EMISSIONS IMPACT ASSESSMENT REPORT

AIR EMISSIONS 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 also presented in the EIAR.

SENSITIVE RECEPTORS

Human Receptors

Sensitive human receptors are those where people may be exposed to dust from existing or planned activities. Locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas, and food retailers.

Residential receptors have been identified within 1km of the application site boundary at Ballinclare Quarry. These are listed in Table 7-1-3-3A below and their location shown on Figure 7-1-3-3A. As residences are clustered in some areas, a single receptor has been identified at the nearest location to the application site boundary.

33 sensitive receptors have been identified for assessment purposes within the 1km study area around the application site, comprising 31 residential properties, a forested area along the Potters River used for amenity / educational purposes to the north of the quarry and the Kilmacurragh Arboretum.

Table 7-1-3-3A
Sensitive Receptors within 1km of Ballinclare Quarry

RECEPTOR REFERENCE	RECEPTOR	SENSITIVITY	DISTANCE (M) / DIRECTION FROM SITE ACTIVITIES (APPROX.)
R1	Residential	Medium	60 SW
R2	Residential	Medium	60 SW
R3	Residential	Medium	141 SW
R4	Residential	Medium	303 SW
R5	Residential	Medium	236 SW
R6	Residential	Medium	247 SW
R7	Residential	Medium	177 NW
R8	Residential	Medium	158 NW
R9	Residential	Medium	128 N
R10	Residential	Medium	202 N
R11	Residential	Medium	360 N
R12	Residential	Medium	363 SE
R13	Residential	Medium	235 SE

RECEPTOR REFERENCE	RECEPTOR	SENSITIVITY	DISTANCE (M) / DIRECTION FROM SITE ACTIVITIES (APPROX.)
R14	Residential	Medium	800 SE
R15	Residential	Medium	790 SE
R16	Residential	Medium	850 SE
R17	Residential	Medium	950 S
R18	Residential	Medium	780 S
R19	Residential	Medium	1000 S
R20	Residential	Medium	720 SW
R21	Residential	Medium	850 SW
R22	Residential	Medium	990 SW
R23	Residential	Medium	950 NW
R24	Residential	Medium	970 NW
R25	Residential	Medium	915 N
R26	Residential	Medium	930 NE
R27	Residential	Medium	750 NE
R28	Residential	Medium	730 NE
R29	Residential	Medium	680 NE
R30	Residential	Medium	700 SE
R31	Residential	Medium	745 SE
Forest to N	Amenity	Medium	50 N
Kilmacurragh Arboretum	Tourist / Amenity	Medium	800 SW

Ecological Receptors

Based on the nature, size and scale of the planned development, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 and designated sites is 2km from the application site unless there are any potential source-pathway-receptor links between the proposed development at Ballinclare Quarry and any Natura 2000 designated site(s) beyond this distance. Designated sites within this range are identified in Table 7-1-3-3B below, and their location shown in Figure 7-1-3-3-A.

Table 7-1-3-3B
Natura 2000 and Designated Sites within 2km of the Application Site

NATURA 2000 AND DESIGNATED SITES	SITE CODE	LOCATION AT CLOSEST POINT (M)
Deputy's Pass Nature Reserve SAC	000717	1600
Glenealy Woods pNHA	001756	1100

AIR QUALITY IMPACT ASSESSMENT

Construction Stage Dust Impacts - Assessment

An overview of the sources and processes associated with the proposed site preparation / site establishment activities at Ballinclare Quarry, and their respective potential for dust deposition (both dust and smaller particles), is presented below in Table 7-1-3-3C.

Table 7-1-3-3C
Site Activities: Sources of Dust Emissions

ACTIVITY	SOURCE	EMISSION POTENTIAL	COMMENTS
Earthworks, Construction and Trackout	Dozers / HGV	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. Soils placed directly in progressive works.
		Low – coarse or wet materials during conditions of low wind speed	

During the site preparatory works, activities will be largely confined within the application site. In light of this and the separation distance to sensitive receptors, the IAQM Construction Dust Guidelines indicates that the dust risk category would be considered to be 'low risk' to 'negligible'. A summary of the assessed risk category for proposed site operations is presented in Table 7-1-3-3D below.

Table 7-1-3-3D
Site Activities: Risk of Dust Emissions

SOURCE	RISK OF DUST SOILING EFFECTS	ECOLOGICAL EFFECTS
Earthworks	Negligible	Negligible
Construction	Negligible	Negligible
Trackout	Negligible	Negligible

While the overall risk category has been assessed as 'negligible, if the trackout activities were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust immediately surrounding 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.

Operational Stage Dust Impact - Assessment

An overview of the sources and processes associated with the proposed quarry backfilling / landfilling, C&D waste processing and soil washing activities, and their respective potential for dust deposition, is presented in Table 7-1-3-3E below.

Table 7-1-3-3E
Sources of Particulate Emissions

ACTIVITY	SOURCE	EMISSION POTENTIAL	COMMENTS
Material transfer on site	Onsite vehicle, Dry loose material.	High when dry materials are handled in strong windy weather. High - on un paved road surfaces	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Material storage	Dry loose material in stockpiles	High when dry material are stockpiled in strong windy weather	Emissions due to prevailing meteorological conditions (high winds).
Traffic (transfer to the site)	HGV / Road vehicles	Low - on paved road surfaces	Dependant on the amount of loose material on road surface available for re-suspension and track out.
C&D / Soil Stockpiling	Front Loader / Stockpiles	High – for dry or fine materials in strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity
		Low – for coarse or wet materials in conditions of low wind speed	
Soil Washing Plant	Front Loader / Soil Washing Plant	Low – intake materials wet during processing; processing system also partially enclosed. Recycled product damp	Low emissions due to partially enclosed system and wet process.
C&D Processing Activities	Front Loader / Processing Plant	Low if C&D processing carried out under cover (in shed)	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		High – for dry or fine stockpiled materials in strong windy weather	
		Low – for coarse or wet stockpiled materials in conditions of low wind speed	

Human Receptors

There were 33 receptors identified for dust impact assessment within the 1km study area around the application site. Using the tiered assessment methodology, receptors located within 500m have progressed to a Tier 2 screening risk assessment as they are considered to have a greater risk of dust impact. More distant amenity sites and ecological sites were also included in the Tier 2 assessment for completeness.

Each receptor is assessed against the frequency of exposure and the distance from the source to the receptor (i.e. the pathway) in accordance with the methodology described in Appendix 8-A of the

EIAR). 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. Representative data on the local wind climate is therefore required for this section of the assessment.

The wind-rose for the site is presented in Attachment 7-1-3-2 (for Baldonnell Meteorological Station) and indicates that the predominant wind direction is from the south-west. The potential for the generation of airborne dust will increase with wind speed, with winds greater than 3m/s capable of carrying airborne dust[1].

The wind rose presented in Attachment 7-1-3-2 also shows the frequency of winds at wind speeds of greater than 2m/s and the individual frequencies for each 10-degree compass sector used within this assessment. Wind speeds over 2m/s were used; as this is how the data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the impact assessment presented below is deemed to be conservative.

A summary of the risk assessment of dust impacts from activities and potential emission sources within the proposed development is presented in Table 7-1-3-3F below.

Table 7-1-3-3F
Dust Risk Assessment Screening (Without Mitigation Measures)

RECEPTOR REFERENCE	DISTANCE FROM OPERATIONS (m)	RELEVANT. WIND DIRECTION [(a)]	POTENTIAL EXPOSURE DURATION [(b)]	RELATIVE WIND / DISTANCE RANK [(c)]	RISK EVALUATION
R1	60 SW	50-90	4.557	2/8	Slight Adverse
R2	60 SW	60-90	4.067	2/8	Slight Adverse
R3	141 SW	60-90	4.067	2/5	Acceptable
R4	303 SW	60-80	3.381	2/3	Insignificant
R5	236 SW	60-90	4.067	2/4	Acceptable
R6	247 SW	70-100	4.067	2/4	Acceptable
R7	177 NW	110-140	1.617	1/5	Acceptable
R8	158 NW	120-150	1.372	1/5	Acceptable
R9	128 N	120-170	2.352	1/5	Acceptable
R10	202 N	150-220	16.268	6/4	Moderate Adverse
R11	360 N	150-220	16.268	6/3	Slightly Adverse
R12	363 SE	270-300	2.842	1/3	Insignificant
R13	235 SE	300-330	1.225	1/4	Insignificant
Forest to N	50 N	120-250	26.95	6/8	Moderate Adverse
Kilmacurrag	800 SW	10-40	1.372	1/1	Insignificant

[1] Department of the Environment, Transport and the Regions, 1995. *The Environmental Effects of Dust from Surface Mineral Workings* – Volume 2. Technical Report. December 1995.

RECEPTOR REFERENCE	DISTANCE FROM OPERATIONS (m)	RELEVANT. WIND DIRECTION [a]	POTENTIAL EXPOSURE DURATION [b]	RELATIVE WIND / DISTANCE RANK [c]	RISK EVALUATION
h Arboretum					
Deputy's Pass SAC	1600 NW	120-150	1.372	1/1	Insignificant
Glenealy Woods pNHA	1100 NW	120-150	1.372	1/1	Insignificant

Table Note: *Refer to* ***Figure 7-1-3-3A*** *for Receptor Locations*

(A) – relevant wind direction based on upwind sector which would potentially convey from site towards the receptor.

(B) – Potential duration of exposure based on frequency of moderate to high wind speed (adjusted for dry days only) as described in the methodology in ***Appendix 8-A of the EIAR***

(C) – Ranking as per methodology in ***Appendix 8-A of the EIAR***

From Table 7-1-3-3F, it is observed that the risk of impact from dust emissions associated with the proposed development at Ballinclare Quarry (without any mitigation measures in place) generally varies from Insignificant at R4, R12, R13; Acceptable at R3, R5, R6, R7, R8, R9; Slight Adverse at R1, R2, R11 to Moderate Adverse at residential property R10 and the forest / amenity area to the north of the application site.

Having regard to the screening effect of intervening high ground (hill) and the nature of the forest / river amenity area to the north, it is considered that only the edge of the forest could be impacted to any degree by potential fugitive dust emissions arising from the proposed inert waste activities at Ballinclare Quarry. It is anticipated that perimeter planting and/or dense gorse vegetation will act as a wind break to further screen any fugitive dust and prevent it from being carried any significant distance into the forested area.

Using the screening assessment tool, the Air Quality Assessment indicates that there is generally an insignificant to moderate adverse risk that dust may cause an impact at sensitive receptors within 500m of the source of the dust generating activities.

Note that the risk assessment above *does not take into account implementation of mitigation measures* within the proposed development that includes retention of perimeter screening and dust suppression measures outlined in the Mitigation Measures section. The assessment presented above is considered to be conservative on the basis that the reference wind speed for the risk evaluation was less than that required to carry airborne dust.

Post-Closure Phase

The post-closure phase will entail decommissioning and removal of plant and equipment following cessation of inert waste disposal and recovery activities and the final restoration of the application site to grassland / scrub habitat thereafter. Potential air quality impacts associated with this phase of development will be negligible.

Ecological Receptors

The application site is not subject to any statutory nature conservation designation. The nearest protected site is located to the north of the application site boundary.

Table 7-1-3-3G
Dust Risk Assessment Screening (Without Mitigation Measures) Ecological Receptors

RECEPTOR REFERENCE	DISTANCE FROM OPERATIONS (m)	RELEVANT. WIND DIRECTION [a]	POTENTIAL EXPOSURE DURATION [b]	RELATIVE WIND / DISTANCE RANK [c]	RISK EVALUATION
Deputy's Pass SAC	1600 NW	120-150	1.372	1/1	Insignificant
Glenealy Woods pNHA	1100 NW	120-150	1.372	1/1	Insignificant

Based on the nature, size and scale of the planned activity at Ballinclare, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 and designated ecological 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 and designated 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.

Baseline dust deposition monitoring indicates that dust levels of at the application site are low and well below the level of 1000 mg/m^2/day, where it is considered that dust could be likely to have a significant effect on sensitive ecosystems.

Using a screening assessment tool, the Air Quality Assessment (as outlined in Appendix 8-A of the EIAR) suggests that there is generally an insignificant to moderate adverse risk that dust may cause an impact at sensitive ecological receptors within 500m of the source of the dust generating activities.

Based on the assessment above, it is concluded that the planned development will have an insignificant dust deposition impact on the Deputy's Pass Nature Reserve SAC and the Glenealy Woods pNHA ecological sites, and it is considered that both sites can be screened out from any further dust impact assessment.

Traffic Emissions - Assessment

For the purposes of assessment, the projected traffic movements associated with the development based on a 50-week year, 5.5 days per week, and 20 tonne loads, will result in up to 145 HGV movements per day, with no significant changes to either road alignment or speed.

This is consistent with existing / previously permitted HGV traffic levels of 150 trucks per day for extractive and related aggregate / concrete / asphalt production activities. From an air quality perspective therefore, the proposed development therefore will not generate a significant change in traffic, other than to have HGVs fully laden on the way in as opposed to on the way out.

As none of the roads in the surrounding local road network meet any of the traffic / alignment criteria set out in LA 105, then the impact of the scheme can be considered to be 'negligible' in terms of local air quality and no further air quality assessment is deemed necessary.

On this basis, the impact of the proposed inert landfill and waste recovery facility from the change of HGVs traffic can be screened out and combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the transportation of materials does not have the potential to contribute to local air pollution.

PM_{10} Contribution : Inert Landfill and Waste Recovery Activities - Assessment

In terms of PM_{10}, the maximum annual mean measured baseline background concentration was 11µg/m³ in 2013 at Kilkitt, Co. Monaghan monitoring station and is adopted as typical of the rural environment surrounding the application site. Therefore, the potential contribution up of 5µg/m^3 towards annual mean background concentrations of the coarse fraction (2.5 – 10µm diameters) of particulates (in the immediate area of the site) is considered to be insignificant and well below the annual objective of 40µg/m³.

Therefore, the potential impacts in relation to increase in ambient PM_{10} concentrations can be classified as 'negligible', when the limited duration of conditions and the magnitude of change in the extent and scale of activities are considered to significantly reduce the generation of airborne PM_{10} beyond the site development boundary.

Unplanned Events (i.e. Accidents)

Accidents, malfunctions and unplanned events refer to events or upset conditions that are not part of any activity or normal operation of the planned development. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during the proposed inert landfill and waste recovery activities.

Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. In terms of air quality impact, the following unplanned events could have an effect on the local area:

- equipment malfunction;
- vehicle collision;
- dry and windy weather conditions with dust suppression equipment malfunction;
- accidental material spillages during transport.

In relation to air quality, the impacts of any unplanned events are considered to be negligible. If unplanned events were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust and 24-hour mean PM_{10} concentration immediately surrounding the existing pit and local road access. However, these are not considered to be significant given the limited duration of such meteorological conditions and the likely limited scale of any incident.

Interaction with Other Impacts (if any)

The potential impact of the proposed development on air quality at sensitive receptors including sensitive ecological receptors and people living in the area has been fully assessed in this Chapter. The overall impact of the project on these receptors is further considered in Chapter 4 (Population and Human Health) and Chapter 5 (Biodiversity).

MITIGATION MEASURES

A large range of mitigation measures can be applied in respect of the proposed development at Ballinclare Quarry. The principal factors which will reduce and mitigate emissions from the planned inert landfill and waste recovery facility will be the placement of the imported waste materials within the existing quarry void, behind the quarry faces and below surrounding ground level. Existing perimeter berms along the site boundary and intervening vegetation / forestry within and beyond the application site boundary will effectively inhibit and limit dispersion of fugitive dust.

Site Specific Mitigation Measures

In addition to these key factors however, a number of additional dust control measures will be implemented at the proposed inert landfill and materials recovery / recycling facility as necessary to further reduce or mitigate potential dust impacts and to ensure dust emission are controlled within specified limits. Mitigation measures to be implemented are set out in Table 7-1-3-3H below.

Table 7-1-3-3H
Particulate Emission Mitigation Measures

SOURCE	EMISSION POTENTIAL	RECOMMENDED MITIGATION MEASURES	EFFECTIVENESS
Excavator / HGV	High – dry or fine particulate matter in strong windy weather	Minimise drop heights when handling materials. Minimise work in adverse / windy conditions.	High
	Low – wet particulate matter in conditions of low wind speed	Minimise drop heights when handling materials, 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 and bowser to moisten surfaces during dry weather.	High
		Restrict vehicle speeds through signage / staff training.	High
		Locate haul routes away from sensitive receptors.	High
Road Vehicles (transfer to the site)	Low / Moderate on paved road surfaces	All HGVs exiting the facility to be routed through wheelwash facilities	High
		Use of road sweeper to reduce the amount of available material for re-suspension.	Moderate / High
		Consider paving additional length of access road leading to the recovery facility (if required to achieve emission limits).	High
Stockpiles (soil/stone, C&D waste or recycled aggregate)	High when dry or fine material being stored or handled during strong windy weather	Minimise mechanical disturbance.	High
		Consider installation of fixed sprinkler system where materials consistently stockpiled (if required to achieve emission limits).	

SOURCE	EMISSION POTENTIAL	RECOMMENDED MITIGATION MEASURES	EFFECTIVENESS
C&D Waste Processing	Low	C&D processing activities carried out within the proposed waste processing shed.	High
Slight Adverse Risk Receptors	High – during dry and strong windy weather	Retention of existing perimeter berms	High
		Retention of planting along / within perimeter	High
		Increase dust suppression activity (sprinklers / water sprays from tractor & bowser).	High
		Minimise work in adverse weather conditions	High
Moderate Adverse Risk Receptors	High – during dry and strong windy weather	Retention of existing perimeter berms	High
		Retention of planting along / inside perimeter	High
		Increase dust suppression activity (sprinklers / water sprays from tractor & bowser).	High
		Minimise work in adverse weather conditions	High

Good Practice Mitigation Measures

Effective site management practices are critical to demonstrate the willingness of the facility operator to control dust emissions. Monitoring of dust deposition and recording of any complaints shall be carried out to take appropriate measures to reduce emissions in a timely manner.

Training on dust mitigation measures shall be provided to staff. Training should also cover an 'emergency preparedness plan' to react quickly in case of any failure of dust mitigation strategies or measures.

When adverse conditions apply, sprayed water from a bowser should be used to dampen down particulate materials from operations and/or stockpiles as and when required, principally in windy periods during extended dry spells.

As noted above, should it be necessary, an automated sprinkler system could also be installed around the facility to systematically dampen down stockpiled materials :

The following additional measures can also be implemented when required to achieve compliance with dust emission limits :

- Covering every load on vehicles delivering waste materials to the site;
- Protecting / reinforcing perimeter vegetation screening around the application site;
- Undertaking regular plant and vehicle maintenance (cleaning);
- Undertaking regular monitoring and inspection of access and haul roads to identify and attend to accidental spillages (of particulate waste materials) and any structural defects (i.e. potholes) to minimise shearing and break-up of road materials;
- considering meteorological conditions (wind speed and wind direction) when deciding where to site / locate material stockpiles.

Trackout

When adverse conditions apply (dry, windy weather), water from a bowser will be sprayed on dry unpaved road surfaces in order to minimize dust rise. Paved road surfaces around the site infrastructure area and the access road leading out of the site will also be sprayed as required.

All heavy goods vehicles leaving the application site will be routed through the wheelwash facilities in order to remove and / or dampen any dust / clay material attaching to the undercarriage and to prevent transport of fine particulates off-site, onto the local public road network.

Cumulative / Synergistic Impacts

In essence, cumulative impacts are those which result from incremental changes caused by past or pre-existing development or actions, together with those generated by the proposed development plus any other reasonably foreseeable development / actions. Therefore the proposed development cannot be considered in isolation but must be considered in addition to impacts already extant and/or arising from existing or planned future development.

A search of the myplan.ie and An Bord Pleanála online planning portal searches was carried out to determine if there were any other planned developments in the vicinity (c. 1km radius) of the application site that have recently been granted permission or are currently under consideration and which have the potential to have a significant adverse cumulative impact on the local environment.

This dust impact assessment shows that, in light of the topographical setting, surrounding vegetation and forestry cover and with mitigation measures in place, the proposed inert landfill and waste recovery activities at Ballinclare will not adversely impact local air quality by way of increased dust emissions.

There is no other major planned development in the vicinity of the existing quarry at Ballinclare. Notwithstanding this, this assessment indicates that the long-term air quality impacts arising from the proposed backfilling and waste recovery activities are insignificant / acceptable at all potentially sensitive receptors. As such dust and PM_{10} levels arising from the planned waste activities do not have the potential to increase or adversely impact dust levels or PM_{10} concentrations in the local area, either on their own or in combination with other development.

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 arising at nearby receptors as a result the proposed site activities will be considerably reduced.

Following assessment of potential adverse effects produced by the development, it is concluded that there will be no significant adverse air quality effects for both human and ecological receptors (screened out) which cumulatively would not hinder the application site or the surrounding area. Overall the effects of the proposed development on air quality at nearby receptors are classified as negligible or acceptable.

A summary of the residual dust risk impact assessment is provided in Table 7-1-3-3I below.

Table 7-1-3-3I
Residual Dust Risk Assessment (With Mitigation Measures)

RECEPTOR REFERENCE	RISK EVALUATION
R1	Acceptable
R2	Acceptable
R3	Insignificant
R4	Insignificant
R5	Insignificant
R6	Insignificant
R7	Insignificant
R8	Insignificant
R9	Insignificant
R10	Acceptable
R11	Acceptable
R12	Insignificant
R13	Insignificant
Forest to N	Insignificant
Kilmacurragh Arboretum	Insignificant
Deputy's Pass SAC	Insignificant
Glenealy Woods pNHA	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 any adverse or unacceptable dust deposition impact on any nearby sensitive receptors.

MONITORING

Dust deposition monitoring will be undertaken at the application site. Dust monitoring locations shall be reviewed and revised where and as/when necessary. The results of the dust monitoring shall be submitted to Wicklow County Council on a regular basis for review and record purposes as required.

NOISE EMISSION IMPACTS

The information / noise 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 activities at the proposed facility, SLR Consulting Ireland carried out a noise prediction assessment, whereby resultant noise levels were calculated at the noise sensitive receptors (residences) shown on Figure 7-1-3-3B.

Operational $L_{Ar,\ 1hr}$ noise predictions at each receptor location are based on BS5228: Part 1 (2009)+ A1:2014 "*Code of Practice for Noise and Vibration Control on Construction and Open Sites*''

For the purposes of this assessment, the following noise sources have been considered in the noise assessment for the landfilling and C&D waste recovery operations :

- Dozer;
- Hydraulic Excavator;
- HGV truck;
- C&D tracked crusher;
- Soil washing plant.

Noise generated by soil and stone intake an backfilling activities will for the most part, be screened by surrounding land forms, and by the existing quarry faces in particular and the difference in elevation along the attenuation path as a result will be greater than 1.5m. For the purposes of this noise impact assessment, a reduction of -15 dB(A) has been assumed for partial noise screening by existing quarry faces and by the vegetated perimeter mounds and berms.

As it is also proposed to erect a dedicated recycling shed at the facility and that all C&D waste crushing / processing will be undertaken internally, within the proposed shed unit, a further noise reduction of -22 dB(A) (BS 8233: 1999) has been assumed for full noise screening of waste crushing activities by the external shed cladding.

For the purposes of this assessment, it is assumed that all of the noise sources are active and arise continuously and simultaneously during permitted working hours and that the attenuation distance to the selected closest receptors is calculated from the noise source (as indicated in Figure 7-1-3-3B). On the basis of the methodology outlined above, it is considered that the noise impact assessment presented herein is sufficiently robust and conservative and represents a worst-case scenario. (Detailed noise assessment calculations are provided in Appendix 10-B of the EIAR).

Operational Activities

The updated Environmental Noise Standard ISO as set out in Annex D, 1996-2:2007(E) details that a prominent, discrete tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by some constant level difference.

The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:

- 15dB in low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in middle-frequency bands (160Hz to 400Hz), and;
- 5dB in high-frequency bands (500Hz to 10,000Hz).

The noise characteristics of the plant and equipment to be used for the proposed backfilling / landfilling and C&D waste recovery activities at Ballinclare Quarry and considered in this noise assessment are shown in Table 7-1-3-3J.

Table 7-1-3-3J
Octave Band Noise Spectra for Plant to be used in Assessment

PLANT	OCTAVE BAND SOUND PRESSURE LEVELS @ 10m, Hz								$L_{A\ eq}$ @10m
	63	125	250	500	1k	2k	4k	8k	
EXCAVATOR	72	71	74	73	69	66	63	58	75
HGV	80	76	73	70	69	66	63	58	74
DOZER	79	77	76	74	68	67	60	59	75
TRACKED CRUSHER	93	86	79	81	75	71	66	59	82
SOIL WASHING PLANT									79

The plant and equipment used at the facility will not generate impulsive or tonal noise within the frequency range. As such, no penalty was added to the predicted operational $L_{Ar,\ 1hr}$ noise level for presence of tonal or impulsive noise.

The operational $L_{Ar,\ 1hr}$ noise prediction for each receptor location is presented in Table 7-1-3-3K below. Table 7-1-3-3K also shows the comparison between the predicted operational $L_{Ar,\ 1hr}$ noise level and the prescribed noise limit (from the EPA's NG4 guidelines) for 'all other areas' at each receptor.

Table 7-1-3-3K
Operational Noise Levels : Proposed Waste Facility

RECEPTORS	PERIOD	NOISE LIMIT $L_{A\ eq,\ 1hr}$ dB(A)	OPERATIONAL* $L_{Ar,\ 1hr}$ dB(A)	DIFFERENCE
R1	Daytime	55.0	35	-20
R2	Daytime	55.0	34	-21
R3	Daytime	55.0	33	-22
R4	Daytime	55.0	32	-23
R5	Daytime	55.0	32	-23
R6	Daytime	55.0	30	-25
R7	Daytime	55.0	37	-18
R8	Daytime	55.0	41	-14
R9	Daytime	55.0	46	-9
R10	Daytime	55.0	42	-13
R11	Daytime	55.0	38	-17

RECEPTORS	PERIOD	NOISE LIMIT $L_{A\ eq,\ 1hr}$ dB(A)	OPERATIONAL* $L_{Ar,\ 1hr}$ dB(A)	DIFFERENCE
R12	Daytime	55.0	38	-17
R13	Daytime	55.0	42	-13
Kilmacurragh Arboretum	Daytime	55.0	31	-24
Forest to North	Daytime	55.0	54	-1

* Operational Noise Level= Predicted Noise Level without a 5 dB penalty

As can be seen from the table above, the EPA NG4 daytime noise criterion limits arising specifically from waste disposal and recovery activities at Ballinclare Quarry are satisfied at all nearby noise sensitive locations.

To identify the potential impact of activities at the proposed inert landfill and materials recovery / recycling facility, the predicted $L_{Aeq,\ 1hr\ d}$B(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 7-1-3-3L below.

Table 7-1-3-3L
Cumulative Operational Noise Levels : Proposed Waste Facility

RECEPTORS	PERIOD	EXISTING BASELINE $L_{Aeq,T}$ dB(A)	OPERATIONAL $L_{Ar,\ 1hr}$ dB(A)*	CUMULATIVE $L_{Aeq,\ T}$ dB(A)	DIFFERENCE	SHORT TERM IMPACT	LONG TERM IMPACT
R1	Daytime	45	35	45	0	Negligible	Negligible
R2	Daytime	45	34	45	0	Negligible	Negligible
R3	Daytime	45	33	45	0	Negligible	Negligible
R4	Daytime	45	32	45	0	Negligible	Negligible
R5	Daytime	45	32	45	0	Negligible	Negligible
R6	Daytime	45	30	45	0	Negligible	Negligible
R7	Daytime	45	37	47	+1	Minor	Negligible
R8	Daytime	46	41	47	+1	Minor	Negligible
R9	Daytime	46	46	49	+3	Moderate	Minor
R10	Daytime	46	42	48	+2	Minor	Negligible
R11	Daytime	46	38	47	+1	Minor	Negligible
R12	Daytime	48	38	48	0	Negligible	Negligible
R13	Daytime	48	42	49	+1	Minor	Negligible

*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 short-term noise impact from recommencement of activity at Ballinclare is determined ***in a worst case scenario*** to be ***minor*** at R7 and R8, R10, R11, R13 and ***moderate*** at R9. The noise impact at all other receptors located at a greater distance is determined to be negligible.

With reference to the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA), the cumulative long-term noise impact from the landfilling and C&D waste recovery operations is determined ***in a worst case scenario*** to be ***negligible*** at all receptors but ***minor*** at R9. The noise impact at all other receptors located at a greater distance is determined to be negligible.

Due to the separation distance, the noise impact at Kilmacurragh Arboretum is assessed to be negligible.

In view of the above findings, it is considered that it is appropriate to implement a number of mitigation measures to further manage / reduce noise related impacts of plant associated with planned future waste activities at Ballinclare Quarry.

Ecological Receptors

Ecological receptors of concern are those areas designated under EU Habitats Directive (92/43/EEC). Neither the application site nor any lands immediately adjoining it are subject to any statutory nature conservation designation.

Based on the nature, size and scale of the planned development / intensification, 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 the facility 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 noise.

The nearest designated nature sites to Ballinclare Quarry are located at Glenealy Woods pNHA, approximately 1.1km away and at Deputy's Pass Nature Reserve SAC approximately 1.6km away. The operational $L_{Ar,\ 1hr}$ noise prediction for these two ecological receptor locations is presented below in Table 7-1-3-3M. The table also presents a comparison between predicted operational $L_{Ar,\ 1hr}$ noise levels and the prescribed noise limit for protection of wildlife.

Table 7-1-3-3M
Operational Noise Levels at Ecological Receptors : Proposed Waste Facility

RECEPTORS	PERIOD	NOISE LIMIT $L_{A\ eq,\ 1hr}$ dB(A)	OPERATIONAL* $L_{A\ eq,\ 1hr}$ dB(A)	DIFFERENCE
Deputy's Pass Nature Reserve SAC	Daytime	55.0	29	-26
Glenealy Woods pNHA	Daytime	55.0	26	-29

*Operational Noise Level = Predicted Noise Level without the 5 dB penalty

As can be seen from the table above, the noise criterion limits for protection of wildlife arising specifically from proposed facility activity are comfortably achieved at both of the nearest ecological noise sensitive locations.

Post Operational Phase

The post operational phase of the proposed development will include some site-based activity to establish grassland cover and decommission any remaining plant and services. Potential noise impacts associated with the remedial phase of the proposed development will be negligible.

Traffic Assessment

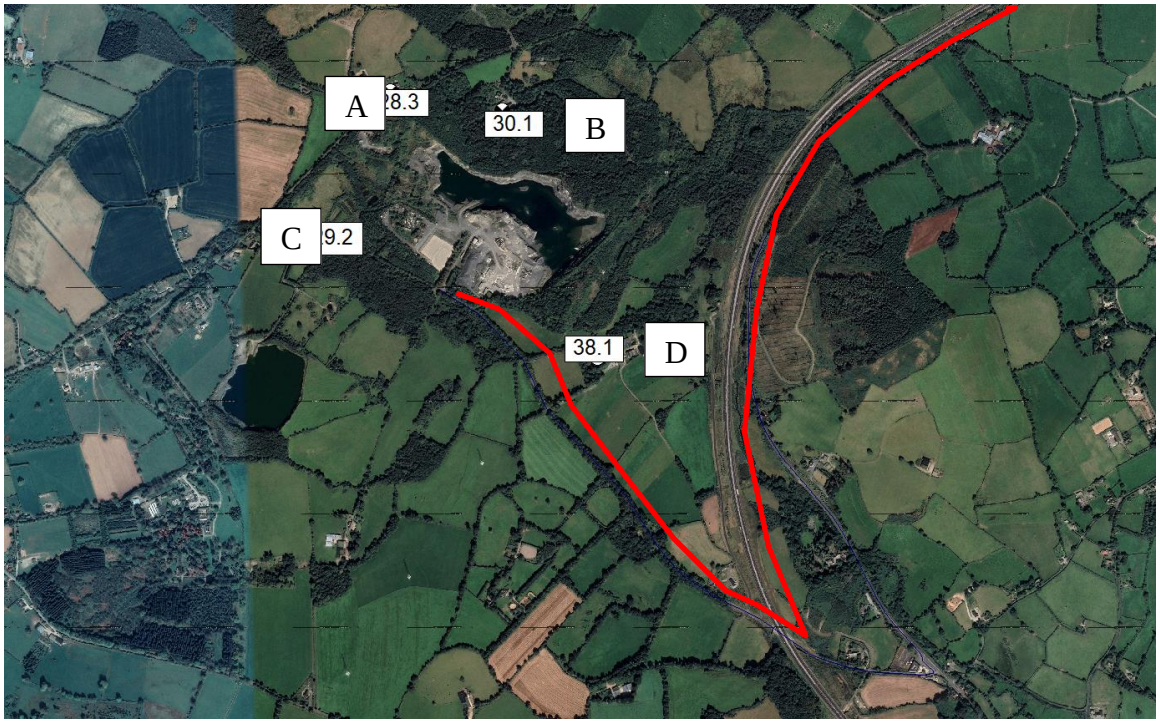
Predicted HGV Sound Levels

The sound predictions in this assessment have been undertaken using a proprietary software-based noise model, CadnaA®, which implements the full range of calculation methods. The calculation algorithms set out in BS5228-1:2009+A1:2014 have been used and the following parameters have been set:

- A ground absorption factor of 0.5 (representing hard ground);
- A reflection factor of 2;
- A line source with 30 HGV movements per hour, moving at 48km/hr;
- A HGV sound power level of 96dB(A)1;A HGV source height of 1.5m.
- A receiver height of 1.5m;
- A noise level at 3.5m from the façade of the property.

Plate 7-1-3-3A below presents the noise model in CadnaA including the re-route of the HGVs trips to and from the application site (highlighted in red) and the location of the surrounding receptor properties which have been assessed (identified as properties A to D) .

Plate 7-1-3-3A
CadnaA Traffic Modelling



Topographical data has not been taken into account. The calculated sound level of additional HGV movements at the four receptor locations assessed by modelling is shown in Table 7-1-3-3N

Table 7-1-3-3N
Calculated Noise Level of Additional HGVs, free field, dB

LOCATION	DAYTIME $L_{Aeq,T}$
(A) Residential Properties on L113 - 1	28.3
(B) Residential Properties on L113 – 2	30.1
(C) Residential Properties in Carrigmore	29.2
(D) Residential Properties in Ballinclare	38.1

Change in the Ambient Noise Level Assessment

To determine the worst-case increase in the ambient noise level at each receptor, it is necessary to logarithmically add the calculated specific sound level of the re-routed HGVs, to the ambient noise level measured during the quietest period recorded by the baseline survey. The results of this calculation and the difference between the cumulative ambient noise level and the baseline ambient noise level are also shown in Table 7-1-3-3O below.

Table 7-1-3-3O
Worst Case Increase in the Ambient Noise Level, free-field, dB

LOCATION	PERIOD	QUIETEST $L_{Aeq,T}$ NOISE LEVEL	CALCULATED $L_{Aeq,T}$ of ADDITIONAL HGVs	CUMULATIVE $L_{Aeq,T}$ NOISE LEVEL	INCREASE IN THE $L_{Aeq,T}$ NOISE LEVEL	IMPACT
(A) Residential Properties on L113 - 1	Daytime	40	28.3	40.8	0.3	Minor
(B) Residential Properties on L113 – 2	Daytime	40	30.1	40.8	0.4	Minor
(C) Residential Properties in Carrigmore	Daytime	39	29.2	40.2	0.4	Minor
(D) Residential Properties in Ballinclare	Daytime	41	38.1	45.1	1.8	Minor

As can be seen from Table 7-1-3-3O above, during the daytime, the worst-case impact is assessed as minor. This level of impact would not be considered to be significant.

Unplanned Events (i.e. Accidents)

Accidents, malfunctions and unplanned events refers to events or upset conditions that are not part of any activity or normal operation of the proposed inert waste disposal and recovery activities planned by the Applicant. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during the proposed waste activities.

Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. In terms of noise impacts, the only unplanned event likely to have an effect on the local area would be a malfunction of plant or equipment or possibly a vehicle collision. .

In relation to noise impact of any unplanned events, any are considered to be short term and negligible, with no potential to increase noise levels at sensitive receptors.

Interaction with Other Impacts

The potential impact of noise generated by the proposed waste activities on sensitive receptors including sensitive ecological receptors and people living in the area has been assessed in this Chapter of the EIAR. The impact of the proposed development activity on these receptors is further considered in Chapter 4 'Population and Human Health' and Chapter 5 'Biodiversity'.

'Do Nothing' Scenario

Given the proximity of the quarry to the local road infrastructure, ambient noise levels from road traffic are considerably elevated and will tend to dominate other noise sources. Locally, barking dogs and 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.

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 landfilling and C&D waste recovery activities at Ballinclare Quarry will have negligible to minor long-term noise impact, and in line with practice at other Kilsaran facilities, the following best practice measures will be implemented wherever practicable at the proposed inert landfill and materials recovery / recycling facility to further reduce the potential noise impact of on-site activities:

Phasing

- Landfilling / quarry backfilling operations will be carried out on a phased basis, commencing at the western side of the site (and will therefore be of limited duration and at greater distance than has been assumed for worst-case noise modelling purposes).

Screening

- Existing screening berms and screen planting around the planned facility will be retained to act as acoustic barriers. Berms and landscaping should be inspected on a regular basis and maintained and/or strengthened 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 2000/14/EC 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 should be taken when unloading vehicles to reduce or minimise potential disturbance to local residents.
- Traffic speed within the facility will be limited / controlled;
- 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 facilities has shown that by implementing these measures, typical noise levels from construction works and/or recovery operations can bring about a further small reduction of up to 5dB(A) in ambient noise levels.

RESIDUAL IMPACT ASSESSMENT

The worst-case 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 is ***negligible*** at all receptors within 500m of the application site boundary with the exception of R9, where it is assessed to be ***minor***. At all other receptors at greater distance, the noise impact is determined to be negligible.

Table 7-1-3-3P summarises the impacts and mitigation measures for operational plant noise at each of the noise sensitive receptor considered.

Table 7-1-3-3P
Residual Noise Summary Table

RECEPTORS	INCREASE IN OPERATIONAL NOISE L dB(A)	IMPACT WITHOUT MITIGATION MEASURES		MITIGATION	NOISE FROM MITIGATION $L_{Aeq, 1hr}$	INCREASE IN OPERATIONAL NOISE L dB(A)	RESIDUAL SHORT-TERM IMPACT	RESIDUAL LONG-TERM IMPACT
		SHORT TERM	LONG TERM					
R1	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R2	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R3	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R4	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R5	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R6	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R7	+1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R8	+1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R9	+3	Moderate	Minor	Required	-5	0	Negligible	Negligible
R10	+2	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R11	+1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R12	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible
R13	+1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible

Cumulative / Synergistic Impacts

In essence, cumulative impacts are those which result from incremental changes caused by past or pre-existing development or actions, together with those generated by the proposed development plus any other reasonably foreseeable development / actions. Therefore the proposed development cannot be considered in isolation but must be considered in addition to impacts already extant and/or arising from existing or planned future development.

The noise impact assessment presented herein indicates that the long-term residual noise impact from the proposed waste activities at Ballinclare Quarry is negligible at all except one local residential receptor and minor at one residential property to the north of the quarry.

A search of the www.myplan.ie website and An Bord Pleanála online planning portal was carried out to determine if there were any other planned developments in the vicinity (c. 1km radius) of the application site that have recently been granted permission or are currently under consideration and which have the potential to have a significant adverse cumulative impact on the local environment.

There is no other major planned development in the vicinity of the existing quarry at Ballinclare. Notwithstanding this, this assessment indicates that the noise impacts arising from the proposed backfilling and recovery activities are negligible to minor at all potentially sensitive receptors and as such do not have the potential to adversely increase noise levels in the local area, either on their own or in combination with other development.

MONITORING

Noise monitoring will be undertaken around the application site. Noise monitoring locations shall be reviewed and revised where and as/when necessary. The results of the noise monitoring shall be submitted to Wicklow County Council and/or EPA on a regular basis for review and record purposes following commencement of landfilling and waste recovery activities.

GROUND EMISSION IMPACTS

This waste licence application provides for the importation of inert material for landfilling / backfilling of Ballinclare Quarry using inert waste materials, predominantly imported soil and stone waste, with some particulate (soil-like) / sludge wastes.

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 existing licenced 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.

Site based personnel at the existing soil and stone waste recovery facility use toilet, hand washing and welfare facilities at on-site offices and the staff canteen located around the central infrastructure area at Huntstown and will continue to do so for the duration of backfilling and recovery activities at the South Quarry. Wastewater from these locations is collected and fed via a sewerage pipe to an on-site wastewater treatment plant (septic tank). No new or upgraded wastewater treatment facilities are required or proposed to support waste recovery activities at the South Quarry.

Experience at the existing licensed 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 arising from the backfilling of the quarry will be slight. With the long-term restoration of the quarry to grassland / agricultural use, the post-closure impact on land is assessed as minor and positive.

SURFACE WATER AND GROUNDWATER EMISSION IMPACTS

The information / noise emission impact assessment presented herein is based on that presented in Chapter 7 (Hydrology and Hydrology / Water) of the EIAR which accompanies this waste licence review application. Details of the baseline water environment and a description of the methodologies employed for the purposes of this impact assessment are presented in the EIAR .

Evaluation Methodology

The impacts on the local surface water and groundwater environment of the proposed soil and C&D waste recovery activities at Ballinclare Quarry are assessed in this section. The methodology applied here is a qualitative risk assessment methodology in which the nature of the potential impacts are described in terms of the character, magnitude, duration, probability and consequence of the impact. The description of the potential impact is screened against the significance and sensitivity of the receiving environment to determine the significance of the impact.

This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the planned development. This approach allows effort to be focused on reducing risk where the greatest benefit may result.

The following sections describe the water management system to be implemented at the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry and identifies the impacts of the proposed development on the hydrogeological environment. It also assesses the likelihood of occurrence of each identified impact in accordance with the above. It should be noted that the impacts are initially assessed with no mitigation or design measures incorporated to reduce the effects.

Proposed Water Management and Treatment Systems

Dewatering of Quarry Void

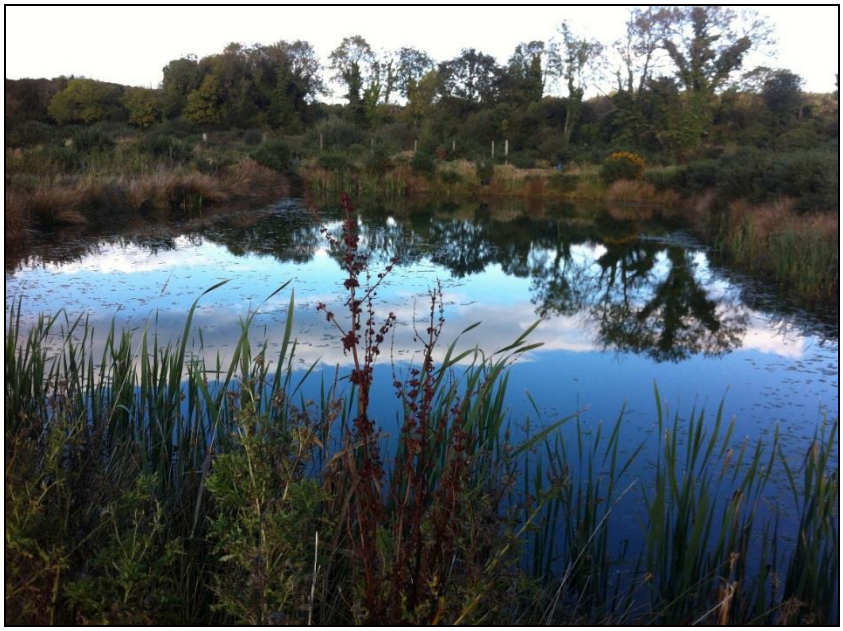
At present, the existing quarry void at Ballinclare Quarry is being dewatered and the water in it treated prior to discharge to the Potters River, as provided for by way of the existing discharge licence (Ref. WPL 116). The approved water treatment measures provide for use of the existing settlement ponds at the site, as well as a bespoke water treatment system to treat the discharge.

Due to elevated natural levels of arsenic in the water collecting in the quarry void, the discharge is being treated via a bespoke Siltbuster treatment system which also provides for the removal of suspended solids from the water (details of the Siltbuster treatment system are included in Appendix 7-J of the EIAR). Following treatment to remove the arsenic in the water, the water passes through the existing settlement lagoons for final polishing before being discharged off-site.

Photographs of two existing settlement lagoons are shown in Plate 7-1-3-3B and Plate 7-1-3-3C below.

Plate 7-1-3-3B
Existing Lagoon at Ballinclare

Plate 7 1-3-3C
Existing Final Lagoon at Ballinclare



On completion of dewatering, the Siltbuster treatment system will remain in place to continue treating off-site discharges of water from the application site as required over the life of the proposed development.

Landfill / C&D Waste : Leachate Treatment

There will be on-going generation of leachate from rainfall on the landfill over the operational life of the inert landfill facility at the application site and as a result of the containment provided by the basal and side liners, any leachate will need to be removed and treated prior to being discharged off-site.

Leachate is the name given to the slightly contaminated liquid that is generated as influent rainwater and/or groundwater flows through a waste mass, picking up soluble and particulate matter as it moves downward towards the base of the landfill. Landfill leachates have varying compositions that reflect the types of wastes at each individual site, in this case the inert soils and/or C&D materials which will be imported to site.

Based on past experience with similar inert landfill facilities, it is likely that the inert waste landfill at Ballinclare will have little or no ammoniacal nitrogen, BOD and COD in the leachate, but could have *potentially* elevated concentrations of sulphate, reduced pH and detectable concentrations of metals. In addition, as inert C&D wastes can often contain road planings and other materials associated with road repairs and construction, some hydrocarbons could also be present.

Leachate may also be generated for a period after landfilling activities have ceased. However, once landfilled areas are filled and a low permeability cap installed to reduce the infiltration of rainfall then the volume of leachate generated will be reduced significantly.

A number of potential leachate treatment and disposal options were considered for the proposed inert landfill and C&D waste recovery facilities at Ballinclare. Following a review of options it was considered that the most suitable option for treatment of a leachate which principally requires reduction of inorganic substances would be an on-site (passive) wetland treatment system.

When installed in parallel, wetland areas can be independently placed out of service to allow for remediation and replenishment of infiltration / substrate media whilst still allowing on-going treatment of leachate through the active bed. Wetland treatment systems have a low visual and amenity impact and require little on-going intervention once installed. The main drawback which can arise with wetlands is that they often require a large footprint area to treat the anticipated input volumes.

As the inert landfill / C&D waste recovery areas are not currently in existence at Ballinclare Quarry, some initial assumptions have been made about the likely quality of leachate that will be produced by the inert landfill and recovery area and the volumes that will be generated over time. Worst case scenarios have been considered both in terms of leachate quality (most problematic in terms of composition) and volume (highest generation volume).

An initial assessment indicates that there is sufficient spare land available at Ballinclare for a wetland treatment system in the western part of the site, adjacent to the planned inert landfill footprint. It is anticipated that the volumes requiring treatment at the facility will be limited by the progressive restoration of the completed landform with a low permeability capping over its operational life, this minimising the amount of leachate generated and requiring treatment.

The effectiveness of the passive wetland treatment systems can be enhanced by the temporary addition of various, more active treatment systems, such as chemical dosing, aeration or other such processes if required. This can allow a wetland system to handle higher contaminant loads or flows for periods of time (should it be necessary) before reverting back to more standard passive mode of operation, therefore providing flexibility should leachate generation rates and chemical constituents change over time.

Based on the initial assessment and design, the proposed passive wetland treatment system at Ballinclare Quarry will comprise:

i. Leachate reception tank: up to 50m^3, self-bunded storage tank with level controls.

ii. Pump will be housed is a standard shipping container (6.0m x 2.4m x 2.6m) containing feed, discharge and chemical dosing pumps;

iii. Passive wetland treatment system: comprising the following elements in series:

- Anaerobic (biochemical reactor) wetland;
- Iron Sequestering Unit (ISU);
- Aerobic wetland.

iv. Off-site discharge via existing ditch / drainage channel to Potters River.

Based on the assumption that the leachate flow rate is generated from a progressively capped inert landfill, the area of on-site wetland required at Ballinclare is assessed to be of the order of 3.8 hectares.

Landfill Groundwater Control System

Once the quarry void has been pumped dry, a groundwater control system will be installed beneath the proposed clay liner system to ensure hydrostatic uplift pressures do not damage the proposed liner system. It is envisaged that the drainage system at the base of the quarry / inert landfill will comprise a herringbone system of granular drainage channels and that these would feed groundwater to the sump at a low point on the quarry floor. Any excess water collecting in the sump (not otherwise used for soil washing or dust suppression) will be removed by pumping for treatment and off-site discharge.

To prevent damage to the clay liner system, groundwater will need to be lowered by pumping from the quarry sump until such time as any inert waste landfilling has reached a depth that overcomes the hydrostatic pressure of the surrounding groundwater table. By developing the quarry void from west to east, the existing sump in the quarry floor can be kept in use and maintained for as long as possible.

The previous experience of operating the quarry at the site is that the surrounding volcanic rock is relatively tight, with few faults or fractures and therefore relatively limited volumes of groundwater would flow through it to the quarry void. Once the quarry void is dewatered, the volume of groundwater likely to collect in the sump is expected to be low, with the bulk of any water removed comprising infiltrating rainfall and/or surface water run-off into the quarry void.

During the operational life of the landfill, the sump will remain open until Phase 3 of landfilling commences, at which point a riser pipe will be installed progressively upwards to allow a submersible pump to access the sump to lift and remove any collected groundwater and infiltrated rainfall / run-off. Pumping will continue until such time that the overlying inert waste has achieved a height where the weight of waste exceeds the maximum uplift pressure from surrounding groundwater. At that point in time, pumping of groundwater may cease and the riser pipe decommissioned.

Within the footprint of the Phase 4 landfill area, a surface water lagoon / sump will be formed at the low point of the area and infiltrated rainfall / run-off would be continually pumped until such time as the basal liner is placed across the entire area to facilitate placement of inert waste.

Soil Washing Plant

There will be no surface water / groundwater emissions or off-site discharges arising from the proposed soil washing and aggregate recovery activities at the former concrete / asphalt production yard in the south eastern corner of the application site. All process water associated with the winning of recycled aggregate from more granular waste soils or from claybound C&D will be re-circulated within a closed loop system. As such, there is no requirement to make provision for treatment for any process water associated with the activity. Top-up water will be periodically required for the plant and will be provided from the on-site water management system.

The filter cake / dewatered solids produced at the end of the aggregate recovery process will be picked up by a front-end loader and transferred via haulage truck for disposal at the adjoining lined landfill facility.

Wastewater Management

Wastewater from the site offices and staff welfare facilities is piped to an existing on-site effluent treatment system. This system, which comprises an aeration treatment unit and two modular Puraflo system over a 300mm deep gravel bed, and was previously approved by way of the recent (2016) quarry planning permission and will continue in service for the duration for the life of the proposed inert landfill and materials recovery / recycling facility (a copy of the site characterisation form and details of the on-site waste water treatment system are provided in Appendix 7-K of the EIAR).

Wheelwash

There is an existing wheelwash facility at the application site which will continue to be used over the life of the proposed facility. Water supplied to the wheelwash is recycled in a closed system and is topped up with water from the supply well or from the quarry sump as required. The wheelwash generates very little run-off and any it does either rapidly evaporates or infiltrates to ground. In order to minimise mud / sediment deposition around the weighbridge, it is also envisaged that an additional wheelwash will be installed to the rear of the maintenance shed, along the proposed egress route leading out of the facility.

Long-Term (Post Closure) Surface Water Management

Following completion of landfilling and restoration works, the wetland area at the western end of the application site will remain in-situ and allowed to naturally evolve and re-wild, with no provision being made for any active long-term maintenance. The wetland system will be retained as a wildlife feature as part of the restoration.

Post closure, the surface water management system at the landfill provides for a shallow interceptor drains (scrape or swale) to intercept surface water run-off from the restored landform and to direct it to the wetland area on the western side of the application site.

The wetland area will effectively serve as a long-term soakaway, settlement lagoon and/or attenuation pond for surface water run-off (from both the restored landfill and the restored C&D waste recovery area) prior to its discharge off-site via the established drainage network to the Ballinclare Stream.

Due to the topography of the proposed landform, it will not be possible to direct all the run-off from the restored landfill to the wetland / proposed settlement lagoon by gravity and as such, the residual, southern flank will be drained to a swale along the southern boundary that will discharge to an existing stream which flows to the Kilmacurra Stream.

Construction Stage Impacts

The potential direct and indirect impacts to surface waters and groundwater arising from the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry are discussed below. In the context of the proposed new landfill and C&D waste recovery facilities, the construction stage is taken to be site preparation which involves continued dewatering from the quarry sump (as required) and the construction of the required infrastructure and site preparation, which is outlined in Chapter 2 of this EIAR.

Direct Impacts

Groundwater

The groundwater receptors at the site consist of the good quality, poorly productive diorite bedrock aquifer and nearby domestic and agricultural local groundwater supply wells. The surface water receptor is the Potters River.

Direct impacts during the construction stage have the potential to arise from:

- The accidental leaking of fuels and other petroleum-based products (lubricating oil, greases, etc.) from plant and machinery, or the storage of such materials has potential to impact on groundwater quality aquifer. This would be an **adverse effect.**

Surface Water

The surface water receptor at the site is the Potters River. Direct impacts during the construction stage have the potential to arise from:

- The uncontrolled discharge of water from the flooded quarry void during the initial dewatering phase and potential leak of fuels and other petroleum-based products at site preparation areas has the potential to reduce water quality of the off-site discharge and impact the Potters River and its salmonid system . This would be an **adverse effect.**
- The uncontrolled discharge of water from the flooded quarry void during the initial dewatering phase has the potential to result in an increase in flood risk downstream in the Potters River. This would be an **adverse effect.**
- Fugitive dust on HGV's leaving the site has the potential to wash into watercourses. This would be an **adverse effect.**

Indirect Impacts

No indirect impacts are anticipated from the construction stage.

Operation Stage Impacts

During the operational stage the dry quarry void will be backfilled and restored using imported soil waste and C&D materials will be recovered at the proposed recovery facility. Therefore, groundwater quality and surface water discharge are the principal impacts during this stage

Direct Impacts

Groundwater

It is noted that the groundwater receptors at the site are the bedrock aquifer and local groundwater wells.

Direct impacts on groundwater during the operational stage have the potential to arise from:

- The accidental leaking of fuels and other petroleum-based products (lubricating oil, greases, etc.) from plant and machinery, or the storage of such materials has potential to impact on groundwater quality aquifer. This would be an **adverse effect.**
- Contaminants in imported soil and C&D materials have the potential to impact on groundwater quality in the aquifer. This would be an **adverse effect.**

Each of the above impacts is assessed in terms of the character, magnitude, duration, probability and consequence in Table 7-1-3-3Q below.

Surface Water

It is noted that the surface water receptor in the vicinity of the site is the Potters River in terms of surface water quality and flow volumes during flood events.

Direct impacts on surface water quality and flood flows during the operational stage have the potential to arise from:

- Any contaminants in imported soil and C&D material or accidental leaking of fuels or other petroleum based products have the potential to impact the surface water quality of the off-site discharge to the Potters River. This would be an **adverse effect;** and

- Any suspended solids in the discharge have the potential to impact on surface water quality. This would be an **adverse effect.**

Each of the above impacts is assessed in terms of the character, magnitude, duration, probability and consequence in Table 7-1-3-3Q below.

Indirect Impacts

No indirect impacts are anticipated from the operational stage.

Post - Operational Stage Impacts

Post operational stage impacts are those impacts which may occur during the final restoration of the site and following the full restoration or during the aftercare period .

Post operational stage impacts would generally be long term effects in duration.

Direct Impacts

A restoration scheme has been prepared for the application site and will be implemented in phases with the final restoration works being carried out following permanent cessation of landfilling activities, refer to Chapter 2 of this EIAR for details. The final surface of the site will be graded and subsoiling will be undertaken to improve soil drainage and functioning to promote grass growth and restore the site to grassland / scrub habitat.

During the post-operational stage, dewatering at the facility will cease and the groundwater will be allowed to rise to its natural level.

There will be no effluent discharge to any surface water course from the site following cessation of site operations. Natural storm / surface water run-off from the restored site will be directed via site drains to local watercourses; this is a natural process.

No indirect impacts are anticipated from the post-operational stage following the restoration of the site.

Indirect Impacts

There are no indirect post closure impacts anticipated.

Unplanned Events

It is considered highly unlikely that any unplanned events within the application site would result in a noticeable impact on the hydrology and hydrogeology of the local area.

The quarry void and the wider site area is not located within the floodplain of the local stream and is not therefore considered to be at risk of flooding.

Accidents at the proposed facility could result in the spillage or leak of fuels (or other petroleum-based products), which has been considered in the assessment of impacts above.

Trans Boundary Impacts

The site does not cross any international boundaries, hence transboundary impacts are disregarded for this site.

The 'Do Nothing' Scenario

If the proposed landfilling and waste recovery activities do not proceed at the application site, the bare, disturbed landform which currently exists across much of the existing site would remain unchanged, with only very slow and gradual recolonization of natural vegetation occurring over time.

In dry periods, in the absence of any site management practices, dust emissions would be likely to arise from the site on an ongoing basis and surface water bodies / groundwater would be vulnerable to impacts from any future human activities within and/or around the quarry.

Rating of Identified Potential Impacts and Significance

The potential impacts outlined above during the construction and operational stages have been described in terms of the character, magnitude, duration, probability and consequence, and each impact is rated in terms of High, Medium, Low and Negligible based on the magnitude, extent, duration and consequence of the identified effects.

The description of the potential effects and rating for each identified impact is presented in Table 7-1-3-3Q below.

The significance of impacts is based on the significance/ sensitivity of the existing environment and the description of identified potential impacts, refer to Table 7-1-3-3Q below. .

Table 7-1-3-3Q
Direct Impacts: Description and Significance of Impact

	Potential Impacts	Character	Magnitude	Duration	Probability	Consequences	Description of Impact	Significance of Impact
Construction Stage: Groundwater								
1	Impact on groundwater from **accidental fuel leakage/ spillage**	Potential to affect groundwater quality in underlying bedrock aquifer. Vertical migration in the bedrock aquifer will be impeded by the bedrock at the site which hosts a poor aquifer.	Size and scale depend on volume of any fuel leaked. Extent in the bedrock aquifer would be limited by the nature of the bedrock.	Duration of effect would be temporary to short-term. Frequency would be non-occurring to rarely.	Unlikely as any leakage/ spillage would be accidental only	Reduction in groundwater quality in underlying bedrock aquifer	The potential impact on groundwater is rated as being **Medium** based on the character, magnitude, duration and consequence of the identified effects.	**Moderate**
Construction Stage: Surface Water								
2	Impact on **surface water quality** in the Potters River during the initial dewatering phase of the quarry void **or accidental leaking of fuels or other petroleum based products**	Potential to affect surface water quality in the Potters River, and impact on salmonid system.	Extent in the river would be downstream of the discharge point. With groundwater contaminants, size and scale would depend on the flow and resultant Assimilative Capacity of the river. With fuel leaks, size and scale of impact depend on volume of leaked	Duration of effect would be temporary (duration of construction stage dewatering). With groundwater contaminants, frequency would be constant during the dewatering phase. With fuel leaks, frequency would be non-occurring to rarely	With groundwater contaminants, likely as the water in the quarry void will be discharged to the river With fuel leaks, unlikely as any leakage/ spillage would be accidental only	Reduction in surface water quality in the river	The potential impact on surface water quality is rated as being **Medium** based on the character, magnitude, duration and consequence of the identified effects.	**Moderate**
3	Impact on **surface water flow/levels** in the Potters River during the initial dewatering phase of the quarry void. There are no sensitive flood receptors along the Potters River other than agricultural land	Potential to affect surface water levels and increased flood risk in the Potters River.	Extent in the river would be downstream of the discharge point. Size and scale would depend on the flood flow / capacity in the river channel.	Duration of effect would be temporary (duration of construction stage dewatering). Frequency would be constant during the dewatering phase.	Likely as the water in the quarry void will be discharged to the river	Increased flood risk to lands further downstream in the river	The potential impact on surface water levels is rated as being **Low** based on the character, magnitude, duration and consequence of the identified effects.	**Slight**
Operational Stage – Groundwater								
4	Impact on groundwater quality from **accidental fuel leakage/ spillage**	Potential to affect groundwater quality in underlying bedrock aquifer. Vertical migration in the bedrock aquifer will be impeded by the bedrock at the site which hosts a poor aquifer.	Size and scale depend on volume of any fuel leaked. Extent in the bedrock aquifer would be limited by the nature of the bedrock.	Duration of effect would be temporary to short-term. Frequency would be non-occurring to rarely.	Unlikely as any leakage/ spillage would be accidental only	Reduction in groundwater quality in underlying bedrock aquifer	The potential impact on groundwater is rated as being **Medium** based on the character, magnitude, duration and consequence of the identified effects.	**Moderate**

	Potential Impacts	Character	Magnitude	Duration	Probability	Consequences	Description of Impact	Significance of Impact
5	Impact on groundwater quality from **contaminants in rogue loads of imported material and / or C&D material**	Potential to affect groundwater quality in underlying aquifer and supply wells through horizontal migration. The vertical migration in the bedrock aquifer will be impeded by the bedrock at the site which hosts a poor aquifer.	Size and scale depend on volume and nature of the rogue imported material. Extent in the aquifer will be limited by the nature of the aquifer which is classified a poor aquifer. .	Duration of effect could be temporary to long term depending on the nature and volume of rogue material imported. Frequency would be non-occurring to rarely.	Unlikely as intake material is inert, would only be accepted from sites where prior land-use / history is known and / or has been tested at source	Reduction in groundwater quality	The potential impact on groundwater is rated as being **High** based on the magnitude, extent, duration and consequence of the identified effects.	**Moderate to Slight**
Operational Stage: Surface Water								
6	Impact on surface water quality in the Potters River from **contaminants in rogue loads of imported soil / C&D materials or accidental leaking of fuels or other petroleum based products**	Potential to affect surface water quality in the Potters River, and impact on salmonid system.	Extent in the river would be downstream of the discharge point. With waste contaminants, size and scale would depend on the flow and resultant Assimilative Capacity of the river. With fuel leaks, size and scale of impact depend on volume of leaked	With waste contaminants, duration of effect could be temporary to long term depending on the nature and volume of rogue material imported. With fuel leaks, frequency would be non-occurring to rarely	With waste contaminants, unlikely as intake material would only be accepted from sites where the prior land-use history is known With fuel leaks, unlikely as any leakage/ spillage would be accidental only	Reduction in surface water quality	The potential impact on surface water quality is rated as being **High** based on the magnitude, extent, duration and consequence of the identified effects.	**Significant to Moderate**
7	Impact on surface water quality in the Potters River from **suspended solids in discharge**	Potential to affect surface water quality in the Potters River, and impact on salmonid system.	Extent in the river would be downstream of the discharge point. Size and scale would depend on the flow and resultant Assimilative Capacity of the River.	Duration of effect could be long term. Frequency would be occasional.	Likely as the material imported an managed will be mainly particulate / soil	Reduction in surface water quality	The potential impact on surface water quality is rated as being **Medium** based on the magnitude, extent, duration and consequence of the identified effects.	**Moderate**
Post Closure Stage : Surface Water								
8	Impact on surface water quality in the Potters River from **suspended solids in runoff from restored landform**	Potential to affect surface water quality in the Potters River, and impact on salmonid system.	Extent in the river would be downstream of the discharge point. Size and scale would depend on the soil erosion at the site before the grass vegetation cover had been established.	Duration of effect could be short term. Frequency would be occasional.	Likely if final restoration occurs in autumn / winter when there is no grass growth.	Reduction in surface water quality	The potential impact on surface water quality is rated as being **Medium** based on the magnitude, extent, duration and consequence of the identified effects.	**Moderate**

Description of Likely, Significant Effects: Summary

A summary of those impacts which have been identified as having a likely, significant effect is provided in Table 7-1-3-3R below. Only one potential impact has been identified as having a likely, significant effect:

- Potential impact on surface water quality in the Potters River from contaminants in rogue loads of imported soil / C&D materials or accidental leaking of fuels or other petroleum based products (Impact 6).

Table 7-2-3-3R
Summary Description of Identified, Likely Significant Effects

Effects	For each identified *likely, significant* effects
Magnitude and spatial extent of the effects	• The identified receptor is the Potters River (Surface Water); • Rogue contaminated material could impact on water quality; and • The extent in the potential impact would be downstream from the discharge point to the river.
Nature of the Effects	• The effects will result in a reduction in surface water quality in the Potters River • The potential effect will be adverse.
Transboundary nature of the Effects	• There are no transboundary effects associated with the proposed development.
Intensity and complexity of the Effects	• The significance / sensitivity is of the Potters River is its water quality.
Probability of the Effects	• The probability of the effects is considered to be unlikely as intake materials will be inert, will only be accepted from sites where the prior land use history is known and / or the material has been tested.
Expected onset, duration, frequency and reversibility of the Effects	• The expected onset is during the operational phase; • The duration of effect would be temporary to long-term. • Frequency would be non-occurring to rarely; and • Effects would be reversible with remediation.
Cumulation of the Effects with the Effects of other existing and/or approved projects	• There are no cumulative effects identified with the proposed development.
Possibility of effectively reducing the Effects	• The potential impact on the river water quality can be mitigated at the site and this will reduce the significance of the impact on water quality.

MITIGATION MEASURES

Proposed mitigation measures to reduce the potential impacts associated with the proposed development to acceptable levels with a low risk to the receiving environment, are identified in this section. 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.

Some mitigation measures were previously / are currently in place at the existing quarry to prevent any reduction in the quality of the local aquatic environment. These measures are in accordance with the "best practice / possible remedial measures" set out in Chapter 3.4 of the DoEHLG (2004) Quarries and Ancillary Activities: Guidelines for Planning Authorities.

The measures outlined below are designed to mitigate any adverse impacts on surface water and groundwater identified here through the sequential approach of:

(i) Avoidance;
(ii) Prevention;
(iii) Reduction; and
(iv) Remedy / Offsetting.

The majority of mitigation measures identified here seek to avoid, prevent and reduce any adverse impacts on surface water and groundwater.

Construction Stage

The following measures will be implemented at the site to prevent leaks and/or spills, these are mitigation by **prevention**:

- The discharge water to the Potters River will comply with the conditions in the discharge licence;
- The discharge water will continue to be treated in the on-site (Siltbuster) treatment plant and will pass through the existing settlement lagoons / attenuation pond at the site;
- No refuelling of plant / machinery, maintenance or repairs will take place in the quarry void to prevent accidental spillages reaching the ground or being washed off in surface water;
- A refuelling pad with connection to hydrocarbon separator is provided at the application site, beside the workshop. All mobile plant and machinery refuelling will take place on the refuelling pad.
- Drip trays will be used for all refuelling activities;
- All plant / machinery maintenance and repairs will take place under cover in the existing workshop at the site or on the hardstand refuelling pad;
- All plant will be regularly maintained and inspected daily for leaks of fuels, lubricating oil or other contaminating liquids;
- Fuel storage will continue at the existing bunded storage facility at the site;
- All petroleum-based products (lubricating oils, waste oils, etc.) will be stored on drip trays under cover in the workshop to prevent pollution due to accidental leakages;
- Waste oil and grease containers will be stored under cover in the workshop. Waste containers will be collected and disposed of by a suitably licenced contractor;
- An emergency spill response kit (with containment booms, absorbent materials and drip tray) will be provided on-site to contain/ stop the migration of any accidental spillages, should they occur;

- 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;
- Regular visual inspection and testing will be undertaken of the integrity of tanks, drums, bunded pallets and double skinned containers;
- Traffic management systems at the site will reduce potential conflicts between vehicles, and the potential risk of collisions and associated fuel spills or oil leaks; and
- Site speed limits will be implemented across the site to further reduce the likelihood and significance of collisions and the possibility of a fuel leak from such a collision.

Water Management Systems

Water in the quarry void will continue to be pumped to the existing (Siltbuster) treatment plant and will then flow through the existing settlement / attenuation ponds for further treatment (settlement) prior to discharge at the Potters River. Should the capacity of the existing settlement ponds be exceeded then additional ponds will be constructed.

All surface water discharges to the Potters River will comply with the emission limits set by the discharge licence (or those which may supersede them in any waste licence issued by the EPA).

The volume of water discharged from the site compared to flood flows in the Potters River is negligible and therefore the discharge water will not result in increased flood risk in the river.

Operational Stage

The proposed mitigation measures outlined above for the construction stage will also be implemented for the operational stage particularly in relation to accidental fuel leaks and spillages of any hydrocarbons and the settlement / attenuation ponds for the removal of suspended solids.

The following additional mitigation measures will also be implemented:

Inert Landfill Liner

Suitable uncontaminated natural, undisturbed soil waste and/or soil by-product (i.e. non-waste) which conforms to an engineering specification will be imported for re-use in the construction of the 1m thick basal and side clay liners required for the inert landfill at the application site. This clay liner will be of sufficiently low permeability (less than or equal to $1x10^{-7}$m/s) to provide an appropriate level of protection to groundwater and the surrounding aquifer, in line with accepted inert landfill design standards (and current legislative requirements).

On-site Passive Wetland Treatment System

A separate drainage system will be provided to reduce pressures and dewater groundwater beneath the basal liner. Dewatered groundwater / storm water run-off collecting in the quarry sump and (separately) surface water run-off in contact with inert waste materials (leachate) from the inert landfilling activities will be collected and pumped up to the approved (Siltbuster) treatment plant and from there to the proposed on-site (passive) wetland treatment system before being discharged off-site to the Potters River. The sizing and design of the wetland treatment system has been developed having regard to the likely contaminants (and concentrations thereof) which could be present in the inert soil / C&D waste intake source from construction sites.

The effectiveness of the proposed wetland treatment systems can be enhanced by the temporary addition of various, more active treatment systems, such as chemical dosing, aeration or other such processes. This can allow a wetland system to handle higher contaminant loads or flows for periods of time (should it be necessary) before reverting to more standard (passive) modes of operation,

therefore providing flexibility should leachate generation rates and chemical constituents change over time.

Based on the initial assessment and design, the proposed wetland treatment system at Ballinclare Quarry will comprise the existing approved treatment system plus

(i) A leachate reception tank : up to 50m^3, self-bunded storage tank with level controls.

(ii) A pump house : housed is a standard shipping container (6.0m x 2.4m x 2.6m) containing feed, discharge and chemical dosing pumps;

(iii) A wetland treatment system: comprising the following elements in series

- (a) Anaerobic (biochemical reactor) wetland;
- (b) Iron Sequestering Unit (ISU);
- (c) Aerobic wetland.

(iv) Off-site discharge via existing ditch / drainage channel to the Ballinclare Stream and the Potters River further downstream.

Testing and Inspection of Imported Material

Only materials carried by authorised waste collectors will be accepted at the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry. All waste intake and acceptance will be subject to regulation and control by way of any EPA Waste Licence issued in respect of the proposed facility.

Insofar as practicable, the source of each large consignment of soil imported to site for landfilling purposes shall be identified in advance and subject to basic characterisation testing to confirm that it is inert according to the criteria set by Council Decision 2003/33/EC. Ideally, characterisation testing will be undertaken in advance by customers, clients or sub-contractors forwarding soil and stone backfill materials to the application site.

Operating procedures at the proposed facility will require all wastes forwarded for landfilling and/or recovery purposes to be pre-sorted at source, inert and free any non-hazardous / hazardous domestic, commercial or industrial wastes. Any waste consignment arriving at the facility with such wastes intermixed with it will be deemed unacceptable for acceptance at the facility on the basis of a CCTV / visual inspection at the weighbridge and will be immediately rejected and re-directed off-site to an authorised (ie. permitted or licensed) waste facility.

All inert soil and stone imported to the facility will be unloaded (end-tipped) from trucks at the active landfill area. In addition to visual / CCTV inspection at the weighbridge(s), it will be inspected again by site based personnel to ensure that there is no non-hazardous or hazardous waste intermixed with it. Should any intermixed, non-inert waste be identified at this point, the entire consignment will be rejected and reloaded back onto the HGV / tipper truck and the haulier directed to remove it off-site to an authorised waste facility.

Similarly, should any non-inert or non-C&D waste be identified amongst incoming waste consignments at the C&D waste recovery areas, the entire waste consignment will also be rejected and reloaded onto the HGV / tipper truck and the haulier directed to remove it off-site to an authorised waste facility.

Waste Quarantine and Compliance Testing

Any soil and stone waste and C&D material which is accepted for intake to the facility but is subsequently suspected to be non-compliant with agreed waste acceptance criteria will be re-loaded onto HGV trucks and transferred to the waste inspection and quarantine facility for closer examination and/or testing.

It is proposed to designate the existing shed to the east of the weighbridge as the on-site waste inspection and quarantine facility. The shed is roofed, closed on all four sides and has a concrete floor, thereby protecting any quarantine material from incident rainfall and avoiding the potential to generate (suspect) contaminated surface water run-off (and a requirement for separate wastewater collection and storage infrastructure).

A representative sample will be taken (in line with any waste licence requirements) of the inert soil accepted and placed at the facility for compliance test purposes. This data shall be used to confirm that the accepted soil intake is inert and complies with acceptance criteria.

Post – Operational Stage

The proposed mitigation measures outlined above for the construction and operational stages will also be implemented for the post-operational stage while site infrastructure is being decommissioned and the final landscaping works are being undertaken to restore the site to a grassland / scrub habitat.

In addition, appropriate seasonal timing of site restoration works, soil subsoiling and grass seeding will reduce the any adverse impacts of soil erosion across the site.

Mitigation Measures - Summary

Taken together, the measures outlined here for the pre-construction, construction and post-construction stages will reduce the identified potential impacts:

Construction Stage -

- **Impact 1 - Groundwater:** impact of accidental fuel leakage / spillage 'moderate' to '**not significant**';
- **Impact 2 - Surface Water:** impact on water quality from 'moderate' to '**not significant**';
- **Impact 3 - Surface Water:** impact on water quality from 'moderate' to '**not significant**';

Operational Stage -

- **Impact 4 - Groundwater:** impact of accidental fuel leakage / spillage 'moderate' to '**not significant**';
- **Impact 5 - Groundwater:** impact of contaminants in rogue loads of imported material 'moderate to slight' to '**imperceptible**';
- **Impact 6 - Surface Water:** impact on water quality from 'significant to moderate' to '**not significant**';
- **Impact 7 - Surface Water:** impact of suspended solids on water quality from 'moderate' to '**not significant**';

Post Operational Stage -

- **Impact 8 - Surface Water:** impact of suspended solids on water quality from 'moderate' to '**not significant**';

The one adverse impact which was identified as having a potentially ***likely, significant effect*** (Impact No. 6), with mitigation measures in place at the site will be reduced to '**not significant**'.

RESIDUAL IMPACT ASSESSMENT

Examination of the identified potential impacts on the receiving environment, provided the appropriate identified mitigation measures are put in place, then there are no significant residual

impacts with respect to groundwater and/or surface water during the construction, operational or post-construction stages of the proposed development.

It is therefore considered that with the implementation of the mitigation measures outlined above, the proposed development will not result in any likely, significant effects on groundwater and/or surface water.

MONITORING

Surface water monitoring will be undertaken in line with the conditions set out in the Discharge Licence for the site (or any variation thereto required by an EPA waste licence).

The following programme of groundwater monitoring will be implemented by the Applicant at the application site (subject to review and approval by the EPA in its determination of an application for a waste licence):

- Groundwater levels will be monitored at each of the 3 existing wells (designated GW1, GW2 and GW3) on a monthly basis;
- Selected groundwater quality testing will be undertaken on samples recovered from the 3 No. groundwater monitoring wells on a quarterly basis, and;
- More detailed groundwater quality testing (to include metals and a number of specified hazardous substances) will be undertaken on an annual basis.

Test results will be maintained on site and will be furnished to the EPA as required by conditions attaching to any future waste licence.

An updated well survey will be carried out within 2km of the application site, and selected downgradient wells will be monitored. The selected wells will have groundwater quality sampling undertaken prior to works commencing and at least biannually during the construction and operational phases.

The groundwater monitoring regime will remain in place for the life of the proposed landfilling and recovery operations and for a limited closure and aftercare period thereafter.

POTTERS RIVER

1000m

500m

BALLINCLARE STREAM

QUARRY

EXISTING SITE ENTRANCE

L1157 LOCAL ROAD

KILMACURRAGH ARBORETUM

BARNDARRIG GAA

WICKLOW CO. CO. COMPOUND

N1

N2

N3

R772 REGIONAL ROAD

M11 MOTORWAY

1 km

POTTERS RIVER

Church (Site of)

0 100 200 300 400m 600 800 1000

Metres 1:10,000

N

NOTES

1. EXTRACT FROM ORDNANCE SURVEY 1:2,500 / 1:5,000 MAP SERIES: 4077-D, 4078, 4078-D, 4079-C, 4136, 4137, 4137-B, 4137-D, 4138-A & 4138-C

2. ORDNANCE SURVEY IRELAND LICENCE NO. CYAL50248253 (C) ORDNANCE SURVEY IRELAND/ GOVERNMENT OF IRELAND

LEGEND

- LANDHOLDING BOUNDARY (c. 36 Ha. / 89 acres)
- PLANNING APPLICATION AREA (c. 32.5 Ha.)
- INERT WASTE LANDFILL FOOTPRINT (c. 17.0 Ha.)
- 500m & 1km DISTANCE OFFSETS FROM BOUNDARY
- RESIDENTIAL RECEPTORS
- COMMERCIAL RECEPTORS
- 002274 - DEPUTY'S PASS NATURE RESERVE SAC
- 001756 - GLENEALY WOODS pNHA
- R772 REGIONAL ROAD
- LOCAL ROAD NETWORK
- ACCESS TRACKS
- 220kV ELECTRIC OVERHEAD LINE
- RIVER / STREAMS
- N1 NOISE MONITORING LOCATIONS

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KILSARAN CONCRETE

WASTE LICENCE APPLICATION

BALLINCLARE QUARRY RESTORATION & INERT WASTE & C+D WASTE RECOVERY FACILITY KILBRIDE (N11), CO. WICKLOW

NOISE MONITORING LOCATIONS

FIGURE 7-1-3-3A

Scale	Date
1:10,000 @ A3	JULY 2022

00036.00080.0.16.Figure 7-1-3-3A.Noise Monitoring Locations.dwg

POTTERS RIVER

BALLINCLARE STREAM

EXISTING SITE ENTRANCE

L1157 LOCAL ROAD

R772 REGIONAL ROAD

M11 MOTORW

KILMACURRAGH ARBORETUM

BARNDARRIG GAA

QUARRY

D1 WICKLOW CO. CO. COMPOUND

D2

D3

1000m

500m

1 km

Metres 1:10,000

0 100 200 300 400m 600 800 1000

N

NOTES

1. EXTRACT FROM ORDNANCE SURVEY 1:2,500 / 1:5,000 MAP SERIES: 4077-D, 4078, 4078-D, 4079-C, 4136, 4137, 4137-B, 4137-D, 4138-A & 4138-C

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- R772 REGIONAL ROAD
- LOCAL ROAD NETWORK
- ACCESS TRACKS
- 220kV ELECTRIC OVERHEAD LINE
- RIVER / STREAMS
- D1 DUST MONITORING LOCATIONS

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KILSARAN CONCRETE

WASTE LICENCE APPLICATION

BALLINCLARE QUARRY RESTORATION & INERT WASTE & C+D WASTE RECOVERY FACILITY KILBRIDE (N11), CO. WICKLOW

DUST MONITORING LOCATIONS

FIGURE 7-1-3-3B

Scale: 1:10,000 @ A3

Date: JULY 2022

00036.00080.0.16.Figure 7-1-3-3B.Dust Monitoring Locations.dwg