Objection	
Objector:	Mr Richard Carey
Organisation Name:	Glenveagh
Objector Address:	Digital Office Centre, Block B, Maynooth Business Campus, Maynooth, Co. Kildare.
Objection Title:	Objection #OS010431 - Applicant objection for Reg No:[W0301-01]
Objection Reference No.:	OS010431
Objection Received:	12 July 2022
Objector Type:	Applicant
Oral Hearing Requested?	No
Application	
Applicant:	Glv Bay Lane Limited
Reg. No.:	W0301-01

See below for Objection details.

Attachments are displayed on the following page(s).

EPA PROPOSED DECISION REVIEW

Bay Lane Soil Recovery Facility

MDR1499A
F01
12 July 2022

Document status

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Prepared by:

RPS

Prepared for:

GLV Bay Lane

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1 APPLICANT DETAILS

GLV Bay Lane wishes to appeal certain conditions in proposed decision Waste Licence Register No: WO301-0 the GLV Bay Lane soil recovery facility.

Applicant Contact: Richard Carey

Applicant Address: GLV Bay Lane Limited, The Townland of Bay, Bay Lane, St Margaret's, Co Dublin.

Reference number of the application: W0301-01

Planning reference: FW19A/0207

Subject matter of the objection.

- Objection to emission limit value for sulphates in schedule B2 of the proposed decision emissions to water, and request to make provision for an alternative arrangement.
- Objection to requirement to provide onsite wastewater treatment for the sanitary effluent arising on site, and request for agreement to allow tankering of the sanitary effluent off site.

The grounds for the objection and the reasons, consideration, and arguments on which they are based are presented in this document, as set out in EPA instructions[1].

[1] https://www.epa.ie/our-services/licensing/waste/waste-licensing/objections/ (retrieved 15 July 2022)

2 SCHEDULE B2 – SULPHATE ELV

This section sets out the reasoning for seeking to change the conditions around the proposed ELV of 250 mg/l for Sulphate at the discharge point in the River Shallon/Ward from

2.1 The ELV proposed

The proposed decision issued proposes that an ELV for sulphates (as SO4) in the effluent water set at 250 mg/l sulphate as SO4.

The EPA inspectors report gives the following reasoning for proposing this ELV:

> *"There is no sulphate limit in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009). The Ward River is not used for water abstractions but as there are elevated levels of sulphates and drinking water wells within 2km of the quarry the RD will include an ELV of 250mg/l for sulphate in accordance with the European Union (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014)."*

This ELV is problematic for GLV Bay Lane as

- The waters in Bay Lane Quarry are consistently elevated above 250mg/l for sulphate, and
- the baseline sulphate levels in the river upstream and at the discharge point show levels of sulphates elevated above 250mg/l, prior to discharge of waters from Bay Lane Soil Recovery Facility. The background concentrations for sulphates in the river water are elevated. Upstream concentrations of sulphates have been recorded recently (December 2021) at 211 mg/l sulphate as SO4 and historically as high as 500 mg/l for sulphate (July 2009). This suggests that the river has background concentrations of sulphates that are naturally elevated.

Direct discharge of site water with its background concentrations of sulphate to the River Shallon/Ward means that GLV Bay Lane would be at risk of breaching its ELV for Sulphate (250 mg/l).

Therefore, GLV Bay Lane requests that an appropriate alternative discharge arrangement be permitted by agreement with EPA and that Schedule B2 of the Waste Licence be changed to allow for this alternative.

2.2 Sulphate concentrations measured

GLV has conducted analysis[2] of sulphate concentrations in the waters in the quarry and of the Shallon / Ward River, into which the waters are to be discharged.

The locations of these sampling points are indicated in **Figure 2.1**. These locations are termed:

1. "Upstream" – upstream of the discharge point, on the NW side of the roundabout, approximately 200 metres NNW from nearest point of Bay Lane Quarry property boundary.
2. "Downstream 1" - at the proposed discharge point, and "Downstream 2" – 100m downstream of the discharge point.
3. "Pit 1", "Pit 2" and "Pit 3" are access points on ramps down to the pit as indicated.
4. "Tank" Settlement tank.

[2] Measured using Test Method No. TM38 by Element Materials Technology, UK, and since 2022 by Fitz Scientific of Drogheda..

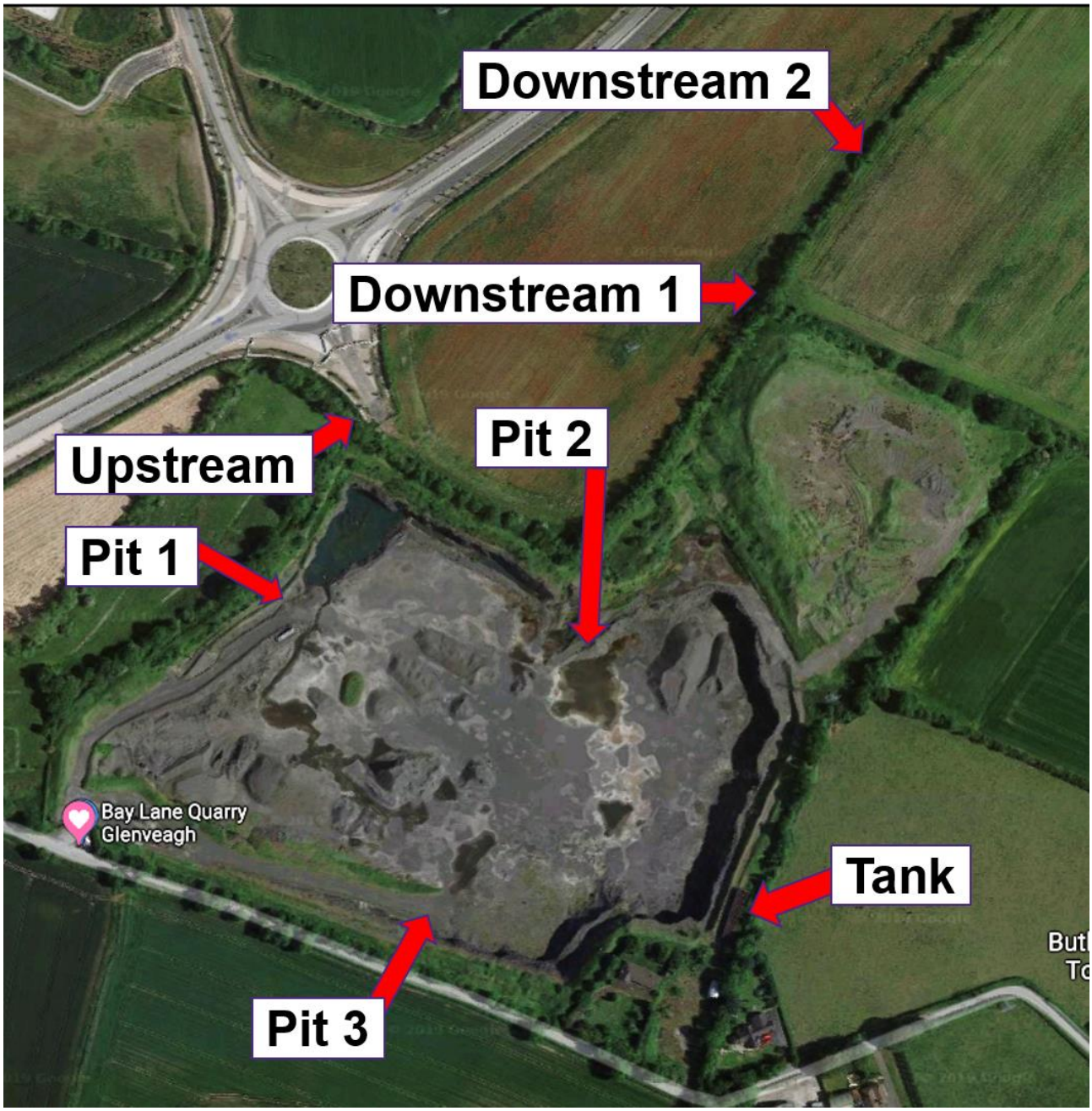

Figure 2.1: Water management features and sampling locations

During periods of low water levels, samples are taken from Pit 1, Pit 2 and Pit 3. During periods of low water levels, samples are taken near “Pit 1”.

This body of water was confined to the North-west corner of the site when the aerial image in **Figure 2.1** was taken, and this is representative of surface water conditions at the time of writing in July 2022.

A sampling regime has been conducted at the river during periods 2005-2009 (by the previous site operators) and 2019-2022 (by GLV Bay Lane). The results of the sampling are presented in **Table 2-1**.

Table 2-1: Concentration's mg/l sulphate as SO4 - Bay Lane Soil Recovery Facility

Date	Upstream	Downstream	Pit	Discharge	Notes
11/05/2005	98	83	-	355	Quarry operations
08/06/2005			-	287	Quarry operations
13/07/2005	90	93	-	353	Quarry operations
03/08/2005	200	203	-	281	Quarry operations
15/09/2005	54	55	-	331	Quarry operations
06/10/2005	125	370	-	370	Quarry operations
03/11/2005	124	597	-	338	Quarry operations
15/12/2005	130	115	-	570	Quarry operations
18/01/2006	120	120	-	580	Quarry operations
22/02/2006			-	277	Quarry operations
15/03/2006	105	297	-	377	Quarry operations
20/04/2006			-	391	Quarry operations
23/05/2006	129	137	-	403	Quarry operations
16/06/2006			-	330	Quarry operations
06/07/2006	60	69	-	377	Quarry operations
08/08/2006			-	448	Quarry operations
19/09/2006	202	438	-	413	Quarry operations
12/10/2006	151	328	-	550	Quarry operations
08/11/2006	164	331	-	413	Quarry operations
24/07/2007	117	231	-	193	Quarry operations
16/08/2007			-	349	Quarry operations
20/09/2007	49	223	-	279	Quarry operations
31/10/2007			-	385	Quarry operations
08/11/2007	124	413	-	457	Quarry operations
28/01/2008	131	330	-	330	Quarry operations
16/04/2008			-	388	Quarry operations
09/05/2008	84	281	-	327	Quarry operations
27/06/2008	349	327	-	380	Quarry operations
10/10/2008	118	296	-	229	Quarry operations
03/11/2008	83	213	-	197	Quarry operations
05/12/2008	97.2	88.4	-	102	Quarry operations
29/05/2009	350	125	-	413	Quarry operations
29/07/2009	500	425	-	286	Quarry operations
26/08/2009	44	49	-	385	Quarry operations
16/09/2009	171	121	-	431	Quarry operations
29/09/2009	131	179	-	390	Quarry operations
02/11/2009	115	141	-	290.5	Quarry operations
26/11/2009	91.5	122.3	-		Quarry operations
19/12/2009	72.8	110	-	110	Quarry operations

Date	Upstream	Downstream	Pit	Discharge	Notes
10-year break in operations 2009-2019 – no water analysis data is available					
17/07/2019	117	624	798	No Discharge	No soil recovery
23/07/2019	96	681	965	No Discharge	No soil recovery
30/07/2019	97	558	989	No Discharge	No soil recovery
12/09/2019	85	410	832	No Discharge	No soil recovery
17/09/2019	81	233	591	No Discharge	No soil recovery
Discharge starts March 2020					
10/03/2020	121	88	752	395	GLV operations
26/06/2020	49	698	734	737	GLV operations
28/08/2020	75	277	792	817	GLV operations
25/11/2020	129	477	544	535	GLV operations
29/01/2021	120	231	314	336	GLV operations
30/04/2021	103	270	Dry	No Discharge	GLV operations
16/07/2021	Dry	Dry	437	No Discharge	GLV operations
20/08/2021	Dry	Dry	478	No Discharge	GLV operations
19/11/2021	Dry	Dry	476	No Discharge	GLV operations
17/12/2021	211	212	564	525	GLV operations
01/04/2022	156	147	378	378	GLV operations
05/05/2022	131	379	379	379	GLV operations

2.3 Discussion

2.3.1 Source of sulphate arisings

When rock minerals containing sulphide are exposed to water and to atmospheric oxygen, this results in the oxidation of sulphides into sulphate, which is then released into the surrounding surface and groundwaters.

Sulphates exist in nearly all natural waters, in concentrations that vary according to the nature of the terrain through which they flow.

The limestone rock in Bay Lane Quarry has been documented as containing high levels of iron pyrite, an iron sulphide with the chemical formula FeS_2. Iron pyrite reacts with water and dissolved molecular oxygen to form sulphate and iron oxyhydroxides.

The quarrying operation (c.2001-2009) exposed large volumes of limestone rock face to oxidative conditions, leading to sulphate concentrations in both rock and water.

The elevated concentrations in aggregate rock used in concrete products led to closure of Bay Lane Quarry operations in 2009.

The EPA inspectors report on the Waste Licence application file notes this understanding:

> *"There is potential for aggregate piles at the base of the quarry to contain enough pyrite to cause sulphate-containing leachate. Water monitoring results (2019-2021) of the standing water within the quarry void have shown elevated levels of SO_4."*

The closure of the quarry in 2009 stopped the exposure of new iron pyrite. The remaining exposed rock faces and aggregate on the quarry floor continued to oxidise in the interim. The removal by GLV Bay Lane of the aggregate remaining in the quarry has helped reduce leachate generating potential.

The water in Bay Lane Quarry now is held in the limited sump area and arises from rainfall and natural incursion of groundwater. This water has increasingly limited area of contact with pyrite and has increasingly limited duration of contact with the pyrite. This management (no new pyrite exposure and shortened contact time) is contributing to reduced concentrations of sulphates in water, over time, as evidenced in **Table 2-1**.

2.3.2 Sulphate concentrations measured in the river

The sulphate analysis data indicates that sulphate concentrations in the river are elevated already without quarry influence:

- Upstream sulphate concentrations in the river were elevated historically, having been recorded at
  - 500 mg/l sulphate as SO4 in July 2009.
- Upstream sulphate concentrations in the river are currently elevated, having been recorded at
  - 156 mg/l sulphate as SO4 in April 2022, and
  - 211 mg/l sulphate as SO4 in December 2021.

These measurements occur prior at a location upstream of current and past discharges from Bay Lane Quarry.

Downstream sulphate concentrations were also elevated before any water discharge from Bay Lane Soil Recovery Facility started in March 2020. The sulphate concentrations downstream averaged 502 mg/l sulphate as SO4 (for n=5 samples) and reached a high of 681 mg/l sulphate as SO4 in July 2019 and exceeded the proposed EPA limit value (250mg/l) on 4 of 5 sampling occasions.

The outcome of this analysis upstream and downstream indicates that surface water sulphate concentrations are already slightly elevated but increase around the quarry. The cause of these elevated concentrations has not been definitively determined. Causes may include exposure to sulphide containing minerals in the streambed, or on exposed rock faces or from incursion of sulphate containing groundwater.

We note that the EPA inspectors report notes:

> *… it has been noted that there is an increase in sulphates between the upstream and downstream monitoring locations of the facility. The extent of the impact is reducing over time with monitoring results showing an improvement trend.*

GLV Bay Lane notes that pre-existing conditions in the river are leading to elevated sulphate concentrations downstream before the quarry discharge influences the river.

2.3.3 Sulphates arisings in the pit are falling

The EPA inspector's report recognises that operations will lead to reduced sulphate arisings:

> *"Backfilling the quarry will reduce the exposure of the aggregate piles to air which will have a positive impact reducing the leachate potential of aggregate piles as the exposure to air will be reduced permanently."*

The data suggests that the backfilling operation of the soil recovery facility is reducing the leachate potential of the aggregate piles and the concentrations of sulphate in the surface water. Mechanisms for how sulphate concentrations and total sulphate load on the river are reducing are likely to include:

1. The now-complete removal of the aggregate remaining from the quarrying operations, reduces exposure of the high-surface aggregate rock to oxidising conditions, and hence sulphates arising.
2. Removing the water from the quarry shortens the duration of pooled water contact with the pyrite containing mineral rock. Shorter duration of contact means less oxidation of sulphides and reduced concentrations in the water. This suggests that sulphate concentrations may settle at an equilibrium aligned to water contact duration and rockface area of exposure to water. Any equilibrium concentration may be higher than the 250 mg/l sulphate as SO4 ELV proposed.
3. Backfilling the quarry with soil and stone, which permanently reduces water and air/oxygen contact with the pyrite and thereby reduces the leachate potential.

4. Backfilling the quarry with a soil component which absorbs water, reducing free water volumes. This means that, for the same levels of water infiltration, the volumes requiring discharge will reduce.

Bay Lane Soil Recovery Facility will cease to discharge water at some point before restoration is complete. Restoration completion is due in an estimated 2.5-5 years' time – i.e., c. end-2024 to mid-2027.

The point at which discharge will no longer be required will be dictated by the compaction solidity, and the mechanics, of the soils. At this point groundwater levels will equalise naturally within the quarry. GLV Bay Lane will continue its soil recovery and restoration operation to completion without further requirement for water discharge. The issue of high concentrations of sulphate in the surface water therefore appears to be time limited, dictated by the pace / duration of operations at the soil recovery facility.

2.3.4 Sulphate load into the river is small

Given the most recent concentration of sulphates determined, and the pumping rate and duration, it is possible to calculate the sulphate loading to the river. This calculation of loading is shown in table following.

Table 2-2: Calculation of sulphate load

Factor	Rate	Units	Notes
Pumping rate / day @ 2 hours / week	0.012	Hours/day	May and June 2022
Pump rated capacity at 15m head	3,672,000	Litres /day	Calculated
Pumping rate per day	43,714	Litres / day	Calculated
Sulphate concentration	379	mg/l sulphate as SO4	May 2022
Sulphate load	16.6	Kg SO4/ day	Calculated

This 16.6 Kg / day is a small loading of sulphate. For reference

- The (2019) trade effluent licence from Fingal, WPW/F/081 capped the total quantity of sulphate as S04 that could be discharged per day at 241.9 KG of SO4.
- Also, for reference, the 2004 trade effluent licence for the site from Fingal, WPW/F/047 Capped the total quantity of sulphate as S04 that could be discharged per day at 730 kg of S04.

The total load being discharged to the river is a small fraction (6.8%) of the load that had been permitted under the 2019 permit from Fingal County Council.

Therefore, we conclude that this rate of loading should be acceptable under Waste Licensing.

2.3.5 Solutions

GLV Bay Lane has considered a range of management options which could be implemented at the site to manage sulphate at the facility. These options are set out in table following.

Table 2-3: Management options considered to reduce the sulphate issue

Management option	Description of the option
1. Discharge into the Shallon / Ward River until floor levels at Bay Lane Quarry increase, under a changed ELV. Storing water onsite for short periods pending discharge with hydrobrake at times of high river flow.	This option would discharge the water with its background concentrations of sulphate into the river for an estimated 2.5 to 5-year duration. This would require a change to the ELV proposed in the EPA proposed decision. ELVs should be set at appropriate varying scales to allow for balancing of peaks. Example ELVs such as a daily average ELV of 625mg/l, a monthly average ELV of 500mg/l and an annual average ELV of 400mg/l.[3] At low or no flow periods, water would be stored onsite. Hydrobrake slows output to minimise peaking in sulphate concentrations.
2. Reduce water inflow to minimise volumes arising.	The inflow to Bay Lane Quarry is primarily diffuse due to rain/precipitation and via surface and underground channels. Measures will be taken to reduce the existing small surface inputs to reduce volumes arising.
3. Monitoring	Monitoring ground and surface waters via wet chemistry and telemetry to better understand management options.
4. Redirect water offsite to treatment at WWTP.	Transport the water off site, via tanker or sewer discharge, to a third-party wastewater treatment facility. It is not certain that a WWTP would be equipped to remove sulphates. A WWTP has not been identified to accept the water. The high concentrations of sulphate could be problematic for the operation of a WWTP itself, and its own discharge ELVs. It is likely that costs of transport and treatment would be significantly high if a facility were identified. This option is not considered to be viable.
5. Redirect water offsite to third party use.	Concrete manufacturing requires significant volumes of Water. Halton Concrete on Bay Lane (0.5km distance) is unlikely to be an option for the management of excess water as the impact of sulphates on concrete properties can be negative, and demand has high peaking. Preliminary investigation indicates long haul distances to irrigated agriculture, which has only periodic, high-peak demand for irrigation water. This option is not considered to be viable.
6. Remove the sulphate onsite	Reverse osmosis is the established industrial method of removing sulphates from water. This method is not considered to be viable due to high cost and short time of required operation. This option is not considered to be viable.
7. Do nothing	This option will not meet the objective of returning Bay Lane Quarry to agricultural state. This option may also result in ongoing elevated concentrations of sulphates leaching into impounded water and into groundwater and local wells. This option is not considered to be viable and was previously eliminated.

GLV Bay Lane proposes that a combination of options 1 (discharge under elevated ELVs at suitable timings), 2 (reduced surface inputs) and 3 (monitoring) be employed.

[3] Similar ELVs were set for Licence No. P0519-04.

Option 1 (discharge under elevated ELVs at suitable timings) requires an appropriate alternative discharge arrangement be made by agreement with EPA and that Schedule B2 of the Waste Licence reflect this possibility.

2.3.6 Conclusion

GLV Bay Lane Limited requests EPA to increase the sulphate emission limit value. This change should be implemented via conditions to ensure that concentration and loading of sulphates in the river remain at acceptable levels, e.g.

- ELVs set at appropriate varying scales, such as a daily average ELV, a monthly average ELV and an annual average ELV.[4]
- To discharge only when there is adequate flow in the water to stay under the desired maximum concentration of sulphate in the river water. Water to be retained onsite in the interim periods of low or no flow.
- To discharge at an agreed loading rate.
- Discharge flows restricted by a hydrobrake to minimise peaking of sulphate levels.

[4] Similar ELVs a daily average ELV of 625mg/l, a monthly average ELV of 500mg/l and an annual average ELV of 400mg/l were set for Licence No. P0519-04.

3 CONDITION 3.23 – WWTP

GLV Bay Lane had initially proposed to provide and maintain a wastewater treatment plant at the facility for the treatment of sanitary effluent arising on-site.

GLV Bay Lane now has a preference to continue tankering wastewater offsite by an appropriately licensed haulier to an appropriately licensed treatment facility.

GLV Bay Lane requests that Condition 3.23 of the Waste Licence permit this changed approach.