.

A summary of the risk assessment of dust impacts from sources within the proposed development is presented in Table 2 below. All receptors with the exception of Receptor R4 (a school) are residential properties surrounding the application site and are considered to be of moderate sensitivity to airborne dust impact.

Table 2
Dust Risk Assessment (Without Mitigation Measures)

Receptor	Distance from Site Activities (approx.)(m)	Relevant Wind Direction (^{0})	Potential Exposure Duration (adjusted for dry days only)[a]	Relative Wind / Distance Rank	Multiplied Rank	Risk Evaluation (Without Mitigation)
R1	50(E)	200-350	28.85	6/8	48	Moderate Adverse
R2	80(SE)	290-0	2.1	1/8	8	Acceptable
R3	50(S)	340-40	1.65	1/8	8	Acceptable
R4	243(SE)	290-340	0.1	1/4	4	Insignificant
R5	120(NE)	190-230	16.65	6/5	30	Moderate Adverse
R6	101(N)	190-230	16.65	6/5	30	Moderate Adverse
R7	162(N)	190-230	16.65	6/5	30	Moderate Adverse
R8	155(SE)	290-340	2.1	1/5	5	Insignificant
R9	151(S)	340-10	0.7	1/5	5	Insignificant
R10	435(E)	270-310	3.25	2/2	4	Insignificant
R11	412(E)	270-310	3.25	2/2	4	Insignificant
R12	422(E)	270-310	3.25	2/2	4	Insignificant
R13	457(E)	280-310	2.3	1/2	2	Insignificant
R14	453(SE)	280-310	2.3	1/2	2	Insignificant
R16	438(N)	200-220	12.7	5/2	10	Acceptable
R17	454(N)	190-210	9.05	4/2	8	Acceptable
R24	351(W)	110-140	1.65	1/3	3	Insignificant
R25	461(NW)	110-140	1.65	1/2	2	Insignificant
R32	50(SE)	290-0	2.1	1/8	8	Acceptable

[a] Based on the frequency of moderate to high winds (≥2 m/s) which would cause dust emissions to travel in the *direction of the receptor. Adjusted for natural suppression due to 183 days with rainfall over 0.2mm (Factor = 0.5)*

This assessment does not take into account proposed mitigation measures that include provision of perimeter landscape proposals, dust suppression measures etc., refer to Mitigation Measures section

Refer to Figure 7-1-3-3A for Receptor Locations / EIAR Chapter 8 for Dust Risk Assessment Methodology

From Table 2 above, it is observed that the risk of impact from dust emissions associated with the waste recovery facility at Halverstown (without any mitigation measures in place) generally varies from insignificant to acceptable at assessed receptors within 500m of the dust generating activities.

Ecological Receptors

The application site is not subject to any statutory nature conservation designation and there are no protected sites within 2km radius of the application site. Based on the nature, size and scale of the planned activity at Halverstown, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 sites is up to a maximum radius of 2km from the application site, unless, there are any potential source-pathway-receptor links between it and any Natura 2000 site(s) beyond this distance.

At a distance greater than 2km and in the absence of any potential source-pathway-receptor link, it is considered that no Natura 2000 sites would be affected by any direct loss of habitat or impacted upon by the effects of dust deposition or traffic emissions.

Studies have indicated that fugitive dust is typically deposited within 100m to 200m of the source, the greatest proportion of which, comprising larger particles (greater than 30 microns) is deposited within 100m. Where large amounts of dust are deposited on vegetation over a long time-scale (a full growing season for example) there may be some adverse effects upon plants restricting photosynthesis, respiration, and transpiration.

Based on the above, it is concluded that the planned activity at Halverstown will have an insignificant dust deposition impact on ecological receptors.

Human Receptors

Using a screening assessment tool, the Air Quality Assessment (outlined in Appendix 8.A) considers that there is generally an insignificant to acceptable risk that dust may cause an impact at sensitive receptors within 500m of the source of the dust generated activities. Risk of impact from dust emissions at receptors R1, R5, R6, R7 was assessed to be moderate adverse w*ithout any proposed mitigation measures*.

As this preliminary assessment does not take into account implementation of mitigation measures within the planned development (including provision of perimeter screening berms, dust suppression measures etc. – outlined below), and uses relatively modest wind speeds to evaluate risk, it is deemed to be relatively conservative.

Traffic Emissions - Assessment

For the purposes of assessment, the projected additional traffic movements associated with the development is predicted to be 55 AADT Heavy Duty Vehicles (HDVs), with no significant changes to either road alignment or speed.

As none of the changes to the surrounding local road network meet any of the traffic / alignment criteria set out in HA 207/07 (published by Highways England), the potential impact of the intensification in soil / stone waste recovery activity and HGV traffic movements can be considered to be 'negligible' in terms of local air quality and no further air quality assessment is necessary.

On this basis, the impact arising from the increase in HDV movements can be screened out and combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the HGV movements are not considered to have potential to contribute to local air pollution.

PM_{10} Contribution from Facility Operations - Assessment

In terms of PM_{10}, the maximum annual mean measured baseline background concentration recorded at Kilkitt monitoring station was 9µg/m³ in 2014 and 2015. An upper range increase of 5µg/m³ (identified in technical literature for the potential contribution from quarrying related activity) towards annual mean background concentrations of coarse fraction particulates (2.5 – 10µm diameters) in the immediate vicinity of the application site is considered to be insignificant and would result in cumulative emissions well below the annual objective of 40µg/m³ for human health air quality limit.

Therefore, the potential impacts in relation to increase in ambient PM_{10} concentrations beyond the development site boundary can be classified as 'negligible', given the limited duration of meteorological conditions and the limited extent of the extent and scale of planned waste recovery activities.

Cumulative / Synergistic Impacts

In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

Adjacent to the proposed development there is a concrete manufacturing plant. There is no visible airborne emission from the concrete manufacturing plant; the plant is fitted permanent bag filter and suction fans which prevent emissions to air.

There are no other significant sources of emission to air in close proximity to the application site and therefore no potential for significant cumulative impacts has been identified. The cumulative impact of the proposed development and the concrete manufacturing plant will therefore be largely insignificant.

Mitigation Measures

A range of mitigation measures are recommended for Halverstown facility operations. Specific mitigation measures are listed in Table 3 below.

Table 3
Particulate Emission Mitigation Measures

Source	Emission Potential	Recommended Mitigation Measures	Effectiveness
HGV	High – dry or fine material during strong windy weather	Minimise drop heights when handling materials. Soils placed directly into screening berms or in progressive works. Avoid working in adverse/ windy conditions.	High
	Low – material of high moisture content during conditions of low wind speed	Minimise drop heights when handling material, protection from wind where possible.	High
Onsite Vehicles	High when travelling over un-surfaced and dry site roads.	Minimise distances of onsite haul routes.	High
		Use of water sprays / tractor & bowser to moisten surfaces during dry weather.	High
		Restrict vehicle speeds through signage / staff training.	High
		Location of haul routes away from sensitive receptors.	High
Road Vehicles (transfer offsite)	Low / Moderate on paved road surfaces	Use of road sweeper to reduce the amount of available material for re-suspension.	Moderate / High
		Maintain the paved access road.	High
Stockpiles	High when dry or fine material being stored or handled during strong windy weather	Seed surfaces of completed mounds / bunds of top soil.	High
		Limit mechanical disturbance.	High
Moderate to Acceptable Risk Receptors	High – during dry and strong windy weather	Retention of hedgerows	High
		Avoid working in adverse weather conditions	High
			High

Residual Impact Assessment

With the range of mitigation measures to be implemented and design measures to be incorporated into the working scheme, it is considered that the risk of dust impact at receptors from the proposed development reduces further.

After an assessment of potential adverse effects produced by the development, it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors (screened out) which cumulatively would not negatively impact the site or the surrounding area. Overall, the effects of the proposed development on air quality have been considered to be negligible to acceptable. A summary of the residual dust risk impact assessment is provided in Table 4 below.

Table 4
Residual Dust Risk Assessment (With Mitigation Measures)

Receptor Reference	Risk Evaluation
R1	Acceptable
R2	Insignificant
R3	Insignificant
R4	Insignificant
R5	Acceptable
R6	Acceptable
R7	Acceptable
R8	Insignificant
R9	Insignificant
R10	Insignificant
R11	Insignificant
R12	Insignificant
R13	Insignificant
R14	Insignificant
R16	Insignificant
R17	Insignificant
R24	Insignificant
R25	Insignificant
R32	Insignificant

On the basis of the assessment presented above, it is concluded that the proposed development, with the range of mitigation measures to be implemented and design measures incorporated into the working scheme, will not have a dust deposition impact on any assessed receptors.

NOISE EMISSION IMPACTS

The information / air emission impact assessment presented herein is based on that presented in Chapter 10 (Noise and Vibration) of the EIAR which accompanies this waste licence application. Details of the baseline noise environment and a description of the methodologies employed for the purposes of this impact assessment are presented in the EIAR .

To determine the noise impact arising from soil / stone intake and recovery at the waste recovery facility, SLR Consulting Ireland carried out a noise prediction assessment, whereby resultant noise levels were calculated at the noise sensitive receptors (residences) within 500m of the site shown on Figure 7-1-3-3B.

Operational L_{Ar}, 1hr noise predictions at each receptor location are based on the prediction protocol for fixed plant contained within ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation'. The noise assessment methodology used was based on BS5228: Part 1 (2009)+ A1:2014 "*Code of Practice for Noise and Vibration Control on Construction and Open Sites*''

The following noise sources have been considered in the noise assessment for the recovery facility operations :

- Dozer;
- Hydraulic Excavator;
- HGV truck.

For the purposes of this noise emissions impact assessment, it is assumed that all of the noise sources are active and arise continuously and simultaneously during assessment hours. A reduction of -10 dB(A) has been assumed for partial noise screening as the attenuation path difference arising (between the noise source and receptors).

For the purposes of this assessment, it is assumed that all of the noise sources are active for 20 % time at the application site. The soil deposition activity by the HGV will not occur at the site boundary, the excavator and dozer will not be working simultaneously and the compaction of soil close to the site boundary will be carried intermittently. On this basis, it is considered that the noise impact assessment presented herein is conservative and represents a worst-case scenario. Detailed noise assessment calculations are provided in Appendix 10-B of the accompanying EIAR.

The operational L_{Ar}, 1hr noise predictions at each receptor location are presented in Table 5 below. The table also shows the comparison between the predicted operational L_{Ar}, 1hr noise level and the noise limit at each receptor during each time-period.

Table 5
Operational Noise Levels : Recovery Facility

Location	Receptors	Period	Noise Limit $L_{Aeq,\ 1hr}$ dB(A)	Operational* $L_{Ar,\ 1hr}$ dB(A)	Difference
N1	R1	Daytime	55.0	50	-5
N1	R2	Daytime	55.0	45	-10
N1	R3	Daytime	55.0	50	-5
N1	R4	Daytime	55.0	36	-19
N1	R32	Daytime	55.0	50	-5

Location	Receptors	Period	Noise Limit $L_{Aeq, 1hr}$ dB(A)	Operational* $L_{Ar, 1hr}$ dB(A)	Difference
N2	R5	Daytime	55.0	43	-12
N2	R6	Daytime	55.0	44	-11
N2	R7	Daytime	55.0	40	-15
N1	R8	Daytime	55.0	40	-15
N1	R9	Daytime	55.0	41	-14
N1	R10	Daytime	55.0	31	-24
N1	R11	Daytime	55.0	32	-23
N1	R12	Daytime	55.0	32	-23
N1	R13	Daytime	55.0	31	-24
N1	R14	Daytime	55.0	31	-24
N2	R16	Daytime	55.0	31	-24
N2	R17	Daytime	55.0	31	-24
N3	R24	Daytime	55.0	33	-22
N3	R25	Daytime	55.0	31	-24

* Operational Noise Level= Predicted Noise Level

As can be seen from the above Table, the EPA NG4 daytime noise criterion limits arising specifically from recovery operations at the proposed facility at Halverstown are comfortably satisfied at all nearby noise sensitive locations.

To identify the potential impact of recovery activity at the proposed facility, predicted specific L_{Aeq} 1hr dB(A) noise levels have been logarithmically added to existing ambient noise levels. The cumulative levels have been compared to the existing ambient noise levels at each of the noise sensitive locations for each time-period. The cumulative assessment is presented in Table 6 below.

Table 6
Cumulative Operational Noise Levels: Recovery Facility

Location	Receptors	Period	Existing Baseline $L_{Aeq,T}$ dB(A)	Operational $L_{Ar, 1hr}$ dB(A)*	Cumulative $L_{Aeq, T}$ dB(A)	Difference
N1	R1	Daytime	75	50	75	0
N1	R2	Daytime	75	45	75	0
N1	R3	Daytime	75	50	75	0
N1	R4	Daytime	75	36	75	0
N1	R32	Daytime	75	50	75	0
N2	R5	Daytime	54	43	54	0
N2	R6	Daytime	54	44	54	0
N2	R7	Daytime	54	40	55	0
N1	R8	Daytime	75	40	75	0
N1	R9	Daytime	75	41	75	0
N1	R10	Daytime	75	31	75	0

Location	Receptors	Period	Existing Baseline $L_{Aeq,T}$ dB(A)	Operational $L_{Ar,\ 1hr}$ dB(A)*	Cumulative $L_{Aeq,\ T}$ dB(A)	Difference
N1	R11	Daytime	75	32	75	0
N1	R12	Daytime	75	32	75	0
N1	R13	Daytime	75	31	75	0
N1	R14	Daytime	75	31	75	0
N2	R16	Daytime	54	31	54	0
N2	R17	Daytime	54	31	54	0
N3	R24	Daytime	47	33	47	0
N3	R25	Daytime	47	31	47	0

* *Operational Noise Level = Predicted Noise Level

With reference to the *Guidelines for Noise Impact Assessment* produced by the Institute of Environmental Management and Assessment (IEMA), the cumulative noise impact from the recovery facility operations at all receptors is determined to be NEGLIGIBLE.

In view of the above findings, it is considered that mitigation measures to reduce the noise impacts of plant associated with the planned activities recovery facility are not strictly necessary.

Noise Exposure and Potential Health Effects

To determine the potential health effects noise impact arising from the planned recovery facility, SLR Consulting Ireland carried out a calculation of L_{den} for operational noise, whereby the resultant noise levels were calculated at nearby noise sensitive receptors (residences) shown on Figure 7-1-3-3B.

The operational L_{den} noise predictions at each receptor location are based on predicted operational noise level at the application site boundary (as indicated in Figure 7-1-3-3B) rather than from the noise source. On this basis, it is considered that the potential health effects presented herein is conservative.

The operational L_{den} noise prediction for receptor location is presented in Table 7 below. The table also shows the comparison between the predicted operational L_{den} noise level and the prescribed noise threshold for reported health effects.

Table 7
Health Effects Noise Levels Screening Summary : Recovery Facility

Receptors	Period	Reported Health Effects Threshold L_{den} dB	Operational L_{den} dB	Difference
R1	Daytime only	50	50	0
R2	Daytime only	50	45	-5
R3	Daytime only	50	50	0
R4	Daytime only	50	36	-14
R5	Daytime only	50	43	-7
R6	Daytime only	50	44	-6
R7	Daytime only	50	40	-10
R8	Daytime only	50	40	-10

Receptors	Period	Reported Health Effects Threshold L_{den} dB	Operational L_{den} dB	Difference
R9	Daytime only	50	41	-9
R10	Daytime only	50	31	-19
R11	Daytime only	50	32	-18
R12	Daytime only	50	32	-18
R13	Daytime only	50	31	-19
R14	Daytime only	50	31`	-19
R16	Daytime only	50	31	-19
R17	Daytime only	50	31	-19
R24	Daytime only	50	33	-17
R25	Daytime only	50	31	-19
R32	Daytime only	50	50	0

It can be seen from the above assessment that the operational noise arising specifically from proposed activity at Halverstown is comfortably below the Reported Health Effects Threshold at all nearby noise sensitive locations.

'Do Nothing' Scenario

At present the noise environment within the study area is dominated by road traffic noise emanating from the R448. Locally, natural sounds such as farmyard animals or barking dogs, agriculture activities are also audible. Over time, it is anticipated that the volume of road traffic, in the area will increase as economic activity increases and that this in turn is likely to lead to a gradual, likely audible increase in ambient and background noise levels.

Cumulative Impacts

There are no cumulative noise impacts arising from the proposed recovery activities within Halverstown. Given the proximity of Halverstown to national and regional road infrastructure, ambient noise levels from road traffic are considerably elevated and will tend to dominate other noise sources. Noise levels arising from proposed recovery activities will not have the potential to increase the existing ambient noise levels in the vicinity of Halverstown.

Mitigation Measures

Where necessary, the three established strategies for impact mitigation are avoidance, reduction and remedy. Where it is not possible or practical to mitigate all impacts, then the residual impacts must be clearly described in accordance with the system for impact description set out in the EPA Guidelines. The adoption of Best Practicable Means is generally considered to be the most effective means of controlling noise emissions.

Notwithstanding the findings of the impact assessment presented above, which determined that the proposed recovery activities at Halverstown will have negligible noise impact, and in line with practice at other Kilsaran facilities, the following best practice measures will continue to be implemented wherever practicable at Halverstown to minimise the potential noise impact of on-site recovery activities:

Phasing

- Infill operations will be carried out on a phased basis, commencing at the areas in closest proximity to neighbouring residences. This will ensure any potential impact on these residences from noise associated with the development will be short term in nature.

Screening

- existing screening berms and screen planting around the planned waste recovery facility will be retained to act as acoustic barriers. Berms and landscaping should be inspected on a regular basis and maintained as necessary.

Plant

- all mobile plant used at the development will have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments thereof;
- all plant items will be properly maintained and operated according the manufacturers' recommendations, in such a manner as to avoid causing excessive noise (i.e. all moving parts are kept well lubricated, all cutting edges are kept sharpened, the integrity of silencers and acoustic hoods are maintained);
- all plant will be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers' noise rating levels. Any defective silencers will be replaced immediately.

Traffic

- all deliveries will be programmed to arrive during working hours only;
- care will be taken when unloading vehicles to reduce or minimise potential disturbance to local residents;
- access / internal haul roads will be kept clean and maintained in a good state of repair, i.e. any potholes are filled and large bumps removed, to avoid unwanted rattle and "body-slap" from heavy goods vehicles;
- delivery vehicles waiting within the facility will be prohibited from leaving their engines running and there should be no unnecessary revving of engines.

Experience from other waste recovery facilities has shown that by implementing these measures, typical noise levels from construction works and/or recovery operations can bring about a reduction of up to 5dB(A) in ambient noise levels.

Residual Impact Assessment

The worst-case scenario noise assessment has shown that in accordance with the scale in the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA) the cumulative long-term noise impact from plant associated with the development at all receptors is NEGLIGIBLE.

Table 8 below summarises the noise impact arising assuming implementation of mitigation measures for operational plant noise at each of the noise sensitive receptors considered.

Table 8
Operational Noise Summary Table

Receptors	Increase in $L_{Aeq, 1hr}$ dB(A) Noise Level from Operations	Impact	Mitigation
R1	0	Negligible	Not Required
R2	0	Negligible	
R3	0	Negligible	
R4	0	Negligible	
R5	0	Negligible	
R6	0	Negligible	
R7	0	Negligible	
R8	0	Negligible	
R9	0	Negligible	
R10	0	Negligible	
R11	0	Negligible	
R12	0	Negligible	
R13	0	Negligible	
R14	0	Negligible	
R16	0	Negligible	
R17	0	Negligible	
R24	0	Negligible	
R25	0	Negligible	
R32	0	Negligible	

GROUND / GROUNDWATER EMISSIONS IMPACTS

Ground Impacts

This waste licence application provides for the importation of inert material for backfilling / recovery purposes at an existing worked out sand and gravel pit and some adjoining agricultural lands. There will be no construction impacts other than some topsoil stripping and vegetation removal across the agricultural lands. Some mitigation measures are proposed for the site preparation and operational stage of the proposed inert waste recovery facility. The site preparation stage is of relatively short duration and is required before the recovery of the inert material can commence. The operational stage comprises the importation and placement of the inert material at the facility.

During the site preparation stage, topsoil will be stripped from existing agricultural land in advance of the placement of imported inert material. The excavated topsoil will be stockpiled elsewhere on site for re-use in restoration works. In order to preserve the structure and integrity of the topsoil and limit the effects of erosion on the stored topsoil the following measures will be implemented:

- topsoil material placed in stockpiles will be at a safe angle of repose;
- stockpiles will be re-vegetated where they are in place for a sufficient length of time to justify such a measure; and
- the re-handling of topsoil material will be minimised as much as possible.

During the operational phase, there is potential for accidental spills or leaks of fuel, hydrocarbons or other hazardous substances being used or stored at the facility to adversely impact land quality. The potential for uncontrolled emissions to ground exists at the permitted facility at present and is minimised by implementing a series of mitigation measures (outlined in section on groundwater impacts below) and adhering to the Environmental Management System (EMS), which includes, amongst other features, detailed systems and procedures providing for the implementation of these mitigation measures and for proper handling, storage, control and monitoring for all potentially hazardous substances.

The existing office and canteen facilities at Kilsaran Concrete's existing concrete production facility at Halverstown are shared with staff working at the adjoining permitted waste recovery facility. These facilities will continue to be available for the use of current (and any additional / future) staff assigned to the waste recovery facility. Sewage from these established facilities is treated at an existing septic tank and percolation area located beyond the north-western corner of the application site. No new or upgraded wastewater treatment facilities are required or proposed to service the proposed waste recovery facility.

Experience at the existing permitted facility to date is that management practices can serve to minimise and prevent any uncontrolled emissions to ground and any potentially adverse implications for land quality or ground contamination.

With the mitigation measures in place, it is considered that any potential impacts on land quality will be slight. With the long-term restoration of the application site to agricultural use and/or woodland habitat, the significance of any temporary loss of productive agricultural land is considered to be slight. The restoration of the previously excavated / disturbed land elsewhere within the application site is considered to be both positive and beneficial.

Groundwater Impacts

Construction Stage

In the context of the planned restoration of the application site with imported inert waste materials, the construction stage is taken to comprise limited site preparation works which will involve stripping and storage of topsoil and some underlying glacial till subsoil (with earthmoving plant and machinery) across existing agricultural lands in advance of the backfilling and recovery operations.

Potential site preparation (construction stage) impacts on surface waters and groundwater are discussed below. The majority of the application area is located within the previously worked pit area and topsoil has previously been removed from this area.

As there is no discharge from the application site to surface watercourses, there are no impacts on surface water quality or quantity during this stage. The backfilling and recovery operations will occur above the groundwater level. Backfilling will increase the thickness of unsaturated materials above the groundwater table at the application site and this is generally considered positive as it affords greater protection to groundwater. As there is no dewatering associated with the proposed works, there will be no impact on groundwater flow / quantity.

The stripping of soils and glacial till subsoils, where present, however has the potential to impact on groundwater quality at the application site in terms of increased concentrations of suspended solids and/or hydrocarbons leaks and spills from plant and machinery. Without mitigation, this is deemed to constitute a potential *medium adverse impact* for groundwater quality during site preparation works.

Operational Stage Impacts – Extraction and Processing

During the operational stage, inert material will be imported to the site and will be placed / recovered across the proposed backfill / restoration areas. As there are no surface water courses on or in the immediate vicinity of the site, and there is no discharge from the site to surface watercourses; there will be no direct impacts on surface water quality (or on surface water flow / quantity) during this stage.

The application site was previously worked dry (above the winter groundwater table level), and the proposed backfilling and restoration works will therefore take place above the groundwater level also. There will therefore be no impact on groundwater flow / quantity.

The proposed backfilling / restoration works will proceed using only excess inert soil and stone waste imported from construction and development sites. However, in the event that some non-inert soil and stone materials are inadvertently imported, there is the potential to adversely impact the groundwater quality of the underlying, locally important sand and gravel aquifer and local groundwater well supplies. Accidental leaking of fuels and other dangerous (predominantly petroleum-based) substances (lubricating oils, greases etc.) from plant and machinery, and/or the storage of such materials has the potential to adversely impact groundwater quality also.

The groundwater aquifer beneath the site is a locally important aquifer and is considered to be a sensitive receptor. Without mitigation, this is deemed to constitute a potential *medium adverse impact* for groundwater quality during backfilling / recovery operations.

The restoration of the application site with increased thickness of inert soil and stone will increase the thickness of unsaturated material overlying the groundwater table. This measure will afford additional protection to the groundwater resources from potential pollutants, thereby reducing the groundwater vulnerability across the application site. This is deemed to constitute a potential *slight beneficial impact* for groundwater quality following completion of backfilling / recovery operations

Post Operational Stage Impacts – Restoration

Following the completion of the restoration, the site will be restored to agricultural land use with small areas of woodland habitat. All plant, equipment and infrastructure will be removed from the application site with any fuels and oils which could be potential harmful to the receiving environment.

There will be no impacts on surface water following the restoration of the site. There will be a slight decrease in groundwater recharge at the site following its restoration, as vegetation growth will increase evapotranspiration rates (relative to the existing situation where the pit floor essentially comprises bare sand and gravels with no evapotranspiration occurring in the absence of vegetation cover). The increase in evapotranspiration following restoration, compared to the current (post-extraction) state, will partially re-establish the pre-development recharge characteristics of the site.

Summary of Potential Impacts and Unmitigated Risk

A summary of the unmitigated risk and magnitude of potential impacts during site preparation and extraction and processing stages are presented in Table 9below. These indicates that if no mitigation measures are applied there is potential for the proposed activity to have a negative impact on groundwater quality.

Table 9
Unmitigated Risk and Magnitude of Potential Impacts (Site Preparation Stage)

Potential Impact	Spatial Impact, Duration, Direct/Indirect and Quality	Probability of Occurrence	Magnitude of Impact	Significance of Impact	Mitigation Required?
Groundwater Quality					
Accidental spillages of fuel or refuelling	Local, Short Term, Direct and Negative / Adverse	Medium	Moderate	Medium	Yes
Release of suspended solids from soil and subsoil stripping	Local, Short Term, Direct and Negative / Adverse	Medium	Moderate	Medium	Yes

Table 10
Unmitigated Risk and Magnitude of Potential Impacts (Waste Recovery Stage)

Potential Impact	Spatial Impact, Duration, Direct/Indirect and Quality	Probability of Occurrence	Magnitude of Impact	Significance of Impact	Mitigation Required?
Groundwater Quality					
Accidental spillages of fuel and release of fuels during refuelling.	Local, Short Term, Direct and Negative / Adverse	Medium	Moderate	Medium	Yes
Accidental importation of non-inert material to site	Local, Medium to Long Term	Medium	Moderate	Medium	Yes

Mitigation Measures

Proposed mitigation measures required to reduce the potential impacts associated with the construction stage and operational stage to acceptable levels, presenting a low risk to the receiving environment, are identified below. These measures are designed to either reduce the likelihood of an event occurring, or reduce the magnitude of the consequences if the event does occur.

Construction Stage - Site Preparation

During the construction stage potential impacts have been identified on groundwater quality from suspended solids and the accidental leak of fuels and leaks during refuelling. The following mitigation measures will be implemented at the application site during this stage:

- surface water runoff will be managed during the soil and subsoil stripping and will be allowed to infiltrate to the ground;
- surface water runoff containing suspended solids will be directed to a temporary holding area at the site where the water can infiltrate to the ground;
- no refuelling or plant / machinery maintenance or repairs will take place in the proposed restoration area to prevent accidental spillages during refuelling or repairs/maintenance;
- a spill kit and drip trays will be kept on site and will be deployed if there is an accidental spillage from plant / machinery; and
- plant operators will be briefed during 'toolbox' talks and site induction on where the spill kit is kept and how and when it is deployed.

In order to preserve the soils and prevent their erosion the following measures will be implemented:

- soil material placed in stockpiles will be at a safe angle of repose and will be bladed off; and
- stockpiles will be re-vegetated where they are in place for a sufficient length of time to justify such a measure.

Operational Stage – Waste Recovery

During the operational stage potential impacts have been identified on groundwater quality from suspended solids, the accidental leak of fuels and leaks during refuelling and the accidental importation of non-inert material to site.

The following mitigation measures, some of which are also implemented during the construction stage (outlined above), will be implemented at the application site during the backfilling / recovery stage:

- surface water runoff will be allowed to infiltrate naturally to the ground across the site;
- no refuelling or plant / machinery maintenance or repairs will take place within the working area to prevent accidental spillages during refuelling or repairs/maintenance;
- refuelling will take place at the designated paved refuelling area;
- plant/machinery maintenance and repairs will take place on the hard stand area at the refuelling point;
- no servicing or maintenance of mobile plant and machinery will be undertaken within the infill area;
- a spill kit and drip trays will be kept on site and will be deployed if there is an accidental spillage from plant / machinery;
- plant operators will be briefed during 'toolbox' talks and site induction on where the spill kit is kept and how and when it is deployed;

- all plant will be regularly maintained and inspected daily for leaks of fuels, lubricating oil or other contaminating liquids;
- there is no fuel storage within the infill areas;
- fuel storage will continue at the existing storage facility;
- all petroleum-based products (lubricating oils, waste oils, etc.) are stored on drip trays under cover in the workshop to prevent pollution due to accidental leakages;
- any imported waste which is accepted at the facility but subsequently suspected to be non-compliant with waste acceptance criteria for the facility will be re-loaded onto HGV trucks and transferred across the application site to a proposed covered waste inspection and quarantine facility for closer examination and/or testing;
- the waste inspection facility comprises a covered shed over a sealed concrete slab;
- incident rainfall will not come into contact with consignments of suspected contaminated waste stored at the covered shed;
- should any subsequent inspection or testing of suspect soil waste at the inspection and quarantine facility identify any non-inert material which cannot be accepted or reused in the restoration of this site it will be segregated and temporarily stockpiled (quarantined) pending removal off site by permitted waste collectors to an authorised waste disposal or recovery facility; and
- provision will also be made for temporary storage of any separated non-inert construction and demolition waste (including metal, timber, plastic etc.) in skips prior to removal off site to a licenced recovery facility.

Taken together, these mitigation measures reduce the potential magnitude of any impacts on groundwater in the locally important sand and gravel aquifer and/or at private water supply wells from

- spillage of fuels and lubricants during site construction from '*medium*' to '*low*';
- transport of suspended solids arising from soil and subsoil stripping during site construction from '*medium*' to '*low*';
- spillage of fuels and lubricants during backfilling / recovery activities from '*medium*' to '*low*'; and
- the importation of non-inert material during backfilling / recovery activities from '*medium*' to '*low*'.

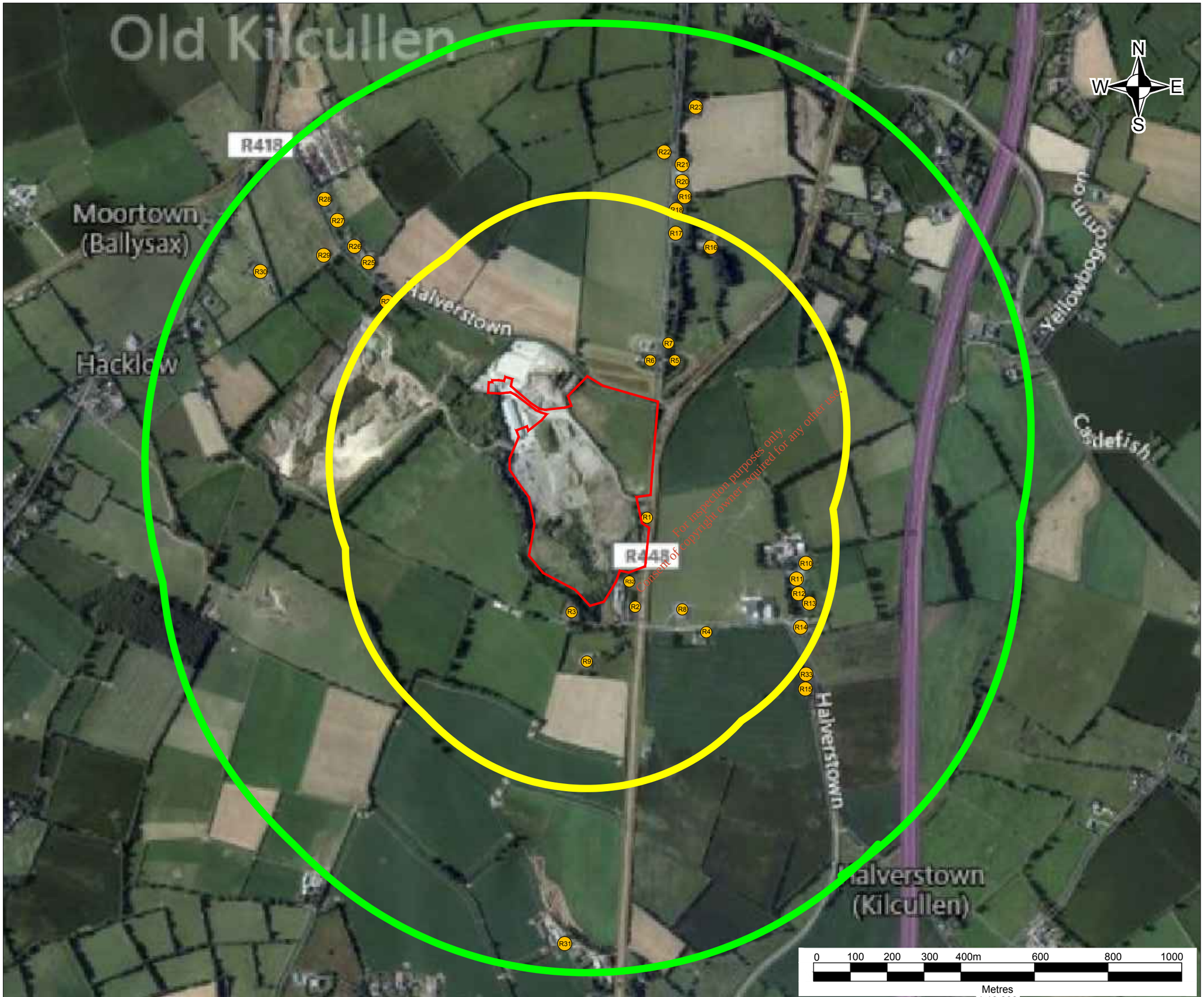
Post Operational Stage - Restoration

Once the restoration works and importation / recovery of soil and stone is complete at the application site, it will be restored to agricultural land use, with some areas of woodland habitat. There will be no requirement for further activity at the application site and therefore no requirement for mitigation measures.

Residual Impact Assessment

With the above mitigation measures in place at the site during the construction stage, operational stage and/or post operational stage, the significance of all of the above identified potentially *medium adverse impacts* for groundwater quality will be reduced to more acceptable residual levels, comprising potentially *slight adverse impacts* for groundwater quality.

The increase in the thickness of inert soil and stone cover above the groundwater table following completion of backfilling / recovery operations will afford additional protection to it. This is considered to be a *slight beneficial impact* for groundwater quality.



NOTES

1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000719 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- LICENCE APPLICATION AREA (c. 17.5 Ha.)
- R — LOCAL RECEPTORS
- 500 METER OFFSET
- 1 KM OFFSET

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KILSARAN CONCRETE

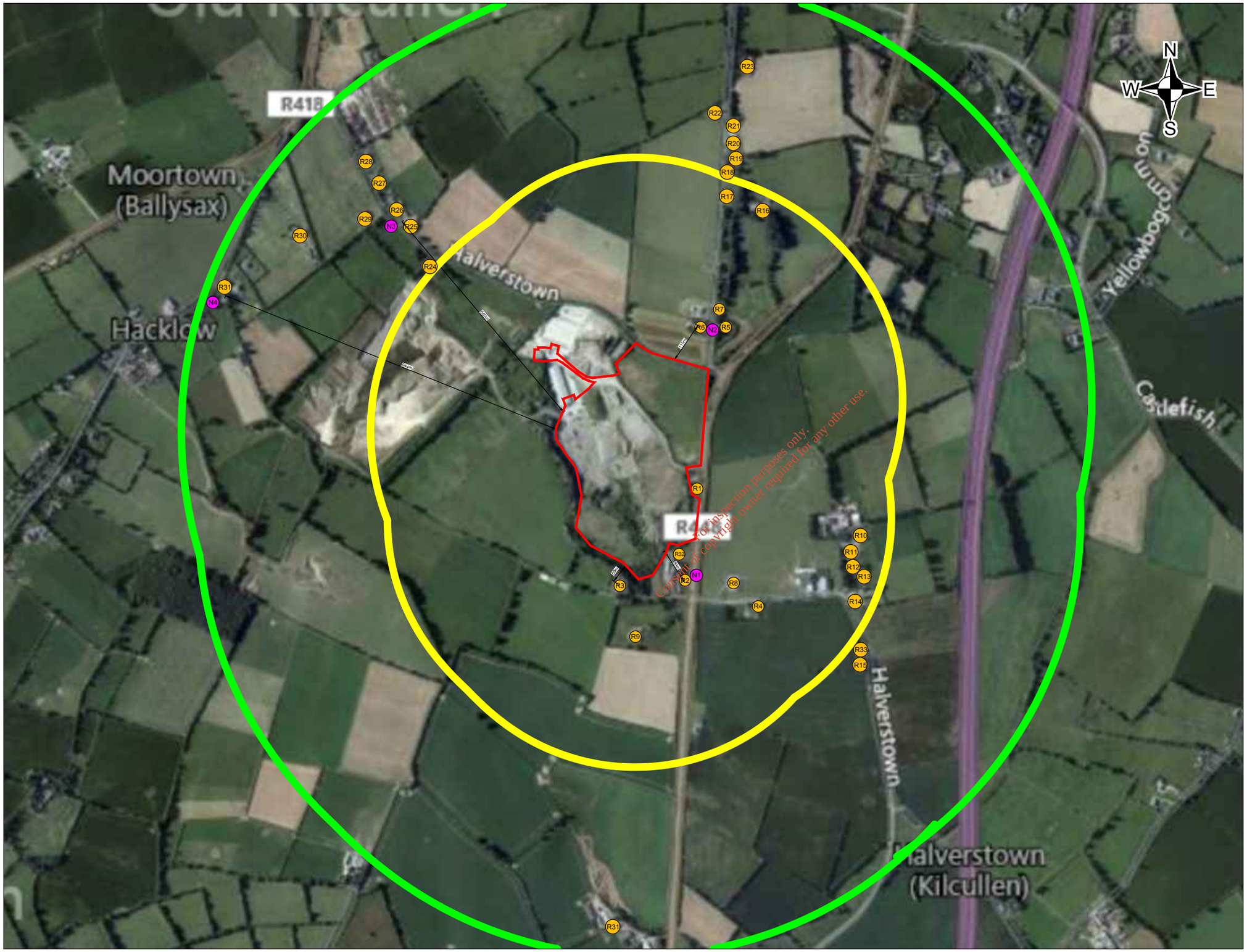
Proposed Waste Recovery Facility
Halverstown, Co. Kildare

LOCAL RECEPTORS - DUST

FIGURE 7-1-3-3A

Scale	Date
1:10,000 @ A3	JANUARY 2019

501.00036.00054.FIG_7-1-3-3A.dwg



0 100 200 300 400m 600 800 1000

Metres
1:10,000

NOTES

1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000719 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- LICENCE APPLICATION AREA (c. 17.5 Ha.)
- R — LOCAL RECEPTORS
- 500 METER OFFSET
- 1 KM OFFSET
- N — NOISE MONITORING LOCATION

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Proposed Waste Recovery Facility
Halverstown, Co. Kildare

LOCAL RECEPTORS - NOISE

FIGURE 7-1-3-3B

Scale 1:10,000 @ A3

Date JANUARY 2019

501.00036.00054.FIG_7-1-3-3B.dwg