

Saint-Gobain Mining (Ireland) Ltd.,

Dublin Road, Kingscourt, Co. Cavan

Mine Site Decommissioning, Closure and Aftercare Management Plan

Report Date:

11th June 2019



KD Environmental Ltd.

1 Swiftbrook Glen, Virginia, Co. Cavan

Report No 2019/28/02

1.0	Introduction.....	3
1.1	Site History & Description	4
1.2	Licences/Permitted Activities.....	5
1.3	Closure and Decommissioning Requirements	5
1.4	CRAMP – Scope Statement and Summary	7
1.4.1	Scope Statement	7
1.4.2	CRAMP Summary.....	7
1.5	Restoration & Aftercare	8
2.0	Site Evaluation	8
2.1	Operator Performance - Compliance	8
2.2	Environmental pathways and sensitivity.....	9
2.3	Site processes and activities	10
2.3.1	Opencast mining.....	10
2.3.2	Underground mining	10
2.4	Inventory of buildings, plant and equipment.....	12
2.5	Inventory of raw materials, products and wastes	13
3.0	Decommissioning / Closure Tasks & Programs	14
3.1	Closure Plan Synopsis	14
3.2	Plant and equipment decontamination requirements	15
3.3	Plant and equipment decommissioning requirements	15
3.4	Demolition	15
3.5	Consumables	16
3.6	Chemicals and Wastes	16
3.7	Contaminated land treatment removal and/or disposal	16
3.7.1	Spoil	16
3.7.2	Soil & Groundwater Monitoring.....	16
3.8	Surface water Monitoring.....	17
3.9	Ground and Stormwater Management.....	18
3.10	Land Rehabilitation and Planting	18
3.11	Programme and timeframes for delivery	19
4.0	Criteria for Successful Decommissioning	23
5.0	Decommissioning Plan Validation	24
6.0	Decommissioning & Aftercare Costings	25
7.0	Decommissioning and Closure Plan Review & Update	29
8.0	Closure Plan Funding Conclusion	29

1.0 Introduction

KD Environmental Ltd. was commissioned by Robert Moore, EHS Manager with Saint-Gobain Construction products (Ireland) Ltd. to carry out a review of the Closure Restoration and Aftercare Management Plan (CRAMP) and associated costs for the Saint-Gobain Mining (Ireland) Ltd site in Magheracloone, Co. Monaghan.

Saint-Gobain Mining (Ireland) Ltd is owned by Saint-Gobain Construction Products (Ireland) Ltd and IED licence P0519-03 covers both activities.

This report has been drafted based on information provided by Robert Moore, EHS Manager with Saint-Gobain Construction Products (Ireland) Ltd. A site visit was also conducted on 14th December 2018 and on 29th March 2019 by David Kelly BSc. MSc. of KD Environmental Ltd.

Observations and assessments within this report were made in accordance with “Guidance on Assessing and Costing Environmental Liabilities” and the “Guidance on Assessing and Costing Environmental Liabilities – Unit Rates for conversion” issued by the EPA in 2014.

Activity Details:

Name: Saint-Gobain Mining (Ireland) Ltd
Address: Knocknacran
Carrickmacross
Co. Monaghan

Licence Number: P0519-03

Activities licenced:

Class 1.3 “The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts 1940 to 1999, where an activity involves any other operation where either the level of extracted or processed minerals is greater than 200,000 tonnes per annum or the total operational yield is greater than 1,000,000 tonnes, and storage of related mineral waste.

11.1 Waste facility - The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

11.5 Landfills, within the meaning of section 5 (amended by Regulation 11(1) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 534 of 2008) of the Act of 1996, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, other than landfills of inert waste.

RBME Category: A3 for Year 2017

Table 1: Comparison with previous plan

Year	Closure and Restoration/Aftercare Cost
2019	€2,292,141
2017	€2,200,455

1.1 Site History & Description

Saint-Gobain Mining (Ireland) Ltd operated an opencast gypsum mine in the townland of Knocknacran, Co. Monaghan and currently operates an underground gypsum mine in the townland of Drummond, Co. Monaghan. The setting is rural with other surrounding land use being mainly agricultural with low density residential dwelling. The quarry and mine are situated approximately 7km from the town of Carrickmacross in Co. Monaghan and 7km from Kingscourt, Co. Cavan.

The opencast mine began operation in 1989 following the granting of planning permission (PL18/5/67892) and in 2017 under planning permission P17/217 permission was granted to extend the life of the quarry to the year 2033. The underground mine was opened in 2004 under planning permission P03/578.

The opencast mine site covers a total area of 63.2 hectares of which 54.9 hectares is the area for gypsum extraction. The remaining 20.7 hectares is processing plant, non-extraction areas and administration buildings/car parks. The underground mine was estimated to extend over an area of approx. 26.4 hectares in 2017.

The opencast mine is bordered on its western boundary by the R179 Kingscourt to Carrickmacross road. The now disused Drumgossat underground mine forms the majority of the northern section of the site, the active Drummond underground mine lies to the south of the site and the quarried gypsum outcrop lies to the eastern section of the site. The main gypsum mineral reserve lies in the west and south sections of the site.

1.2 Licences/Permitted Activities

Saint-Gobain Construction Products (Ireland) Ltd was issued with an Industrial Emissions Licence (IED) licence P0519-03 by the EPA in July 2015 for their manufacturing and gypsum mining facilities. Saint-Gobain Mining (Ireland) Ltd is owned by Saint-Gobain Construction Products.

Under P0519-03, Saint-Gobain Construction Products (Ireland) Ltd are permitted to carry out the following activity under Section 90(2) of the Environmental Protection Acts 1992 and 2003;

- Class 1.3 *"The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts 1940 to 1999, where an activity involves any other operation where either the level of extracted or processed minerals is greater than 200,000 tonnes per annum or the total operational yield is greater than 1,000,000 tonnes, and storage of related mineral waste.*

- Class 11.1 *"The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV which a licence under the said Part is or will be required"*

Class 11.5 Landfills, within the meaning of section 5 (amended by Regulation 11(1) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 534 of 2008) of the Act of 1996, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, other than landfills of inert waste.

At Knocknacran, Magheracloone, Drummond, Derrynascobe, Derrynaglah, Ballycartlan, Enagh and Carrickmacross, County Monaghan, and at Lisnabow, Kilmainhamwood and Kells, County Meath.

1.3 Closure and Decommissioning Requirements

IED Licence Requirements

Under Condition 10.2 of EPA IED Licence P0519-03, Saint-Gobain Construction Products (Ireland) Ltd. is required to perform a Decommissioning and Residuals Management Plan and review this plan annually;

10.1: Following termination, or planned cessation for a period greater than six months, of use or involvement of all or part of the installation in the licenced activity, the licensee shall, to the satisfaction of the Agency, decommission, render safe or remove for disposal/recovery any soil, subsoil, buildings, plant or equipment, or any waste, materials or substances or other in matter contained therein or thereon, that may result in environmental pollution.

10.2.1: Decommissioning Management Plan (DMP). The licensee shall maintain, to the satisfaction of the Agency, a fully detailed and costed plan for the closure, decommissioning and rehabilitation of the installation or part thereof.

10.2.2: The plan shall be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented unless agreed by the Agency.

10.2.3: The licensee shall have regard to the Environmental Protection Agency Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision when implementing Condition 10.2.1 above.

10.2.4: The Decommissioning Management Plan shall include, as a minimum, the following:

- (i) A scope statement for the plan
- (ii) The criteria which define the successful de-commissioning of the activity or part thereof, which ensures minimum impact to the environment
- (iii) A programme to achieve the stated criteria
- (iv) Where relevant, a test programme to demonstrate the successful implementation of the de-commissioning plan
- (v) A programme to address any remaining licence obligations; and
- (vi) Details of costings for the plan and a statement as to how these costs will be underwritten

10.2.5: The licensee shall carry out closure, decommissioning and rehabilitation of the installation in accordance with the plan. No deviation from the plan shall be allowed unless agreed by the Agency.

10.2.6: The licensee shall carry out such tests, investigations or submit such certification, as may be requested by the Agency, to confirm that individual tasks of the plan are being progressed or have been completed.

10.2.7: A final validation report to include a certificate of completion for the Decommissioning Management Plan, for all or part of the installation as necessary, shall be submitted to the Agency within three months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment

Planning Permission

Planning permission granted to Saint-Gobain Mining (Ireland) Ltd by Monaghan County Council also requires for a closure plan to be drafted and submitted under sections 3 and 4 of planning permission P17/217 in the interests of amenities in the areas and the proper planning and development of the area. Under Condition 4 In respect of closure of the mine, the following shall apply:-

- (a) The developer shall notify the authority when closure is imminent (at least 12 months prior to closure) and when closure has commenced,
- (b) within 12 months of closure and for every 12 month period thereafter, until otherwise agreed in writing with the Planning authority, the developer shall submit a report to the Planning authority containing the following information:-
- (c) the nature and extent of rehabilitation work carried out during the past year, the nature and extent of rehabilitation work to be carried out during the coming year, any changes in conditions of the project that may affect the closure plan, and the results of all monitoring described in the closure plan.
- (d) In the event of the Planning authority deeming (on the basis of the reports and monitoring) that the mine closure plan is an adequate to properly rehabilitate the site due to changed conditions or, in the event of the developer wishing to amend and/or alter the mine closure plan, the developer shall formally submit detailed proposals for amendments/alterations to the closure plan for the agreement of the Planning authority. The Planning authority shall be empowered to require changes to the proposed amendments/alterations. The mine closure plan shall not be deemed to be altered until the Planning authority formally notifies the developer of the acceptability of the alterations/amendments.

1.4 CRAMP – Scope Statement and Summary

1.4.1 Scope Statement

Scoping for this Closure Restoration and Aftercare Management Plan (CRAMP) has determined that the site will have no expected long-term liabilities and a clean closure is envisaged. A closure plan and a restoration/aftercare plan for the Saint-Gobain Mining (Ireland) Ltd site has been prepared as required under Condition 10 of EPA IED licence P0519-03 and as per EPA document “Guidance on Assessing and Costing Environmental Liabilities” and the “Guidance on Assessing and Costing Environmental Liabilities – Unit Rates for conversion” issued by the EPA in 2014.

1.4.2 CRAMP Summary

It is predicted that there are two potential scenarios for site closure of the mine operation. The first scenario is the transfer of ownership of the facility to another company for mineral gypsum extraction. This is the simplest scenario and an unlikely outcome following cessation of processing by Saint-Gobain Mining (Ireland) Ltd. Any potential purchaser of the site will have to be made aware of all environmental liabilities associated with the purchase of the facility and would be responsible for any future environmental risk and clean-up costs associated with the site. In this scenario, the site will not have to be decommissioned or remediated and fixed plant/machinery will not have to be removed. Some low cost decommissioning may have to take place such as removal and decommissioning of unsuitable fixed plant.

The second scenario is that the gypsum mining operation ceases for good following depletion of the available/suitable gypsum ore and that the site is decommissioned/remediated by Saint-Gobain Mining (Ireland) Ltd with all plant and buildings removed from the site. Production buildings and large fixed plant will be decontaminated, deconstructed, sold and removed from site. The administration building, canteen building, access road to these buildings and carpark will remain in place. The opencast mine area would be remediated and the underground mine would be closed and sealed. This closure scenario is more complex and details of planned decommissioning and site remediation required under this scenario are given in this report.

Total closure decommissioning costs in 2019 have been calculated as €2,292,141 which includes a 10% contingency. Saint-Gobain Mining (Ireland) Ltd through their parent company Saint Gobain will put in place a financial provision for the amount stated above to cover closure costs for their facility at Knochacran / Drummond.

Full details of decontamination and decommissioning are given in section 3 of this report.

1.5 Restoration & Aftercare

The site was rated to have an Enforcement Category of A3 (a high rating) from a Risk Based Method of Evaluation (RBME) performed in 2018 using 2017 data. The overall enforcement category of the licence is based the combination of enforcement categories obtained for each of the attributes in the following table:

Table 2: RBME classification – 2017 data

Attribute	Score	Enforcement Category
Complexity	5	High
Emissions	12	High
Location	3	Low
Operator Management	2	Medium
Enforcement Record	10	Medium
Enforcement Category due to fixed attributes		C1
Final enforcement Category		A3

A restoration and aftercare management plan is required for Saint-Gobain Mining (Ireland) Ltd as part of the site closure plan.

2.0 Site Evaluation

2.1 Operator Performance - Compliance

Saint-Gobain Construction Products (Ireland) Ltd. was granted IED licence P0519-03 for their gypsum processing facility and mining operation in 2015. Saint-Gobain Construction Products (Ireland) Ltd. contribute significant resources in order to achieve environmental compliance. On occasion a non-compliance to this IED licence requirements may occur. A full record of environmental non-compliances is available upon request from the environmental office at Saint-Gobain Construction Products (Ireland) Ltd. – a summary for 2018 is given below.

- Incident History

In June 2018 one major incident occurred. A high volume of water ingress into the mine resulted from normal mining activities intersecting an unforeseen fault. As has been normal practice for many years this water was pumped to the old Drumgossat Mine workings to be stored for discharge to the River Bursk during the winter season. The high volume of water meant that the water reached higher levels in the mine than had historically occurred.

On September 24th a subsidence event took place in the area of the Mahercloone GAA Facility. Investigation by SRK consultants concluded the subsidence occurred due to a unique and complex set of circumstances with the higher than normal level of water in the old mine working being one factor. The company investigation was independently reviewed by DCCAE consultants who's report is available on the DCCAE website.

The R179 Kingscourt to Carrickmacross road also closed for a number of weeks until the risk from further land subsidence could be determined. This has concluded that loss in underground mine stability was localised and that further mine collapse is unlikely. The pumping of water to the old Drumgossat mine workings ceased on 28 September 2019.

- **Compliance History**
In 2018, 14 x emission limit value exceedences were recorded. Six of these exceedences six were due to off site organic loadings of dust which are not related to site activities. There were two noise limit exceedences and six water monitoring ELV breaches.
A C.I (Continual Investigation) was opened by the EPA in regarding the continuous non-compliance relating to elevated sulphate levels in the River Bursk.
- **Complaints History**
In 2018, a number of complaints were received in relation to the major land subsidence incident.
- **Enforcement History**
The site was rated to have an Enforcement Category of A3 (a high rating) from a Risk Based Method of Evaluation (RBME) performed in 2018 using 2017 data.

2.2 Environmental pathways and sensitivity

The Saint Gobain facility was rated to have a high Enforcement Category of A3. The topography, surrounding land use and location of site operations has not changed since this was performed. There are no protected ecological sites within 1km of the site and no sensitive agricultural receptors within 150m of the site. The surrounding topography is an intermediate terrain dominated by drumlin formations. There is some residential housing in the area which is generally confined to linear settlement patterns, mainly along local roads.

The River Bursk receives storm water from the mine at point MSE1 and surrounding areas. The Bursk is a tributary of the River Glyde. The Glyde flows to the sea at Dundalk Bay and although not a designated a salmonid water, this river is known to have salmon run (salmon are listed in Annex II of the Habitats Directive, 92/43/EEC).

Biological monitoring of the River Bursk by KD Environmental Ltd. in 2018 concluded that the water quality both upstream and downstream of the MSE1 discharge has a Q rating of Q3-4 indicating fair to doubtful water quality with slight levels of pollution. The River Bursk is therefore seen as being of Class C sensitivity. The River Bursk is not recognized as a Potentially Eutrophic Coastal or Estuarine water.

The site is situated in an area of a locally important aquifer with a moderate aquifer vulnerability rating (Minerex 2010 groundwater report). There are no known emissions to land or groundwater from the mine site.

There are no ecological designations or protected areas (SAC, SPA, or NHA) within 1km of the mine site. The nearest protected site is Killyconny Bog Special Area of Conservation (SAC Site Code 000006) approx. 20Km away.

2.3 Site processes and activities

2.3.1 Opencast mining

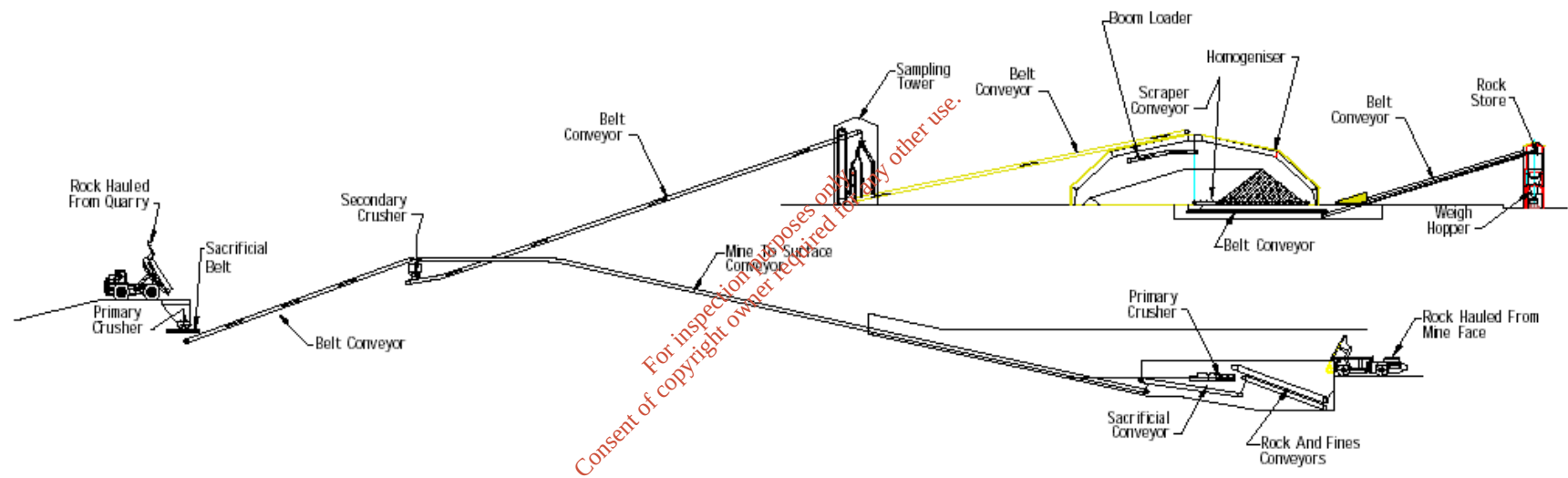
Hydraulic excavators and dump trucks are used to remove topsoil, subsoil, and overburden to expose the gypsum rock. The material which has been removed to expose the gypsum is stored on the site. The gypsum is then extracted in a series of benches. Primary breaking is achieved by blasting. Rock breakers are used to carry out secondary breaking, if required. The broken gypsum rock is loaded onto dump trucks using a hydraulic excavator and transported to the surface primary crusher. The surface primary crusher reduces the run-of-mine rock to less than 300 mm. The minus 300 mm rock is transported by conveyor belt to a vibrating grizzly feeder. Material less than 75 mm passes through the feeder and the oversize is directed to the secondary crusher. The secondary crusher reduces the oversize material to less than 75 mm. The rock is then transported by conveyor belt to the stacker-reclaimer (homogenizer) where it is stored under cover awaiting collection either to the plaster and plasterboard factory near Kingscourt or to one of the cement manufacturing companies. Once the entire gypsum mineral has been removed from an area, the area is backfilled using the stored topsoil, subsoil, and overburden.

2.3.2 Underground mining

Gypsum rock is drilled and blasted from a series of tunnels. The tunnels are self-supporting as approx. only 17% of the gypsum is extracted. The remaining 83% is left in the ground to form the roof, floor, and wall support of the tunnel. In areas of poor geology (soft and broken rock) roof support is installed in the form of rock bolts and mesh. The tunnels are laid out in a grid pattern to form rooms (where the gypsum has been removed) and pillars (where the gypsum has been left in place). The rock is loaded onto dump trucks using rubber-tyred loaders and transported to the underground primary crusher. The underground primary crusher reduces the run-of-mine rock to less than 300mm. This material is then transported to surface on a conveyor belt, where it joins the surface processing plant at the secondary crusher.

All mining operations are carried out within the confines of the gypsum deposit therefore no waste material is extracted. This eliminates the need for spoil heaps or dumps.

A flow chart illustrating on site processes at the Saint-Gobain Mining (Ireland) Ltd mine and mining facility is given below.



2.4 Inventory of buildings, plant and equipment

Table 3. Inventory of Main Site Plant and Equipment

Plant description	Number on site
Crushers	3
Wheel wash	1
Weigh Bridge	1
Homogeniser	1
Lorry Loader	1
Conveyors	7
Autosampler	1
Ventilation fan stations	2
Substations	3
Electric Panels	17
Pump station	3
Dumpers	4
Excavators	3
Water Tanker	1
Tractors	1
Diesel Bowser	1
4 x 4	1
IT (FLT)	1
Telescopic Handlers	2
Front End Loader	3

Table 4. Inventory of Site Buildings & Structures

Buildings & Structures
Rock Shed
Offices/ Administration
Workshop/Garage
Laboratory (Within Admin Building)
Car Park x 1
Surface water lagoons x 4
Surfacewater Holding Tanks
Oil Storage Bunds
Homogeniser Building
Sample Tower
Primary & Secondary crusher buildings
Emergency station (mine rescue)

All production buildings associated with the Saint-Gobain Mining (Ireland) Ltd. facility comprise of either concrete block built structures or steel supports with metal cladding.

2.5 Inventory of raw materials, products and wastes

The following table is a detailed inventory of raw materials used at the facility:

Table 5. Inventory of Raw Materials/Chemicals on Site

Material	Volume Stored	Storage
Castrol Hyploy LS 85W/140	205L x 2	Bund
Castrol Agri-Trans Plus 80W	208L x 1	Bund
Castrol Tecton Global 15W/40	800 L (approx.)	Bund
Castrol Monograde SAE 20W	208L x 4	Bund
Castrol Axle EPX 80W/90	300L	Bund
TQD3	100L	Bund
Castrol Monograde 10W	200L x 2 800L	Tank
Castrol Hyspin AWS46 Oil	900L	Tank
Lithium EP2 Grease	4 x 12.5kg 1x 50kg	Grease Shed
Castrol Transmax DEX III	190L	Bund
Transmax off road 50	208L x 2	Bund
Transmax off road 30	100L	Bund
Cat TDTO 30 Drive Train Oil	20L x 4	Bund
Cat Deo TM VLS 10 W30 Engine Oil	20L x 2	Bund
Cat HYDO Advanced 01 Hydraulic Oil	208L x 1	Bund
Castrol Magnatec A5SW-30	10L	Bund
Axle & Brake Oil Volvo WB102 & AP1 GL-4	20L x 2	Bund
Para Oils	15L	Bund
Waste Oil	3 x 200L	Bund

All chemicals, cleaning materials and oils used at the facility are stored on a suitable bund as required. There have been no documented incidences of major chemical or fuel spills at the facility.

3.0 Decommissioning / Closure Tasks & Programs

3.1 Closure Plan Synopsis

The closure scenario considered is a permanent cessation of operations on site and a complete clean closure of the mine facility. Following the cessation of operations at the underground and opencast mines, all mobile and fixed plant will be removed from the site. The site will be decontaminated and decommissioned. On verification by the EPA that this has been completed, it is planned that the final stage in the mine closure is to allow the groundwater table to recharge to its natural levels by turning off the pumps currently used to pump water from the opencast and underground mine floor. Prior to the cessation of mining activities on site. On closure and cessation of site activities and following the decommissioning and removal of all plant and equipment from the underground mine, ground water will be allowed to flow into the mine at a controlled rate.

Storm water and groundwater ingress will over time fill the opencast quarry with water to form a small lake.

Groundwater flow into the underground mine can be extracted by utilising submersible pumps to extract water to the current lagoons system for discharge as the permitted MSE1 discharge into the River Bursk.

The area around the newly formed lake will have where required soil and topsoil applied and these areas will be reseeded and planted with native species.

A detailed plan for this scenario is covered in this report as it requires a more extensive plan than selling the site as an on-going gypsum mineral mining facility. Upon cessation of activities at the mine and subsequent decommissioning, no remaining environmental liabilities are expected. The following must be considered in order to achieve clean closure at the facility:

- Before decommissioning activities commence, a site closure application will be prepared and submitted to the Agency.
- While it is considered that the operations at the installation will not lead to any deterioration of the environmental conditions on or under the site, Saint-Gobain Mining (Ireland) Ltd. is committed to ensuring that, as far as practicable, the decommissioning returns the site to a neutral condition and it is carried out in a manner that minimises any impact to the environment and as agreed with the Agency.
- Saint-Gobain Mining (Ireland) Ltd. is committed to ensure that proper decontamination of on-site plant and equipment takes place.
- Saint-Gobain Mining (Ireland) Ltd. is committed to ensure that proper recovery or disposal of wastes generated during the decommissioning process takes place.

3.2 Plant and equipment decontamination requirements

Building structures, bunding, fixed plant, mobile plant and other structures within the gypsum mine facility will be decontaminated by Saint-Gobain staff prior to removal from the site before being sold. Dry deposit contaminants will initially be removed by mechanical methods such as scrapping, sweeping and vacuuming to limit the generation of wash water on site. Given the specialised nature of the mining industry, familiarity with the mine site and for health and safety reasons, a decontamination and decommissioning team made up of Saint-Gobain staff will be established and will be retained on site for the duration of the decontamination and deconstruction phase of the site closure to perform required tasks.

Residual contaminants not removed by initial mechanical cleaning will be removed using compressed air and steam cleaning. Compressed air will be used as a preference where possible to reduce volumes of contaminated wash water resulting from steam cleaning and power hosing. Wash water produced will be collected in the surface water drains and pass to the surface water lagoons, before being discharged to the receiving river on passing discharge emission limit values as per IED licence P0519-03.

3.3 Plant and equipment decommissioning requirements

Fixed plant may be shipped to other sites within the Saint Gobain group in either France or the UK. Another option is that fixed and mobile plant is sold on the open market or will be sold as scrap if there is no other option available.

3.4 Demolition

The administration building, canteen building, access road to these buildings and carpark will remain in place. Production buildings such as the homogeniser building, structures and large fixed plant will be deconstructed, sold and removed from site following decontamination.

Materials produced as a result of building and structures deconstruction include:

1. Metal framing and Cladding
2. Construction & Demolition materials (blocks, concrete, plaster etc...)
3. Electrical cabling
4. Piping and ducting
5. Plastics
6. Wood
7. Glass

Materials will be sold as scrap or recovered materials as a preference. Materials not sold will be recycled or disposed of by licenced contractors that presently remove waste from the site.

3.5 Consumables

It is forecast that at least 3 months' notice of site closure will be available to Saint-Gobain Mining (Ireland) Ltd. On receiving notification of site closure, Saint-Gobain Mining (Ireland) Ltd will cease ordering or reduce quantities ordered of consumables to allow stock on site to be used up in the last months of mining. Mining will be reduced or cease at the Saint-Gobain Mining (Ireland) Ltd facility on notification that the site is to close. On final closure, any consumables that remain on site will be either removed by their suppliers at a neutral cost or transferred to the Saint-Gobain Construction Products (Ireland) Ltd. processing facility (if still in operation).

3.6 Chemicals and Wastes

Before the plant decommissioning starts, all chemicals, oils or cleaning products will be removed from site either by selling to third parties, transferring to other Saint Gobain group sites or removal by licenced waste contractors. All wastes on site will be removed as currently performed by licenced waste contractors. All wastes produced during decommissioning will also be removed from site by licenced waste contractors.

3.7 Contaminated land treatment, removal and/or disposal

3.7.1 Spoil

There are no heaps of spoil, rubble and C & D waste currently on site. Any such spoil heaps that are on site in the event of closure will be sampled and analysed for Total Pollutant Content and waste acceptance criteria in order to determine if the material can be classed as inert, stable non-reactive or hazardous under the Landfill Directive of 1999. Such stockpiles will be removed from site and treated or disposed of accordingly by licenced waste contractors and facilities as agreed with the EPA.

3.7.2 Soil & Groundwater Monitoring

As a condition of the licence, Saint-Gobain Mining (Ireland) Ltd has taken biannual samples of groundwater for analysis from all groundwater boreholes at the mine site. These are reported in the AER as per IED licence P0519-03 and table 5 below.

Soil Contamination is not considered to be a significant issue in terms of site closure. There have been no significant oil or chemical spills on site to date. If oil spills occur on site they will be dealt by the on-site Emergency Response Team. There are spill containment procedures in place and spill clean-up material readily available. Groundwater monitoring results have to date not indicated any site contamination.

As required under Schedule C.5 of IED licence P0519-03, Saint-Gobain Mining (Ireland) Ltd. performs ground water sampling and analysis from 12 groundwater boreholes on the mine site. This is currently performed on a biannual basis.

All 12 groundwater boreholes will continue to be monitored on a biannual basis decommissioning and flooding of the underground mine and opencast quarry. It is estimated it will take 30 years to complete flooding of the underground mine and opencast quarry. Therefore groundwater monitoring has been costed for a duration of 32 years following cessation of mining activities (2 years decommissioning plus 30 years controlled flooding).

Trigger limits have been set for each groundwater parameter based on published IGV (Interim Guideline Values) and analysis results during and following the facility closure will continue to be compared to these trigger limit values as a measure of compliance.

Table 6: Groundwater monitoring

Parameter	Frequency	Method
Water Level	Biannually	Dip meter
pH	Biannually	pH meter
Conductivity	Biannually	Conductivity meter
Calcium	Biannually	Standard method
Sulphate	Biannually	Standard method
Ammonia	Biannually	Standard method
Chloride	Biannually	Standard method
Nitrate	Biannually	Standard method
Manganese	Biannually	Standard method
Sodium	Biannually	Standard method
Potassium	Biannually	Standard method
Magnesium	Biannually	Standard method
Other*	Biannually	As agreed with the EPA

3.8 Surface water Monitoring

The controlled flooding of the underground mine and opencast quarry will over time allow for storm water and groundwater recharge to form a lake on the footprint of the Saint-Gobain Mining (Ireland) Ltd mine and quarry. The Environmental Impact Statement for the Saint-Gobain mining facility concluded that the lake will cover an area of approx. 25.4 hectares. It is estimated that approx. 30 years will be the time required for groundwater rebound to flood the underground mine and for storm water to fill the excavated area of the opencast quarry.

Post flooding, in the event of overflow from the newly formed lake, any overflow water from the lake will flow through gravity into the existing westward flowing stream close to MSW1. It is proposed that during flooding and for a period of 2 years after flooding is completed, quarterly analysis of the receiving water downstream on the stream will be performed for the current MSW1 licenced parameters. The westward flowing stream that receives storm water at MSW1 is a tributary of the Kingscourt River and forms part of the River Lagan catchment area.

There are no licenced ELV's (Emission Limit Values) for MSW1 in licence P0519-03, however, surface water analysis results during and following the facility closure will continue to be compared to the 2009 surface water regulation good water quality values as a measure of compliance. Warning and control limits for the monitoring point downstream of MSW1 may be set and agreed with the EPA prior to site closure.

This monitoring program has been costed in section 6.

Table 7: Surfacewater monitoring at MSW1

Analysis	Frequency	Method
pH	Quarterly	pH meter
BOD	Quarterly	Conductivity meter
Sulphate	Quarterly	Standard method
Calcium	Quarterly	Standard method
Conductivity	Quarterly	Standard method
Total Nitrogen	Quarterly	Standard method
Total Phosphorus	Quarterly	Standard method
Other*	Quarterly	As agreed with the EPA

3.9 Ground and Stormwater Management

It is planned that the final stage in the mine closure is to allow the groundwater table to recharge to its natural levels by turning off the pumps currently used to pump water from the opencast and underground mine floor.

Prior to the cessation of mining activities on site. On closure and cessation of site activities and following the decommissioning and removal of all plant and equipment from the underground mine, the controlled flow of groundwater into the mine will commence. Storm water and groundwater ingress will over time fill the opencast quarry with water to form a small lake.

Groundwater flow into the underground mine can be extracted by utilising submersible pumps to extract water to the current lagoons system for discharge as the permitted MSE1 discharge into the River Bursk.

3.10 Land Rehabilitation and Planting

During the lifespan of the opencast mine at Knocknacran, Saint-Gobain Mining (Ireland) Ltd practiced grading, contouring and landform remodelling whilst extracting mineral gypsum. This allows for acceptable sloping and fall in gradient that lends itself to successful reseeding and planting of the opencast mine area. The use of mounding and grading also assists the creation of microclimates that encourage plant growth and can help in the reduction of erosion.

On closure of the mining operation and following the creation of a small lake through the controlled flooding of the mine, the area around the lake will in some sections require soil and topsoil applied. These areas will be reseeded and planted. Phased planting will be undertaken throughout the closure plan timeframe to create a landscape that blends into the surrounding countryside.

A map illustrating rehabilitated land and newly formed lake is included as Appendix 1 of this report. It is estimated that 23.9 hectares of land will need rehabilitation. This will require 59,750m³ of topsoil, of which there are 26,700m³ available on site. Other required topsoil will be source from a certified green field site and subject to inspection before use as fill material on site.

The guiding principles for the rehabilitation of land at the mine site are as follows:

- Establish an ecological and landscape structure that creates habitats of local value
- Allow natural plant succession in conjunction with the planting of indigenous tree and shrub species
- Achieve a high level of ecological diversity within the site establishing a high quality mixture of coniferous and deciduous planting
- Achieve a strong nature conservation theme
- Improve visual and physical connections with surrounding land uses

It is proposed to seed areas of the site with a range of seed mixes to increase the cover and to improve the habitat value of the site. The use of a variety of grass mixes will allow various use areas of the site to be defined.

The first planting of pioneer grass species will occur following the final contouring of the opencast mine slopes and after grass seeding has been established. Planting will be used to facilitate a long term process of succession and colonization in order to create a diverse ecological habitat. The first phase of planting will be birch and alder. These species tolerate harsh and exposed conditions and will create shelter for other tree species to be planted such as oak and maple.

An understory of hawthorn, hazel and dogwood will be planted. Woody plants such as these encourage bird species to establish in wooded areas and this assists with the dispersal of seeds and the natural plantation of the site. Tree and hedge plantations will be placed to create links with existing hedgerows creating corridors for fauna to move from area to area. They will also create habitat islands which will help in the dispersal of seed.

An estimate of the quantity of soil and topsoil has been calculated based on the area to be rehabilitated, the current soil and topsoil available on site and the required depth of soil in each section of the opencast mine perimeter – see Appendix 1. Costings for the purchase and application of the required soil and of reseeding/replanting these areas are included in section 6 of this report.

3.11 Programme and timeframes for delivery

Closure of the Saint Gobain gypsum mine will be completed in 2 phases. The 1st phase is the intermediate closure plan which will take place 2 years after cessation of gypsum rock extraction from the opencast quarry. The 2nd phase is the closure of the underground mine and will occur when all the economically extractable reserve of gypsum mineral has been removed from the mine area unless permission has been obtained to extend the underground mining area. The possible closure date for Drummond mine is therefore difficult to accurately predict as it will depend on market demand. The planning phase will involve the development of a procurement management plan for the phases of the shutdown project. It will also involve refinement of project scope and schedule and the definition of procedures. It is estimated that it will take three months to dispose and remove raw materials, wastes and chemicals/oils on site.

Phase 1 refers to the closure of the opencast quarry. Phase 1 includes the removal and decontamination of materials and equipment associated with the operation of the opencast quarry. This does not include equipment required for pumping or environmental monitoring. Phase 1 will include surface contouring, landscaping of the extension area, thinning and final planting. The decontamination of plant, structures and equipment is expected to take two months to facilitate the subsequent decommissioning of the site. Deconstruction and removal is estimated to take three months due to the large size and volume of key processing equipment.

Step 1. Removal of all equipment from the opencast quarry area with the exception of the pumping station. (Year 1)

Step 2. Site contouring, Restoration of topsoil cover & grass seeding. (Year 1 – 2)

Step 3. Planting of pioneer species and initial landscaping, installation of access where appropriate. (Year 2 – 3)

Step 4. Thinning of species, planting of final cover species. (Year 7 – 8)

Phase 2 refers to the closure of the underground mine. It includes the decommissioning, decontamination and removal of equipment / materials used for the operation of the underground mine and site contouring.

Step 1: Removal of all fixed and mobile plant from underground (except pumping and ventilation equipment).

Step 2: Removal of all oils and greases from underground storage areas.

Step 3: Installation of telemetry system linking subsidence monitoring points at key locations to surface. (Year 1)

Step 4: Removal of all surface fixed plant and production buildings. (Year 1 – 2)

Step 5: A 250 mm diameter borehole will be installed to intersect the Drummond mine workings at approx. -20 m O.D. A 150 mm submersible pump will be installed prior to all underground pumping equipment being removed from the mine. The existing Drumgossat submersible pumping system will also be maintained. In the event of stability issues arising during the flooding process, it will be possible to halt and reverse the flooding process by activating the submersible pumps.

Step 6: Remove pumping equipment from deepest locations and monitor rate of flooding. When water level reaches -10m O.D., the pumping system in the opencast quarry can be removed, allowing the depression to fill. (Year 1 – 10)

Step 7: Remove all remaining equipment from the underground mine. Seal declines to portal at both Drummond and Drumgossat. (Year 10)

Step 8: Complete site contouring, restoration of topsoil cover, grass seeding, boundary treatment in mineral processing area. (Year 2)

The flooding of the underground mine and opencast quarry with ground and storm water will take a considerable amount of time. Information from the Environmental Impact Assessment completed for the Saint-Gobain gypsum mine and quarry, estimates that in excess of 30 years will be the time required for groundwater rebound to flood the underground mine and for storm water to fill the excavated area of the opencast quarry.

Groundwater and surface water monitoring will continue as specified in section 3.7 during this period. Storm water monitoring downstream will be performed during the period of controlled flooding of the quarry and underground mine and for a further 2 years after flooding is complete.

As outlined in the closure plan, waste disposal and decontamination of plant and equipment will be the first tasks completed as disassembly and shipping of plant and equipment cannot be performed until this is done. It is envisaged that all waste would be removed from the site within 3 months of notification of the mine facility closure.

Following completion of all closure tasks, an external closure plan audit will be conducted by an environmental consultant nominated by Saint-Gobain Construction Products (Ireland) Ltd. and agreed with the EPA.

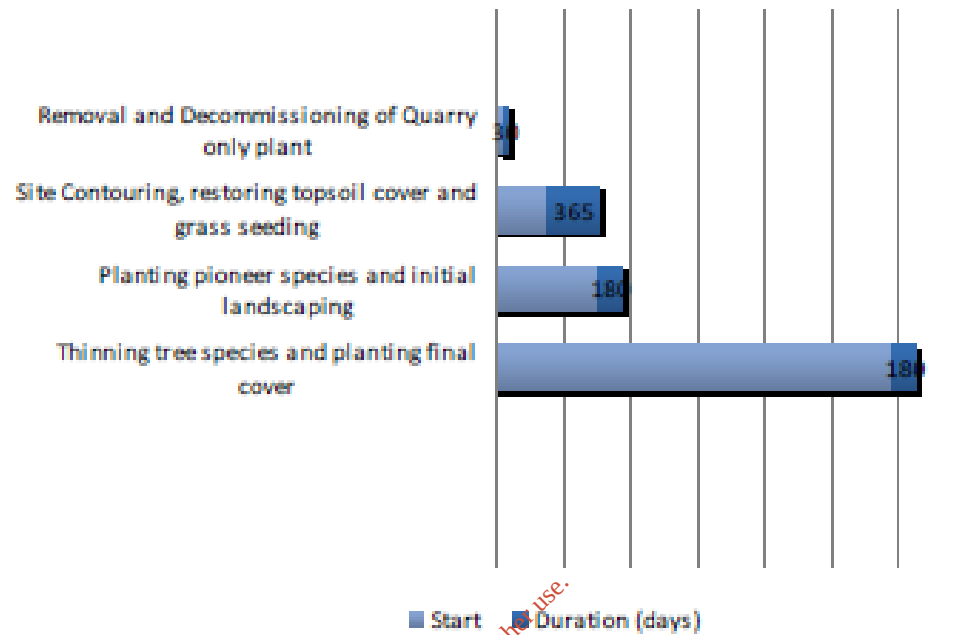
A period for ongoing monitoring of ground and surface water waters will also be agreed with the EPA following closure.

Only following verification from the EPA that decontamination and decommissioning of the site has been completed will the underground mine and quarry be allowed to fill with groundwater and storm water.

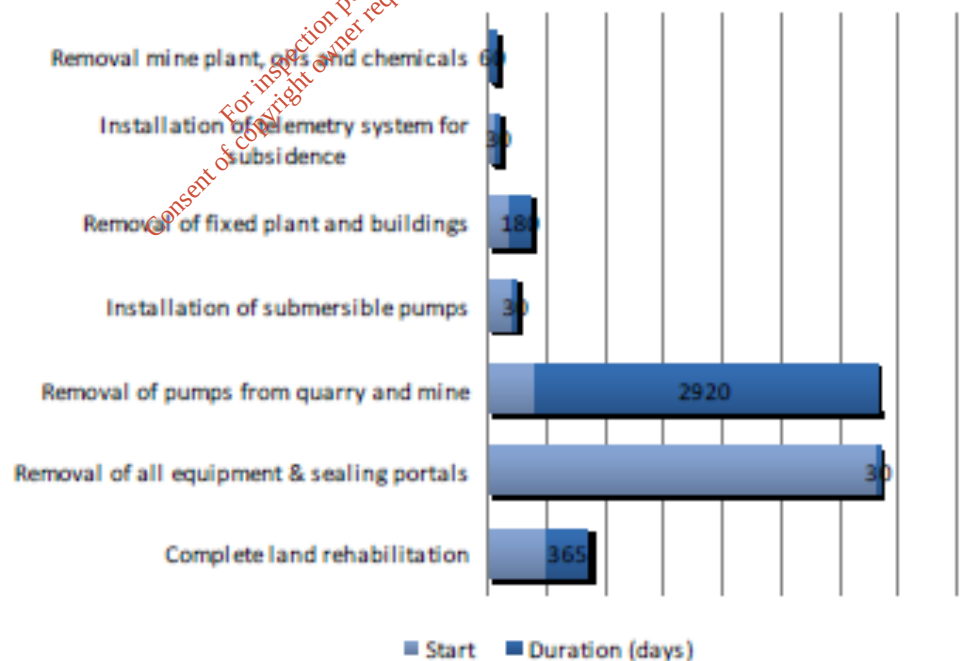
Two Gantt charts illustrating the timeframe for the completion of both phases of the closure plan are provided below.

The total duration for completion of CRAMP for the Saint-Gobain Mining (Ireland) Ltd mine is estimated at being 34 years. This consists of 2 years of plant and building decommissioning, landscaping and land rehabilitation; 30 years of controlled flooding, ground and surface water monitoring with a further 2 years of surface water monitoring.

Gantt Chart Closure Tasks for Quarry



Gantt Chart Closure Tasks for Mine



4.0 Criteria for Successful Decommissioning

Successful clean closure will be achieved when it can be demonstrated that there are no remaining environmental liabilities at the Saint Gobain gypsum mining facility. The criteria for successful clean site closure will be as follows:

1. Ensuring sufficient resources are made available so that the site closure is carried out to plan and within a reasonable timescale.
2. All plant safely decontaminated/decommissioned using standard procedures and authorised contractors.
3. All wastes handled, packaged, temporarily stored and disposed or recovered in a manner which complies with regulatory requirements.
4. All relevant records relating to waste and materials transfer or disposal were managed and retained throughout the decommissioning/closure process.
5. There is no soil or groundwater contamination at the site. This has been verified using monitoring data, site incident and pollution records and groundwater assessments conducted at the time of site closure. The criteria for evaluating whether the soil or groundwater is contaminated will be that samples are assessed against the Dutch Guideline Criteria (soil), the EPA's Interim Guideline Values (groundwater) and trigger limits set for each borehole location (groundwater) by Minerex Environmental Consultants.
6. The Environmental Management System will remain in place and continue to be implemented during the closure period by designated Saint-Gobain personnel.

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5.0 Decommissioning Plan Validation

Prior to commencement of the implementation of the CRAMP, it will be reviewed by an appropriately qualified independent consultant. This consultant will be nominated by Saint-Gobain Construction Products (Ireland) Ltd. and agreed with the EPA at the time.

Throughout the implementation of the Plan, the consultant will monitor progress and advise on the proper implementation of the Plan. After the Plan has been implemented and all associated works have been carried out, the consultant will conduct a Decommissioning and Closure Audit. This audit will verify that all equipment and materials have been properly disposed of and that the site has been rendered free from potential liabilities. A report on the Decommissioning and Closure Audit will be prepared for the EPA, and will form part of the validation certification for the Plan. The audit will ensure the following:

1. All actions as detailed in the CRAMP are carried out.
2. Timescales are as agreed in the decommissioning/closure plan.
3. All waste and recycled materials have been transported off site to contractors as agreed in the plan.
4. Evidence is available of all consignments transported off site.
5. There is no evidence of environmental impact on soil or groundwater arising from the activities associated with the decommissioning/closure plan.

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6.0 Decommissioning & Aftercare Costings

The tables below details estimated costs based on up to date pay rates and contractor rates. Heavy end estimates have been used to give higher region costs. Costs have been determined by applying a 4% increase to 2017 prices to allow for annual inflation increases.

Table 8: Decommissioning and Aftercare Costs

Task	Description	Closure/ Aftercare	Quantity	Unit	Unit Rate €	Cost €	Source of Rates
Decontamination of main site plant & equipment	Removal of gypsum from main plant & equipment	Closure	488	Man hours	21.22	€10,353	Spick N Span cleaners
Decontamination of Buildings and Structures	Removal of gypsum from main buildings & structures	Closure	976	Man Hours	21.22	€20,707	Spick N Span cleaners
Deconstruction of Production Buildings & Structures	Demolition of Lorry load conveyor shed, the homogeniser building, the engineering workshop and bund structures	Closure	652	Man Hours	31.82	€20,749	Cass Roofing
Removal of fixed plant	Removal of fixed plant	Closure	976	Man-hours	53.04	€51,767	Industry Standard
Decommissioning & cleaning of Diesel tanks	Cleaning out tanks with total capacity of 23m ³ (Assuming all tanks half full). Cost includes tank decontamination, transport of fuel for recovery/recycling, contractor labour and tank decommissioning/disassembly. Cost plus 20% as there are a number of large tanks (5) on site at the mine	Closure	23	M ³	53	€1,220	Rilta
Cleaning interceptor	Cleaning interceptor	Closure	1	Event	1633.63	€1,634	Rilta current cost
Disposal of Plant	Broken or damaged plant that is not transported for further use is metal fabricated and will be sold as scrap. This is cost neutral	Closure			0.00	€0	
Staffing Costs (includes Administration costs)	1 x Environmental Manager as part of full time role covering process site, landfill, & Mine site. €15,000 for mine site only.	Aftercare	1	Per Annum	15912.00	€15,912	Current Salary Rates
Staff Costs	Annual Leave Cover over 2 years	Aftercare	40	Days	130.48	€5,219	Current EHS Salary
Monitoring	Surface Water Monitoring	Aftercare	34	Years	464.63	€15,797	Current costs
	Ground Water Monitoring (12 Boreholes)	Aftercare	32	Years	1750.32	€56,010	Current costs
	Dust Monitoring	Aftercare	34	Per Month	127.30	€4,328	Current costs
	Noise Monitoring	Closure	2	Per Event	795.60	€1,591	Current costs
	Land Subsidence monitoring	Closure	34	Years	5304.00	€180,336	Current costs
Soil and topsoil required for ground rehabilitation	Landscaping of areas above flood level of opencast mined area	Closure	33,050	M ³	28.64	€946,605	Wills Bros
Application of soil and subsoil to required areas	Landscaping of areas above flood level of opencast mined area	Closure	33,050	M ³	3.39	€112,190	Wills Bros

Task	Description	Closure/ Aftercare	Quantity	Unit	Unit Rate €	Cost €	Source of Rates
Purchase of trees and plants for land rehabilitation	Land rehabilitation of opencast quarry areas	Closure	23.9	Ha	0.00	€0	Cost Neutral Greenbelt Project
Planting of trees, grasses and plants for land rehabilitation	Land rehabilitation of opencast quarry areas	Closure	23.9	Ha	0.00	€0	Cost Neutral Greenbelt Project
Task	Description	Closure/ Aftercare	Quantity	Unit	Unit Rate €	Cost €	Source of Rates
Draining and Cleaning MSE1 lagoons at rear of site if contaminated during decontamination	Sludge testing	Closure	3	Per sample	530.40	€1,591	Minerex
	Design & planning	Closure	2	Per lagoon	265.20	€530	Minerex
	Management & site work / supervision	Closure	6	Man Day	530.40	€3,182	Minerex
	Reporting	Closure	7	Per Report	424.32	€424	Minerex
	Pumps, generator, hosing, pipe stoppers.	Closure	3	Per day	265.20	€796	Minerex
	Hire of Dumper truck, Long reach excavator & JCB & Labour	Closure	4	Per Day	636.48	€2,546	GIL Rates
Filling in and seeding of MSE1 lagoons if required	Purchase of fill materials and soil. Staff costs to operate JCB and truck. Reseeding at lagoon areas in compliance with recommendations from the habitat survey for the processing site	Closure	6,253	M2	10.61	€66,332	GIL Rates
Removal of solid wastes	C&D Waste	Closure	5,000	Per Tonne	35.01	€175,032	Midland Waste
	Municipal solid waste	Closure	60	Per Tonne	25.46	€1,528	Midland Waste
	Mixed dry recyclables	Closure	100	Per Tonne	4.24	€424	Midland Waste
	Paper/ cardboard/ packaging	Closure	19	Per Tonne	243.98	€4,636	Midland Waste
	Wood	Closure	24	Per Tonne	31.82	€764	Midland Waste
	Chemicals/ paints / Ink & associated packaging	Closure	5	Per Tonne	1060.80	€5,304	Rilta
	Interceptor chambers	Closure	5	Per Tonne	270.50	€1,353	Rilta
	WEEE - hazardous	Closure	2	Per Tonne	254.59	€509	Irish Lamp
	Metal	Closure	1,000	Per Tonne	0.00	€0	Charlie Byrne
	Waste Oils & Solid oily waste	Closure	40	Per Tonne	1909.44	€76,378	Rilta
	External consultancy, advice and validation of closure plan steps	Closure	5	Days	795.60	€3,978	Industry standard
Purchase of Submersible pumps	Controlled flooding of underground and opencast mine areas	Closure	2	Per pump	10608.00	€21,216	Clarke Rewinds
Installation and commissioning of submersible pumps	Controlled flooding of underground and opencast mine areas	Closure	2	Per pump	371.28	€743	Clarke Rewinds

Task	Description	Closure/ Aftercare	Quantity	Unit	Unit Rate €	Cost €	Source of Rates
Annual preventative maintenance of submersible pumps	Controlled flooding of underground and opencast mine areas over 20 years	Aftercare	30	Per annum	371.28	€11,138	Clarke Rewinds
Utilities – water and electricity	Water used for cleaning/decommissioning and electricity supply to power decommissioning equipment for up to 6 months.	Closure	182	Days	106.08	€19,307	Estimated
External consultation	Closure plan audit to ensure criteria for successful closure	Closure	3	Days	795.60	€2,387	Industry standard
Task	Description	Closure/ Aftercare	Quantity	Unit	Unit Rate €	Cost €	Source of Rates
Licence enforcement charges (34 years)	EPA Licensing costs for P0519-03 (licensing cost divided by 2 and multiplied for total duration of CRAMP – decreasing by 1/24th year on year)	Aftercare	34	Years	5794.09	€196,999	As per EPA guidance
Insurance Costs	Site insurance costs including environmental liabilities, personal injury, vehicular etc...	Closure	2	Year	21124.77	€42,250	Current Insurance provider
Total Decommissioning Closure Costs						€1,778,360	
Total Aftercare costs						€305,404	
Total Estimated Decommissioning & After Care Costs						€2,083,764	
Contingency 10%						€208,376	
Total Funds Required including Contingency						€2,292,141	

Note* See table below for breakdown of Inflationary increases over a 34 year period.

Table 9: Projection of Future Cost Estimates Accounting for Inflation of 2% per Annum

Year	Aftercare Costs (+10% Contingency)	Decommissioning Costs (+10% Contingency)
2019	€335,944	€1,967,196
2020	€342,663	€2,006,540
2021	€349,517	€2,046,671
2022	€356,507	€2,087,604
2023	€363,637	€2,129,356
2024	€370,910	€2,171,943
2025	€378,328	€2,215,382
2026	€385,895	€2,259,690
2027	€393,612	€2,304,884
2028	€401,485	€2,350,981
2029	€409,514	€2,398,001
2030	€417,705	€2,445,961
2031	€426,059	€2,494,880
2032	€434,580	€2,544,778
2033	€443,272	€2,595,673
2034	€452,137	€2,647,587
2035	€461,180	€2,700,539
2036	€470,403	€2,754,549
2037	€479,811	€2,809,640
2038	€489,408	€2,865,833
2039	€499,196	€2,923,150
2040	€509,180	€2,981,613
2041	€519,363	€3,041,245
2042	€529,750	€3,102,070
2043	€540,345	€3,164,111
2044	€551,152	€3,227,394
2045	€562,175	€3,291,941
2046	€573,419	€3,357,780
2047	€584,887	€3,424,936
2048	€596,585	€3,493,435
2049	€608,517	€3,563,303
2050	€620,687	€3,634,569
2051	€633,101	€3,707,261
2052	€645,763	€3,781,406
2053	€658,678	€3,857,034
2054	€671,852	€3,934,175

7.0 Decommissioning and Closure Plan Review & Update

The Decommissioning and Closure Plan for the Knochacran / Drummond facility will be reviewed annually and updated where necessary. Details of the review and any updates will be reported in the AER.

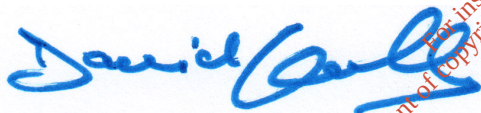
In the event of closure of the facility, the EPA will be notified in writing that the mining operations are ceasing and that the mine will be closing.

The Plan will then be implemented in a phased manner as described previously. Throughout the closure, the site's EMS will remain in place and it will be ensured that there are no uncontrolled releases to the environment. Saint-Gobain Mining (Ireland) Ltd will liaise with the EPA over the period to determine when it would be appropriate to apply for the surrender of the licence.

8.0 Closure Plan Funding Conclusion

The combined decommissioning and aftercare costs of the Saint-Gobain Mining (Ireland) Ltd mining facility in 2019 are calculated at €2,292,141. This figure includes a 10% contingency. The total aftercare and decommissioning costs have also been calculated over a 34 year period to allow for inflation increases at 2% per annum.

Saint Gobain, owners of Saint-Gobain Construction Products (Ireland) Ltd., has financial provision to meet these costs as required.



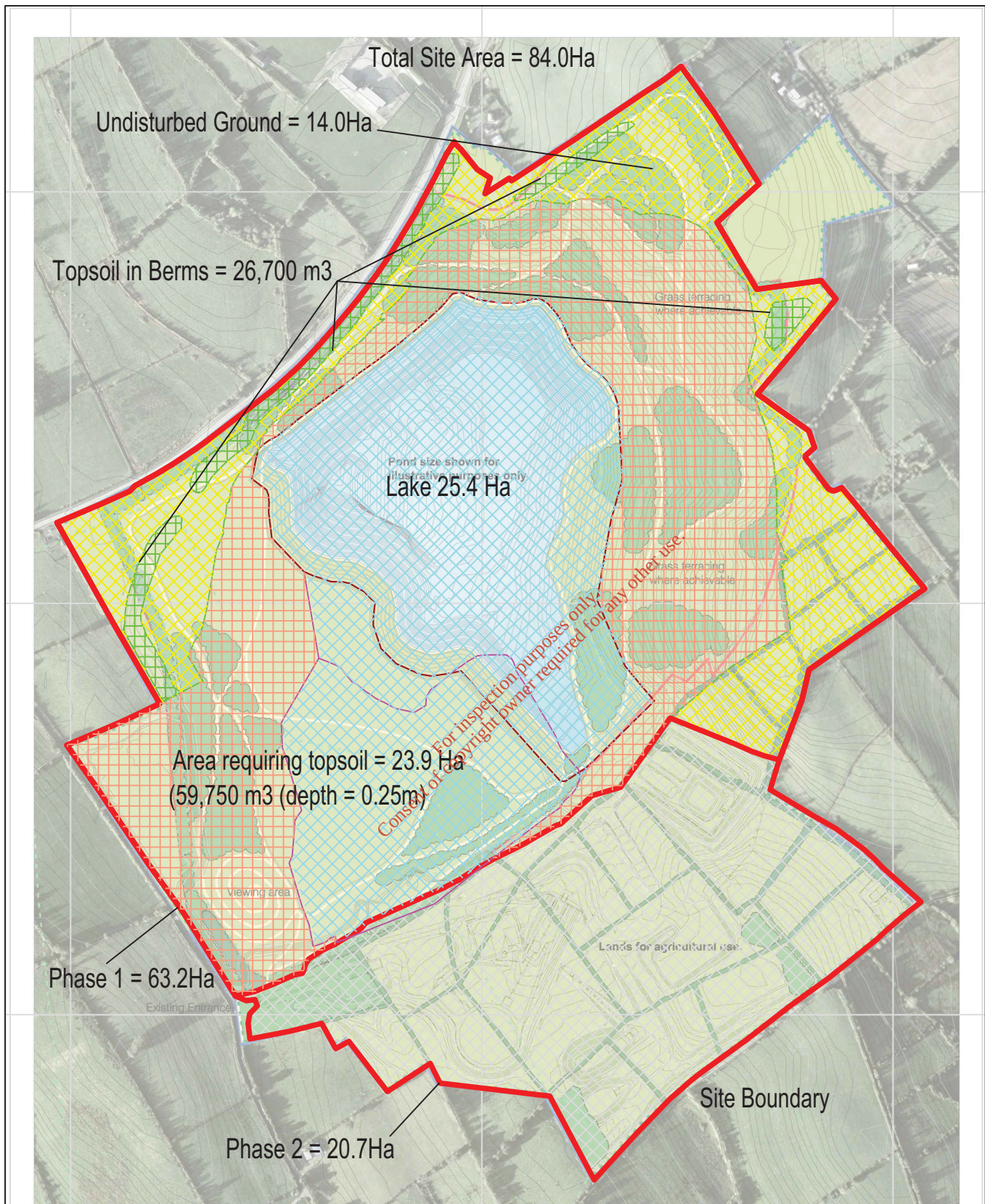
David Kelly BSc. MSc.
Technical Manager
KD Environmental Ltd.

11th June 2019

Appendix 1

Topsoil Requirement & Layout

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Topsoil Required = 59,750 m³
 Topsoil Available on Site = 26,700 m³
 Difference = 33,050 m³

ref drg: Closure Plan 5621_DR-301-02 Jan 2010

Title

Knocknacran Opencast Mine
 Topsoil Requirement for Closure Plan

Surveyed 01-09-17

Drawn 09-09-17

Grid National

Datum: O.S. Poolbeg +1000m

SCALE 1:2500



GYPSUM INDUSTRIES PLC
 KNOCKNACRAN OPENCAST
 Kingscourt, Co Cavan, Ireland

Drawing No.

350b-24-14