1 December 2017

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Environmental Licensing Programme,
Office of Environmental Sustainability,
Environmental Protection Agency,
PO Box 3000,
Johnstown Castle Estate,
Co. Wexford.

Our Ref : 501.00180.00109
Your Ref : W0293-01

Re: Waste Licence Application for Soil Recovery Facility and Backfilling of Calary Quarry, Killough Upper, Kilmacanogue, Co. Wicklow (Waste Licence Ref. No. W0293-01). Response to Article 12 Compliance Notice dated 5th September 2017

This submission is made in response to an Article 12 Compliance Notice dated 5th September 2017 issued by the Environmental Licensing section of the EPA Office of Environmental Sustainability in respect of the waste licence review application by Roadstone Ltd. (Ref. W0293-01) to backfill and restore the existing void at Calary Quarry through the importation and recovery of 3,280,000 tonnes of inert soil, stone and rock waste. This response, prepared by SLR Consulting Ireland, addresses the queries raised in the order presented in the letter of 5th September last.

RESPONSE TO ARTICLE 12 COMPLIANCE NOTICE

1. WASTE RECOVERED AT FACILITY TO DATE

State the type and amount of waste, in tonnes, that has been deposited at the facility to date. Indicate on a sketch or existing map the location of the deposited waste.

Inert soil and stone waste was imported and placed at the southern end of Calary Quarry between September 2007 and July 2009 in order to provide for progressive restoration and regrading of the worked-out quarry side slopes. This waste activity, which comprised recovery of inert soil and stone through deposition on land, was controlled and regulated by way of a waste recovery permit (Ref. ESS/15/8/12) issued by Wicklow County Council in September 2007 (under the 1998 Waste Permit Regulations).

The permit allowed a maximum of 50,000 tonnes of soil and stone waste per annum to be imported for recovery at the quarry, equivalent to a maximum of 150,000 tonnes over the (then) 3 year lifespan of the waste recovery permit.

Following the enactment of the *Waste Management (Waste Facility Permit and Registration) Regulations in 2007*, the total waste intake to a permitted recovery facility was restricted to a total of 100,000 tonnes unless the operator applied to the EPA for a waste licence. In the event, Roadstone elected not to make a waste licence application and the facility eventually closed in July 2009, by which time its waste intake was estimated to have reached 100,000 tonnes. A sketch showing the location and extent of the recovered soils at the southern end of the quarry void is provided in Attachment A.

2. WASTE PERMIT AND ANNUAL REPORTS

Provide a copy of a waste facility permit (Ref No. EES/15/8/12) and associated Annual Environment Reports.

A copy of the waste permit issued by Wicklow County Council in September 2007 (Ref ESS/15/8/12) was previously provided in Attachment B3 of the Waste Licence Application. An additional copy is provided under cover of this submission as Attachment B.

A copy of the 3 No. Annual Environmental Reports submitted to Wicklow County Council in respect of activities at the waste recovery facility in the calendar years 2007, 2008 and 2009 are also provided under cover of this submission, in Attachment C.

3. IMPACT ON GROUNDWATER

Given that waste has been deposited in the quarry void, provide evidence in the form of groundwater sampling and analysis that no groundwater pollution has been caused. (It is noted that groundwater sampling analysis was last completed in 2005).

As was noted in Chapter 6 of the EIS, the groundwater wells at Calary Quarry were believed to be blocked or no longer intact. A site visit undertaken on foot of the Agency's request for more recent groundwater quality data established that it would not be possible to obtain a groundwater sample from any of the former supply boreholes or groundwater monitoring wells at the quarry. In order to provide the necessary information in respect of the potential impacts of former waste recovery activities at the quarry, it was therefore decided to install a replacement groundwater monitoring well immediately adjacent to the former water supply borehole at GW2, in the south-western corner of the recovery facility, immediately west and down hydraulic gradient of the soil and stone waste placed at the southern end of the quarry and up-gradient of the R755 Regional Road.

The groundwater well at GW2 was drilled and developed in late September and October 2017. The well is 91.5m deep and constructed almost its full length in bedrock. The well screen section (groundwater monitoring zone) extends from approximately 14m depth to the bottom of the well. A well construction record is provided in Attachment D of this submission, together with a plan showing the well location in Figure A.

Well GW2 was subsequently sampled by personnel from SLR in November 2017 and samples forwarded for testing at ALS Laboratories, an independent accredited test laboratory based in Deeside in the UK. As the surface water ponding on the quarry void comprises a mix of groundwater and surface water run-off and is in contact with the body of soil and stone waste, it was decided that it would also be worthwhile to undertake a further round of surface water sampling (2 No.) to confirm the original assessment of water quality in the pond presented in the EIS submitted in support of the planning and waste licence applications for the waste recovery facility.

Copies of the certified test results for the groundwater and surface water samples taken at Calary Quarry are presented in Attachment D, together with spreadsheets summarising the findings of screening assessments against recognised water quality standards (where available).

The results of the groundwater quality testing of the sample from well GW2 indicates that the groundwater at Calary Quarry complies with the environmental quality standards set by the *European Communities (Environmental Objectives) (Groundwater Regulations 2010* (S.I. No 9 of 2010) and the chemical quality standards set by the *Drinking Water Regulations 2014 (S.I. 122 of 2014).* The groundwater quality also complies with the EPA Interim Guideline Values (IGV) for groundwater, with the exception of chloride, where the measured concentration of 50mg/l compares to an environmental quality standard (IGV) of 30mg/l.

The test results suggest that there is some faecal contamination of the local groundwater body beneath the quarry (measured at 10 CFU/100ml) as well as the presence of some e-coli (measured at 18 CFU/100ml). It is considered that the only plausible explanation for the presence of faecal coliforms and e-coli in the area is sheep grazing and/or slurry spreading across the higher ground around the Sugar Loaf mountain, up-gradient of the application site.

The results of the surface water quality tests from the pond are compliant with the *European Communities (Environmental Objectives) (Surface Water Regulations 2009* (S.I. No 272 of 2009) and the *Drinking Water Regulations 2014 (S.I. 122 of 2014).*

4. DOWN-GRADIENT MONITORING WELLS

State which of the existing or proposed new groundwater monitoring wells can or will be used to represent the down-gradient water quality.

As noted in the response to Item 3 above, all pre-existing water supply and groundwater monitoring wells at the application site are either blocked or no longer intact. A replacement well for the former supply well at GW2 has already been installed and it is envisaged that this will be maintained in service for monitoring of groundwater quality down-gradient of the inert waste body if and when a waste licence is issued in respect of the proposed recovery facility at Calary Quarry.

At the present time, it is envisaged that a replacement well for the former supply well at GW3, within the proposed site infrastructure area, will also be used to monitor groundwater quality down-gradient of the waste body.

At least one, and possibly two, additional new groundwater monitoring wells (provisionally designated GW4 and GW5) are to be located as close as is physically possible to the existing eastern face of the quarry to facilitate monitoring of groundwater quality up-gradient of the waste body. The provisional locations of these wells are indicated in Figure A, a copy of which is provided in Attachment D.

All of the groundwater monitoring wells at the proposed recovery facility will be drilled into existing, undisturbed in-situ rock, to sufficient depth to intersect the groundwater table below the quarry floor after it has been drawn down to facilitate importation and placement of the soil and stone waste.

5. COMPLIANCE OF WASTEWATER / EFFLUENT TREATMENT SYSTEM

State whether the on-site sanitary effluent treatment system will comply with EPA Code of Practice Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. <10) or other relevant guidance.

A Puraflo Effluent treatment System was supplied and installed by Bord na Mona at Calary Quarry in September 2003. When operational, liquid effluent from the septic tank is intermittently pumped to the Puraflo treatment modules where it is treated by a combination of biological, chemical, and physical processes as it filters through peat fibre media (principally filtration, absorption, adsorption, ion exchange, microbial assimilation). The treated effluent from the Puraflo modules is dispersed into the surrounding ground through a percolation area.

The location of the septic tank and the 'Puraflo' effluent treatment module are indicated on Figure 2.2 and Figure 2.3 of the Environmental Impact Statement submitted in support of the waste licence application.

Details of the Puraflo wastewater treatment system installed at Calary Quarry are provided in the cost estimate issued by Bord na Móna to the (then) quarry manager in April 2002, a copy of which is provided in Attachment E. As can be seen, the system provided sufficient wastewater treatment capacity for a population equivalent (p.e.) of up to 10 people working on an open industrial site, with

an overall treatment capacity of 400 litres per day or 250 grams of BOD per day. The available treatment capacity complied with published EPA guidance in place at the time the system was installed.

Proprietary details of the Puraflo system and an outline drawing of the wastewater treatment system constructed at the quarry, including construction details for the percolation area providing for the discharge of the treated effluent into the underlying rock are also provided in Attachment E, together with a copy of a completion certificate provided by Bord na Móna following installation of the treatment system at the quarry in September 2003.

The EPA Code of Practice for Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. < 10) requires on-site wastewater treatment systems to have a minimum septic tank capacity of $3m^3$ for a population equivalent of 2 to 5 people. The existing septic tank at Calary Quarry, with a capacity of $4m^3$ readily complies with this requirement.

As there are expected to be no more that 3 or 4 full time staff present at the waste recovery facility once it is fully operational, the treatment capacity available from the on-site Puraflo system corresponds to approximately 100 litres per person per day and 62 grams of BOD per person per day. As regards the hydraulic loading of the treatment system, given that there will be minimal requirement for water for cooking and washing purposes, it is likely that wastewater generation at the recovery facility will be significantly below the available capacity of 100 litres per person per day and that the available treatment capacity will be sufficient for planned waste recovery facility.

The Puraflo treatment system is sized to produce a treated effluent with a BOD of less than 15mg/l, suspended solids of less than 15mg/l and a nitrate concentration (as NO_3) of less than 20mg/l (as indicated on the proprietary information sheet). The quality of the treated effluent would therefore be expected to comply with the minimum performance standards for on-site wastewater treatment systems of 20mg/l BOD, 30mg/l of suspended solids and 20mg/l NO_3 set out in Table 5.1 of the EPA Code of Practice.

It is understood that the Puraflo wastewater treatment system was regularly maintained when it was previously in operation at the quarry between 2003 and 2010 and that it functioned well, without any undue difficulties. The septic tank was emptied following suspension of quarrying activity in 2010 and has not been used since. It is envisaged that the existing wastewater treatment system will be recommissioned if and when a waste licence is issued in respect of the proposed soil waste recovery facility at Calary Quarry.

6. SETTLEMENT POND DIMENSIONS

State the dimensions of the proposed settlement pond and the clearwater pond shown on Figure 6-5 dated May 2016. State the design objectives regarding flow velocity and removal of deposited sediment.

There are two distinct water management phases at the proposed waste recovery facility. The first phase entails dewatering the quarry void prior to commencement of recovery activities in order to facilitate working in the dry and backfilling upwards from the quarry floor. The second phase deals with the management of surface water run-off during the backfilling process.

The response outlined below was previously advised to Wicklow County Council in January 2017 on foot of a request for further information in respect of the planning application for the recovery facility. Details of the existing (baseline) water quality in the ponded quarry void are presented, together with details on the sizing of the settlement ponds, the rate of pumping and retention times during the dewatering and active backfilling phases. The response was informed by discussions with, and feedback provided by, officials from the Environment Department of Wicklow County Council in December 2016.

PHASE 1 : INITIAL QUARRY DEWATERING

Settlement Ponds

It is proposed to install two secondary settlement ponds at the proposed recovery facility at Calary Quarry to treat waters being discharged off-site. All water to be discharged will be passed through the ponds during dewatering to aid its final treatment. Details of the secondary pond sizing indicated on the drawings submitted with the waste licence application are as follows :

- Pond 1 (14m x 5m x 1.5m depth) provides 105m^3; and
- Pond 2 (8m x 4m x 1.5m depth) provides 48m^3.

The total settlement pond size is 153m^3 and this provides for final polishing of the water prior to its discharge during dewatering.

Rate of Pumping

The application, as submitted, envisaged that the rate of discharge from the proposed recovery facility during quarry dewatering will be within the limits of the discharge licence issued in 2009 (Ref. No. WPL87). Condition No. 2.1 of that licence states that the volume of treated 'effluent' shall not normally exceed 805m^3/day subject to a summer maximum discharge limit of 1,600m^3/day (April to September) and the winter maximum discharge limit of 2,000m^3/day (October to March), as stated in the EIS. These are equivalent to the proposed discharge rates assumed in the EIS submitted in support of the waste licence application.

Water Retention

The settlement pond retention time during dewatering will be of the order of 4.5 hours at the normal discharge rate, reducing to 2.3 hours at the maximum summer discharge rate and the order of 1.8 hours at the maximum winter discharge rate.

Under normal operating conditions, this retention time would not be sufficient to treat process water arising at a quarry or recovery facility which normally requires a minimum of 24hr settlement to treat for suspended solids.

However, during the dewatering phase there will be little or no on-site activity with the potential to produce sediment in surface water run-off into the existing waterbody. The size of the waterbody within the quarry void itself is such that it will also provide for more than 24hr. retention (and attenuation) of all surface water run-off from around the application site during the dewatering phase. As water ponded in the quarry void has very low baseline levels of suspended solids, it is considered that the proposed ponds and interceptor are sufficient to effectively manage the surface water / stormwater run-off which will arise during the dewatering phase.

Water Management and Monitoring

The water management system during dewatering will utilise the existing drowned quarry void to provide sufficient settlement and retention time to remove any suspended solids in surface water run-off during the dewatering process and ensure that concentrations are significantly below the existing discharge licence limit of 30mg/l. The ponded void will also be used to provide attenuation of stormwater flows as required.

This water management system will manage all surface water run-off except for the final c.2,000m^3 of water in the quarry void. By this stage, it is expected that the remaining water in the quarry void will be confined to a small sump area at a low point on the quarry floor, sufficient to allow backfilling of the quarry void to commence.

During the dewatering phase, water being discharged from the quarry will be subject to frequent ongoing monitoring to confirm that there is no unexpected (or gradual) rise in the level of suspended

solids in the discharge. In the highly unlikely event that levels do rise close to emission discharge limits, dewatering will cease pending installation of such additional treatment capacity as may be required to ensure full compliance with specified discharge limits.

Summary

The existing water in the quarry void is clean, in terms of suspended solids, and does not therefore require any treatment in settlement ponds to remove suspended solids during the dewatering phase. Notwithstanding this, the following details are confirmed with respect to the dewatering of the void and discharge to the Killough River:

a) The cumulative retention time for surface water run-off provided by the quarry void and secondary settlement ponds will be greater than 24hr and provides for the attenuation and effective 'treatment' of all runoff during the dewatering phase;

b) It is envisaged that the maximum rate of pumping will comply with the limits set in the discharge licence issued in 2009, with a summer maximum of 1,600m^3/day (April to September) and at a winter maximum of 2,000m^3/day (October to March).

c) The proposed secondary settlement ponds provide final 'polishing' of ponded quarry waters and have a storage capacity of 153m^3;

d) All water discharged off site will be routed through an appropriately sized hydrocarbon interceptor.

PHASE 2 : SURFACE WATER MANAGEMENT DURING BACKFILLING

During the quarry backfilling and restoration phase, the same water management principles will apply as during the dewatering phase. Any surface water run-off or groundwater ingress arising within the application site will be captured in the quarry void and discharged to the Killough River.

Surface Water Runoff Quality

Roadstone's experience of operating two large scale licensed soil recovery facilities at both Fassaroe, near Bray (Licence Ref W0269-01) and Huntstown in North Dublin (Licence Ref. W0277-01) is that much rainfall coming into contact with the (relatively dry) backfilled soil is in fact absorbed into it and/or evaporates off it and that the quantities of sediment laden run-off requiring to be managed are relatively small. From a technical perspective, this is explained by development of suctions (negative pore pressures) in stiff clayey soils on excavation. These suctions then draw surface water (rainfall) into the soil matrix to dissipate the negative pressures.

Any surface water which does arise during the quarry restoration and backfilling phase will contain some suspended solids from the imported material placed in-situ. Some disturbance may also arise from vehicle movements across the placed material during backfilling, though this will be minimised by directing all site traffic over dedicated haul routes formed using imported granular material (predominantly crushed rock conforming to capping / sub-base specification). All run-off will require treatment through retention and settlement, prior to discharge.

Water Management and Monitoring

The water management system during the backfilling and restoration phase comprises a sump on the quarry floor to collect runoff, a number of primary settlement ponds (in series) at higher level(s) designed to provide at least 24 hour retention prior to discharge, secondary (polishing) ponds and hydrocarbon separator.

The maximum daily discharge during the winter (October to March) is 2000m^3/day, or 83m^3/hour. The discharge water quality for suspended solids is 30mg/l.

A schematic layout of the proposed surface water management system to be installed in order to achieve the required discharge quality is provided in Figure RFI2-1 in Attachment F. The

configuration of the proposed water management system is considered to be pragmatic given the physical constraints at the application site.

All surface water run-off will be directed towards, and collected at, the sump on the quarry floor (at 220mOD). Although not factored into the assessment of treatment capacity for design purposes, in reality a significant amount of suspended solids in surface water run-off will settle out at this sump.

During the restoration and backfilling phase, the cumulative capacity of the settlement ponds (excluding the sump on the quarry floor) and the secondary ponds at higher level at the recovery facility will provide sufficient capacity to provide a minimum 24hr retention period to facilitate primary treatment through settlement and removal of suspended solids. The settlement ponds will be maintained and settled fines removed at appropriate intervals, principally during lower rainfall periods.

All surface water run-off arising at the recovery facility will then be passed through secondary (polishing) ponds and a hydrocarbon interceptor prior to discharge off-site. All water discharged from the recovery facility will be monitored to ensure that it complies with the emission limits specified in any waste licence issued by the EPA.

It should be noted that as the quarry is progressively restored (from south to north) and backfilled, vegetation will be established at finished ground level, thereby increasing the amount of evapotranspiration occurring at the application site. This in turn will reduce the volume of surface water run-off requiring treatment prior to discharge. Progressive restoration will also minimise the area of exposed soil which could potentially generate suspended solids at the application site.

If necessary, should the quality of the off-site discharge ever be close to, or repeatedly at or in excess of, the specified discharge or emission limits for suspended solids, additional measures can be taken to ensure compliance. Additional treatment can be provided by increasing the storage capacity / area of the primary settlement ponds and sump within the quarry void in order to achieve an increase in overall retention time. Alternatively filter materials (crushed aggregate / straw bales) could be placed around the sump on the quarry floor to protect it from direct run-off arising during the restoration and backfilling operations.

In the unlikely event that further treatment was ever required, consideration could also be given to deployment of specialist water treatment technologies (eg. Siltbuster) to ensure the concentration of suspended solids is maintained below the prescribed emission level. It is however emphasised that such a requirement would be most unlikely, given that a similar water management strategy to that outlined above has proven effective in treating surface water run-off at other Roadstone soil recovery facilities.

Rate of Pumping

At the present time, it is envisaged that the rate of pumping and discharge from the application site during the restoration and backfilling phase will be within the limits set by the 2009 discharge licence (Ref. No. WPL87). The same pumping limits will be used as for the initial dewatering phase.

Settlement Ponds

It is proposed to install primary settlement pond(s) with a combined maximum capacity of over 2,000m^3 to provide the required 24 hours retention time for the maximum permitted winter discharge. These settlement ponds will be 2m deep, providing for a working water depth of 1.5m for settlement to provide 2,000m^3 retention, with 0.5m freeboard.

The settlement ponds are designed in line with the Guidelines for Settlement Lagoons in Appendix D of the EPA Environmental Management Guidelines[1]. These guidelines indicate that 24 hour retention will settle out particles of 0.004mm (fine silt) or greater. The guidance notes that in practice, clay-size particles (<0.002mm) tend to flocculate naturally into larger composite particles, which can then settle out in ponds.

The settlement pond(s) design for the planned waste recovery facility at Calary Quarry is to achieve 24hr retention for the maximum permitted winter discharge during the winter. The settlement pond design is to provide sufficient retention time to allow coarser (and heavier) particulate materials (>0.004mm) to settle out, and are not specifically designed to achieve a target concentration for suspended solids. Retention of run-off for a 24 hour period prior to discharge will allow time for sufficient settlement to comply with the emission limit for suspended solids (30mg/l) in off-site discharges.

Summary

The following details are confirmed here with respect to dewatering during the restoration and backfilling of the quarry void:

a) The sump in the quarry void provides for primary settlement of suspended solids in any surface run-off arising across the quarry void

b) The proposed settlement ponds provide a cumulative storage capacity of c. 2,000m^3; and are supplemented by additional capacity in the secondary (polishing) ponds at high level (additional 153m^3);

c) The cumulative retention time for surface water run-off provided by the settlement pond(s) will be c. 24hr. for the maximum winter discharge, thereby providing for the effective treatment of all surface water run-off and removal of suspended solids during this phase of activity;

d) The maximum rate of pumping will be in line with the 2009 discharge licence, with a summer maximum of 1,600m^3/day (April to September) and at a winter maximum of 2,000m^3/day (October to March).

If necessary, additional treatment can be provided by extending the storage capacity and area of the sump within the quarry void providing for primary settlement in order to comply with the target emission limit for suspended solids.

In the unlikely event that further treatment was required, consideration would also be given to deployment of specialist water treatment technologies (eg. Siltbuster) to ensure concentrations are maintained below the licenced limit.

The water management strategy outlined above has previously proven effective in treating surface water run-off at similar licensed soil waste recovery facilities at Fassaroe and Huntstown.

7. DISCHARGE LOCATION TO KILLOUGH STREAM

State grid coordinates (Irish Grid 6-digit numbers) for the location where the discharge from the facility discharges into the Killough Stream. Include a drawing showing this location. State whether the discharge into the stream is from an open drain or an underground pipe.

[1] *Environmental Protection Agency, 2006, Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals).*

The off-site discharge from the culvert running beneath the R755 Regional Road to the natural channel of the tributary stream flowing downslope to the Killough Stream is located at Irish National Grid (ING) Co-ordinates 322735E 213299N.

The confluence of the tributary stream and the Killough River is located approximately 300m further west and approximately 55m downslope, along the western side of the local road along the floor of the valley, at ING Co-ordinates 322483E 213247N. The merging watercourses both flow in open channels at their confluence point.

The location of both discharge points is shown on the extract from the 1:2,500 Ordnance Survey map of the local area reproduced in Figure B, provided in Attachment F.

8. POTENTIAL FLOOD IMPACT ON KILLOUGH STREAM

Provide a hydraulic model of the volumetric discharge from pumping the quarry so that there is sufficient evidence to demonstrate that the pumping will not cause flooding in the Killough Stream or Dargle River downstream. Propose volumetric pumping limit values, seasonally varied if necessary, that are not disruptive to the natural environment regarding protection of species and habitats and contribution to flood risk.

The discharge licence issued in November 2009 when Calary Quarry was still operational (Ref. No. WPL87, as amended by An Bord Pleanála appeal decision Ref. No. 27.WW.378) set a limit on normal daily discharge and a maximum daily summer and winter limit on discharge volumes. Condition No. 2.1 of the discharge licence states that the volume of treated effluent shall not normally exceed 805m^3/day, subject to a summer maximum discharge limit of 1,600m^3/day (April to September) and a winter maximum discharge limit of 2,000m^3/day (October to March).

As these discharge limits had been determined on foot of previous regulatory assessment (which included an appeal of conditions to An Bord Pleanála), had won previous regulatory approval and could be complied with in practice, it was decided to adopt the same discharge control regime for both the quarry dewatering phase and operational phase for the proposed soil and stone waste recovery facility at Calary Quarry and to adopt it for impact assessment purposes in the Environmental Impact Statement which accompanied the planning and waste licence applications

The normal daily and maximum summer and winter discharge licence limits were set in the Discharge Licence by Wicklow County Council, based on water balance calculations for the application site undertaken for a previous EIS (2005) and in response to requests for further information (RFI) for a planned quarry extension (which was ultimately refused on appeal to An Bord Pleanála) in 2008.

SLR has assessed the capacity of the receiving waters to determine if there is sufficient channel capacity in the receiving waters for the discharge from the quarry and ensure that it will not contribute to an increased risk of flooding downstream.

SLR undertook a channel cross section survey at seven locations downstream, three on the ditch leading to the Killough River, at three locations along the Killough River and at one location on the Dargle River, as shown on drawings presented in Attachment G. The channel cross section survey was undertaken on the 13th September 2017 by a surveyor using GPS and Total Station surveying equipment.

The bank full channel capacity at each location was calculated from the survey information using Mannings Equation and the values are shown in Table 1 below.

Table 1 : Estimated Channel Bank Full Capacity

Survey Cross Section	Bankfull Discharge Q	Bankfull discharge Q with maximum quarry discharge (winter)	% of Bankfull flow for maximum discharge flow from quarry
CS01 – Roadside Drain	1.6 m^3/s	1.6 m^3/s	1.4%
CS02 - Headwater tributary of Killough River	2.5 m^3/s	2.5 m^3/s	0.9%
CS03 - Killough River at Ballybawn	18.1 m^3/s	18.2 m^3/s	0.1%
CS04 - Killough River before Dargle confluence	9.7 m^3/s	9.8 m^3/s	0.2%
CS05 - Dargle River before Glencullen River confluence	161.3 m^3/s	161.3 m^3/s	0.01%

The maximum winter discharge from the quarry is 0.023m^3/s (2,000m^3/day). The assessment results are shown in Table 1 above indicate that the maximum discharge from the quarry has an almost negligible impact on the bankfull flow in the Killough River or the Dargle River. The maximum winter discharge from the quarry accounts for less than 1% of the flow in the headwaters of the Killough River and c. 0.01% of the flow in the Dargle River.

It is considered, based on the channel capacity assessment presented herein, that the maximum discharge from the quarry during the winter will have an almost negligible impact on the bankfull flow in the receiving waters and will not result in an increased risk of flooding downstream. In this respect, it is not considered that any seasonally varied pumping rates are required for the discharge.

Notwithstanding the near negligible impact of the quarry discharge on bankfull flows in the receiving waters, as a flooding mitigation measure Roadstone Ltd. will undertake not to discharge any water from the quarry during a Met Éireann Status Orange or Status Red rainfall warning for the Wicklow area.

Roadstone adopts a similar mitigation measure for discharge from its Belgard Quarry facility in west Dublin. Condition 4.3 of its discharge licence (Ref. WPW/473/007-1) requires the company to cease discharge from the quarry during a Met Éireann Status Orange or Status Red rainfall warning for the area.

There is no evidence to show that the historical discharge from the quarry, at a similar volumetric rate to that envisaged for the proposed soil and stone waste recovery facility, has had a significant impact on the riparian habitats and/or species within the Killough and/or Dargle Rivers.

There will be no variation in the volumetric rates of any discharge of pumped water during the initial drawdown of the flooded quarry void or for any dewatering of the site during the operation of the proposed recovery facility thereafter.

Based on the volumetric values of the discharge from the quarry, it is assessed that the discharge of pumped water either during the initial drawdown of the flooded quarry void, or from the dewatering of the site during the operation of the proposed inert soil and stone waste recovery facility, will not result in any significant changes in baseline flow conditions within the Killough and Dargle Rivers nor will there be any measureable effects on the riparian habitats and protected species within these rivers.

9. POTENTIAL IMPACT ON AQUATIC SPECIES

Provide an analysis that demonstrates that the low temperature of the pumped water will not have an impact on species and habitats in the Killough Stream and Dargle River.

Water temperature readings have not been regularly recorded as part of the monitoring of water quality at the quarry. The only measurements taken for temperature are for February 2015 and more recently in November 2017. These results however, would indicate that the surface temperatures of the lake formed in the quarry void is slightly higher than that within the Killough River, refer to Table 2 below.

Table 2 Temperature and Dissolved Oxygen at the Quarry and in the Killough River

Sampling Site	February 2015		November 2017	
	Temp (°C)	DO_2 (mg/l)	Temp (°C)	DO_2 (mg/l)
Quarry	4.22	12.7	10.9	5.90
Killough Stream Upstream of Discharge	3.99	13.2	-	-
Killough Stream Downstream of Discharge	3.98	13.24	9.9	4.72

Whilst some thermal stratification may occur within the flooded quarry void, it is considered that this will not be an issue in terms of any discharge of pumped water during the initial drawdown of the flooded quarry void. All pumping operations during the initial drawdown operations will take water from the upper epilimnion layer (i.e. no deeper than 3m from the surface) as the pond is dewatered.

In view of the proposed volumetric rate of the proposed discharge from the quarry, the timeframe over which any dewatering operations will take place and the surface area of lake in the flooded quarry void, it is considered that there will be sufficient mixing of the epilimnion and hypolimnion layers where these may occur and it is anticipated that there would not be any significant temperature shift in the water discharged from the quarry during the initial drawdown operations.

The discharge of water during the summer months is likely to be at a temperature at or slightly greater than that in the Killough River. Therefore it is not likely that there will be any measureable effects on the in-stream riparian habitat and/or species in the cold water systems of the Killough and Dargle Rivers.

10. LIMIT VALUES FOR DISCHARGE FROM QUARRY

Propose limit values for parameters in the discharge from the quarry and demonstrate that these are protective of water quality in the receiving waters.

The discharge licence issued in 2009 when Calary Quarry was still operational (Ref. No. WPL87) also set limit values for the protection of water quality in the receiving water of the Killough Stream. The discharge licence required treated effluent discharged from the settlement ponds and oil interceptor to comply with the quality standards set in Table 3 below.

Table 3 Emission Limit Values for Discharge Licence WPL87

Parameter	Parametric Limit Value	Units
pH	6 to 9	pH units
Temperature	25	°C
BOD	<= 5	mg/O_2
COD	<= 50	mg/l
Suspended Solids	30	mg/l
Ammonium	<= 0.2	mg/l N
Chloride	<= 50	mg/l Cl
Nitrate	<= 30	mg/l NO_3
Phosphate as P	<= 0 03	mg/l MRP
Diesel Range Organics	<= 5	mg/l
Mineral Oil	<= 5	mg/l

As these limits had been determined on foot of a previous regulatory assessment (which included an appeal of some licence conditions to An Bord Pleanála), had obtained previous regulatory approval and could be complied with in practice, Roadstone elected to adopt the same discharge limits for both the quarry dewatering phase and operational phase for the proposed soil and stone waste recovery facility at Calary Quarry and to adopt them for impact assessment purposes in the Environmental Impact Statement which accompanied the planning and waste licence applications.

A copy of the assessment report which was prepared on behalf of An Bord Pleanála and which informed its decision on the appeal against some of the conditions attaching to the discharge licence issued by Wicklow County Council is attached for reference in Attachment G. The report includes a number of assimilation capacity assessments for various water quality parameters in Appendix A which should provide reassurance that the proposed emission limit values are protective of water quality in the receiving waters.

CLOSE

We (SLR) consider that our response to the Article 12 Compliance Notice is not of such significance as to require revision of any information presented in the non-technical summary previously submitted in the EIS and/or the waste licence application.

As requested, two copies of this submission are provided in hard copy format (an original plus one copy), together with 2 No. electronic copies in searchable PDF format on CD-ROM.

We trust that we have adequately addressed the issues raised in your Article 12 Compliance Notice dated 5 September last. Should you wish to discuss any of the points raised in this response in more detail, please contact the undersigned.

Yours sincerely,
For SLR Consulting (Ireland)

Derek Luby
Technical Director

cc. Shane Geraghty / John Glynn Roadstone Ltd.

ATTACHMENT A

EXTENT OF EXISTING WASTE BODY AT CALARY QUARRY

ATTACHMENT B

PREVIOUS WASTE PERMIT (REF. ESS/15/8/12)

ATTACHMENT C

ANNUAL ENVIRONMENTAL REPORTS FOR 2007, 2008 AND 2009

ATTACHMENT D

WATER QUALITY TEST RESULTS

ATTACHMENT E

WASTEWATER TREATMENT SYSTEM

ATTACHMENT F

SURFACE WATER MANAGEMENT SYSTEM

ATTACHMENT G

CHANNEL SURVEY LOCATION AND CROSS-SECTIONS

ATTACHMENT H

DISCHARGE ASSESSMENT REPORT