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Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

Information to inform Habitats Regulation Assessment Pursuant to Article 6(3): Curraghinalt Gold Project

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1 INTRODUCTION

The Curraghinalt Project is an underground gold mining project in County Tyrone, Northern Ireland. Dalradian Gold Limited (DGL) is the project proponent and is the owner of the mineral prospecting licences that comprise the Curraghinalt Project. DGL is based in Northern Ireland and has offices in Omagh and Gortin and site offices at Curraghinalt, the location of an advanced exploration/development programme.

The exploration of the Curraghinalt deposit started in 1983 and work has been undertaken by a number of companies including Ennex International plc (1983 to 1997), Tournigan Gold Corporation (2003 to 2009) and Dalradian (2010 to present). In 1987, planning permission was granted to construct underground exploration tunnels, including a portal entrance on the hillside, an adit tunnel of 411 m and three underground headings. In January 2014, DGL obtained planning permission to extend the underground exploration workings by up to approximately 2000 m in order to access and define the deposit and to sample the mineralized material for off-site metallurgical testing.

If implemented, the construction phase will take approximately two years. The operational life of the mine is expected to be between 20 - 25 years based on the known mineral resources and proposed production rate.

The primary approval that needs to be obtained to proceed with the project is planning permission from the Department for Infrastructure (DfI) in Northern Ireland. However a number of other consents (Discharge Consents etc.) must also be obtained from other statutory agencies. This document is intended to assist any agency in the preparation for Habitats Regulations Assessments required for this project.

An EIA was undertaken provided input to project design decisions. An Environmental Statement (ES) and Addendum has been prepared in support of the application for planning permission and should be read in conjunction with this document. In addition, the SRK Document "Outline Construction Environmental Management Plan" (CEMP) (2019) v0.12, contains details of proposed mitigation strategies proposed for the project and should be read by all parties and statutory undertakers both in full and in conjunction with this document

The location of the site within Northern Ireland and the general assessment site boundaries are indicated within the project ES and planning documents associated with the proposal.

1.1 Remit and Scope of Assessment

It is the responsibility of every competent authority and statutory undertaker (in respect of any and all consents required) to conduct assessments pursuant to Article 6 of the Habitats Directive. This document is intended to assist in that process.

However, it is considered best practice to develop development proposals and potential proposals with regard to this assessment and test potential proposals and mitigation measures prior to the formal submission of applications for consent. To that end, this assessment is intended to:-

- Undertake a review of the environmental baseline;
- Review potential mitigation plans;
- Identify potentially significant ecological impacts;
- Conduct assessment based on this information; and
- Produce a draft Article 6 Appropriate Assessment.

This assessment has a narrow focus. It is protection-led, conducted with due regard to the Precautionary Principle and concerned exclusively with the maintenance of the integrity of Natura 2000 Sites, specifically assessment of the nature and significance of all potential effects on site selection features and conservation objectives of Natura 2000 sites concerned.

During project planning, a number of alternatives were considered for mining, infrastructure location, processing and waste management. These alternatives are described in chapter 5 of the project ES and are not repeated here. In line with best environmental practice and the precautionary principle, various changes were made to project design as a result of the close collaboration between the EIA and engineering design teams.

1.2 Legislative Context

Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, commonly known as the Habitats Directive, is transposed into law in Northern Ireland by the Conservation (Natural Habitats, etc.,) Regulations (Northern Ireland) 1995 (as amended); the Conservation Regulations.

Article 6(3) of the Habitats Directive (transposed by Regulation 43) establishes the requirement that any plan or project likely to have a significant effect on any Natura 2000 Site(s) shall first be subject to an Appropriate Assessment (AA) of the implications for the site(s), and further that competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site(s) concerned:

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*."

The Natura 2000 network is comprised of sites designated, or in the latter stages of designation, under both the EU Birds Directive and EU Habitats Directive. Specifically:

- Special Areas of Conservation (SAC) designated under the EU Habitats Directive for flora, fauna and habitat interest which have been adopted by the European Commission (EC) and formally designated by the national government;

- Special Protection Areas (SPA) designated under the EU Birds Directive for rare, vulnerable or migratory bird interest which have been adopted by the EC and formally designated by the national government;

- Candidate and proposed sites (cSAC and pSPA), being those that have been submitted to the EC but not yet formally adopted; and

- Sites of Community Importance (SCI), being those that have been adopted by the EC, but not yet formally designated by the national government. Once a site is adopted as an SCI it is subject to Article 6 (2), (3) and (4) of the EC Habitats Directive 92/43/EEC.

Ramsar Sites are listed under the International Convention on Wetlands of International Importance (the Ramsar Convention) and usually share boundaries with SACs and/or SPAs. In Northern Ireland it is established Government policy to afford to Ramsar Sites the same degree of protection as Natura 2000 sites.

2 PROJECT PARAMETERS

The project parameters are described in Section 2.1 of the Addendum to the project ES and should be read in conjunction with this assessment.

Following the 2017 planning application, DGL reviewed the project design taking into account feedback during the planning application process. This has resulted in some refinements to the

detailed project description assessed in the ES. A summary of the proposed changes is listed below. As a result of these changes and recent CJEU case law, the shadow Habitats Regulations Assessment issued in 2017 has been revisited to take account of the project revisions.

Resulting changes to project parameters are presented in Section 2.1 of the ES Addendum.

- Changes in infrastructure linking mine operations to surface operations (Section 2.3):
  - Relocation of primary (first-stage) crushing underground;
  - Introduction of ore-sorting equipment underground;
  - Introduction of a conveyor to be used as the primary method to transport material from the underground mine to surface;
  - Change in the orientation of the portal to accommodate the conveyor system

- Process and product changes (Section 2.4):
  - Simplified ore processing resulting in the removal of cyanide from the process and consequent change in product;
  - Transportation of concentrate off site and out of Northern Ireland;
  - Changes to tailings and paste backfill;

- Changes in the mine waste management (Section 2.5); and
- Changes to construction management (Section 2.6).

In addition to the design modifications, DGL has also committed to delivering the project as carbon neutral over its lifetime. This is further described in Section 3 of the ES Addendum.

For the purposes of this assessment, the project as described in the 2017 Environmental Statement (ES) will be referred to as the "2017 design" and the updated design will be referred to as the "2019 update".

Table 1: Project parameters comparison of the submitted 2017 design and the 2019 update.

Parameter		2017 design	2019 update
Mineral resource (ore processed)		10 Million tonnes (at 5.0 grams per tonne gold cut-off grade)	8.7 Million tonnes (at 3.0 grams per tonne gold cut-off grade)
Production rates	Ore fed to the plant (run of mine) on average	Between 1,200 and 1,700 tonnes per day	Between 1,200 and 1,500 tonnes per day
	Final product	Total gold production of approximately 3.5 M oz. over the life of the mine.	No change
		N/A	0.45 million tonnes of concentrate
Development life	Construction period	Approximately 2 years (includes construction of infrastructure and initial development of the mine workings)	No change
	Operational period (known as the Life-of-Mine)	20-25 years	No change
	Closure period	It is estimated that it will take 1 year to complete restoration of the mine site. This will be followed by 5 years post closure monitoring and maintenance.	No change.
Operational hours	Mine	365 operating days per year, 24 hours per day.	No change
Staff numbers	Construction phase	300-400 personnel (total employed) Average number of people on site on day shift is approx. 220 and 60 on nightshift	No change
	Operational phase	325-425 personnel in total. Average 156 on dayshift and 90 on nightshift	No change
Mining and processing wastes	Waste rock	12.9 Mt (approximately 79% stored underground as backfill)	15.9 Mt (approximately 71% stored underground as backfill)
	Tailings	10 Mt (approximately 43% stored underground as backfill)	8.25Mt (approximately 57% stored underground as backfill)
Resource use	Water demand	22.5 m3/hr fresh make-up water	15.9 m^3/hr fresh make-up water of which 7.16m^3 is clean water

Parameter		2017 design	2019 update
			(supplied from the site water treatment plant or from the fresh water pond)
	Power demand	Loads will be 7 MW average running load and 54,200,000 kwhr/yr.	Loads will be 7 MW average running load and ~48,000,000 kwhr/yr.
	Fuel (diesel)	4.3 million litres per annum	3.3 million litres per annum

2.1 Rationale for the proposed changes

To reduce the number of vehicle movements between the underground workings and the process plant a system of conveyors has been introduced. This extends the conveyor system to feed the process plant back towards the portal and down the main decline. This will significantly reduce the project diesel consumption To accommodate the conveyor, the portal design has been modified and its orientation changed.

The extension of the conveyor system will result in the relocation of the primary crusher from surface to the underground mine. DGL has also introduced an underground ore sorting process

Although cyanide is used safely in gold mines all over the world, DGL recognised that local communities are strongly opposed to the use of cyanide in the mineral processing operation. DGL has investigated means to remove cyanide from the processing operation and still achieve economic viability of the mine. It has now established this is possible through production of a gold flotation concentrate that will be transported off site for final processing.

Having established this, DGL has removed cyanide-use entirely from the mine design. The removal of the carbon-in-leach circuit, and associated reagent-handling facilities, has resulted in a smaller process plant footprint and removal of several external tanks. The remaining external flotation tanks that were located to the south of the process plant building have been relocated to the north side of this building

The general infrastructure layout for the site, including the newly introduced conveyors is shown in **Error! Reference source not found.** of the ES Addendum.

2.2 Hydrological Context of Proposal

As the proposal site is not located within any area designated as a Natura 2000 site, no direct impacts are likely to arise upon the Natura 2000 network should the proposal proceed. That being so, the primary impact pathway between the proposal site consists of indirect impacts of a hydrological nature.

The Curraghinalt deposit and the infrastructure sites are located within an area comprising a topographic ridge that forms the drainage divide between the Owenkillew River and the Owenreagh River. Much of the higher ground on the Curraghinalt ridge is covered with peat, supporting blanket bog and wet heath habitats. Peat thickness varies from <5 cm to over 3 m that has historically, and continues to be, subject to cutover in some areas.

The Owenkillew River is notable for the physical diversity and naturalness of its banks and channel, and the richness and naturalness of its plant and animal communities, which includes extensive beds of Stream Water Crowfoot (*Ranunculus penicillatus* var. *penicillatus*) and its population of Freshwater Pearl Mussel (*Margaritifera margaritifera*) that is the largest in Northern Ireland.

The river basin management plan (RBMP) for the North Western River Basin (of which all rivers draining the project site form a part) was prepared in accordance with legislation transposed from the EU Water Framework Directive. The RBMP summarises the state of the water environment and define actions to protect and improve the water environment.

The current status of, and future objectives for the rivers are outlined below.

The stretch of the Owenkillew adjacent to the project site is currently of Good status although the 2021 and 2027 objectives reduce to Moderate. This reduction in objective in unexplained.

The stretch of the Owenreagh adjacent to the application site is currently of Good status with upstream waterbodies also of Good status.

The Mourne River is currently of Moderate Ecological Potential with objectives of Good Ecological Potential. The Upper Foyle transitional water is of Moderate status. The receiving Foyle Harbour and Faughan water body is of Moderate Ecological Potential and is termed a heavily modified water body. Finally, Lough Foyle is of Good status.

Overall, the water quality in watercourses downstream of the project sites reflects the natural mineralisation of the project area and the wider effects of peaty soils and agricultural activity in the local catchments. Average pH is circum-neutral and within guideline values although pH of individual samples ranges quite widely, from 5.3 to 8. Electrical conductivity, a reflection of dissolved ions in the water, is fairly consistent at between 100 and 122 µS/cm. Existing nutrient levels in the watercourses often exceed ideal values for freshwater pearl mussels. Total suspended solids are generally low, elevated levels are generally correlated with high flows associated with heavy rainfall. Concentrations of metals are generally below guideline values but concentrations of cadmium, copper, iron, mercury, manganese and selenium sometimes exceed environmental quality standards defined in legislation, specifically the Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015. Watercourses draining the site are detailed within the CEMP at Figure 3.6.

2.3 Hydrogeology

The project is located in the area of the Gortin Groundwater Body, which is characterised as having limited potential for significant abstraction. This groundwater body incorporates the entire catchments of the Owenkillew, Glenelly and Mourne Rivers.

Hydrogeological studies for the Curraghinalt Project have established that fracture flow is the dominant flow mechanism in the bedrock with most flow occurring in the upper, weathered zone (up to approximately 20 m depth). The bedrock aquifer is low-yielding with limited potential for significant abstraction. The superficial alluvial and glaciofluvial deposits in the area are generally localised to river valley and low-lying areas, with the exception of the thin glacial outwash deposits recorded up-slope, at the proposed infrastructure site. Typically, the peat has very low hydraulic conductivity and high storage capacity.

Groundwater levels in the weathered bedrock superficial deposits are close to surface and closely mirror topographic elevation. The hills forming the ridge between the Owenkillew and Owenreagh Rivers therefore comprise a hydraulic divide with groundwater flowing away from the high ground towards the valleys. Groundwater levels in the deeper fresh bedrock are generally similar to shallow deposits, however they do not follow topographical lows. Piezometeric groundwater levels in the fresh bedrock in valley areas are greater than shallow units indicating a natural upward gradient and discharge to the river valleys.

Most groundwater flow is shallow, discharging locally and rapidly to surface waters. Within the river valleys some limited discharge from bedrock to glaciofluvial and alluvium aquifers is likely to occur. The water table in intact peatland fluctuates only a little, but is usually close to the surface, naturally either above or below usually by only centimetres. The storage and the runoff behaviour of the peat varies significantly with very small changes in water level. The peat stores water in dryer periods but is prone to flashy high discharges when the water level is higher during wetter periods.

All groundwaters in the area are fresh quality, with bedrock groundwater characterised by a weakly mineralised calcium or sodium bicarbonate signature and low to neutral pH. Sands and gravels groundwater has a similar calcium bircarbonate and low/neutral pH chemistry.

Peat groundwaters typically have a sodium chloride signature and are acidic and oxidising with low total dissolved solids and a high iron content. In general, the groundwater shows an increase in total dissolved solids and electrical conductivity with depth from the superficial sediments, to the weathered bedrock and in-turn the fresh bedrock. Similarly, there is a general increase in many metal concentrations with depth. This is likely a result of the reduced interaction with freshwater recharge to the deeper formations and increased age of the groundwater water at depth (i.e. increased water mineralisation).

The only groundwater abstraction licence in the vicinity of the study area is held by Cemex NI Ltd, approximately 2 km from the project infrastructure area.

Private (non-regulated) groundwater abstractions, including wells and springs, are relatively commonplace across the region and 135 abstraction points were identified from a groundwater user survey undertaken between October 2015 and February 2016 within the project area.

3 METHODOLOGY

Assessments pursuant to the requirements of Article 6 of the Habitats Directive are completed in accordance with the EC recommended methodology, set out in the following documents:

- 'Assessment of plans and projects significantly affecting Natura 2000 sites, Methodological guidance on the provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC'; and

- 'Managing Natura 2000 Sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'.

The methodology recommends a four-staged approach, where the results obtained upon completion of each stage determines the requirement for and scope of the subsequent stage:

Stage One: Screening or Test of Likely Significance: The process which identifies the likely impacts of a project or plan upon Natura 2000 sites, either alone or in combination with other projects or plans, and determines whether or not these impacts are likely to be significant. A baseline environmental assessment is required to identify potential sources of impact and environmental receptors.

Stage Two: Appropriate Assessment: The consideration of the impact on the integrity of Natura 2000 sites of the likely significant impacts of the plan or project identified in Stage 1. Impacts are assessed alone and in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.

Stages Three and Four: They provide a methodology for the further assessment of plans or projects where likely significant effects cannot be excluded on the basis of the first two stages of assessment. These stages are concerned respectively with alternative methods of achieving the objectives of a plan or project which avoids adverse impacts and of assessing and designing compensatory measures for plans or projects which must progress for established Reasons of Overriding Public Interest.

These stages are unlikely to be of relevance to the current assessment.

To permit this assessment process to be followed in the current instance, this assessment reviews and assesses the environmental baseline and identifies potential sources of impact. Where such impacts may exist, a review of mitigation and the scientific literature is carried out to determine whether or not they are likely to be significant.

4 SOURCES OF INFORMATION

The data and information employed in the course of this assessment was sourced from the following documents and publicly available resources:

- Curraghinalt Environmental Statement (SRK for DGL);
- Curraghinalt Environmental Statement Addendum (SRK for DGL);
- Outline Construction Environmental Management Plan (SRK for DGL, 2019)
- Owenkillew SAC: Conservation Objectives (published NIEA);
- Foyle & Tributaries SAC: Conservation Objectives (published NIEA);
- Lough Foyle Ramsar Site: RIS (published NIEA)
- Northern Ireland Environment Agency (NIEA) (www.ni-environment.gov.uk);
- National Biodiversity Network (NBN) gateway (www.searchnbn.net);
- Joint Nature Conservation Committee (JNCC) (www.jncc.gov.uk);

The site and its environs were visited by Corvus Consulting and allied personnel between 2016 & 2017 for the purposes of this assessment.

4.1 Screening of European Sites

The Proposal site is not within, or subject to, any statutory nature conservation designations made under international legislation. The site is indirectly hydrologically and ecologically connected to a variety of Natura 2000 sites.

Where such connections exist, assessment must be made of potential indirect impacts upon receptor sites. The assessment herein has concentrated upon a variety of identified and potential sources of impact. Such assessments are of merit when potential impacts upon designated sites are considered.

Designated sites have been screened for potential impacts (beyond *de minimis*) against relevant standards where they are located within the following set distances from the proposed development**:**

- Natura 2000 Sites ((Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites)) within 10km of the installation;

Interrogation of the NIEA (Protected Areas) website yielded the following information regarding Natura 2000 sites situated within a 10km buffer (determined by generation of a 10km buffer surrounding the boundary of the maximum extent of exploration) of the site) and thus potentially implicated in terms of adverse impacts resulting from the proposal:

- Owenkillew River SAC: JNCC Site Code UK0030233;

- Upper Ballinderry River SAC: JNCC Site Code UK0030296
- Black Bog SAC/Ramsar Site: JNCC Site Code UK0016609 / UK Site Code 12003

Interrogation of the NIEA (Protected Areas) website yielded the following information regarding Natura 2000 sites outwith the abovementioned 10km buffer (determined by generation of a 10km buffer surrounding the boundary of the maximum extent of exploration) of the site but hydrologically linked to the proposal site and thus potentially implicated in terms of adverse impacts resulting from the proposal:

- River Foyle & Tributaries SAC: JNCC Site Code UK0030320
- Lough Foyle SPA: JNCC Site Code UK9020031
- Lough Foyle Ramsar Site: UK Site Code UK12014
- The potential for potential transboundary impact upon sites in the Republic of Ireland is also considered[1],[2]. However it is noted that as the UK sites above are upstream of all potentially connected ROI sites, should it be established that no impact will arise upon the UK Natura 2000 sites, then a corollary of that statement is that not impact will arise upon the ROI Natura 2000 Sites.

4.2 Rationale for Screening

The proposal site is not situated within any Natura 2000 site. It is situated adjacent to Owenkillew SAC and several watercourses draining the site drain into the SAC. Therefore, should the project give rise to sources of adverse environmental impact, there is the potential for such sources to give rise to indirect impacts on The Owenkillew SAC and upon sites located further downstream.

Ecological impact assessment of potential indirect impacts on Natura 2000 sites is conducted utilising a standard source-pathway-receptor- model where, in order for an indirect impact to be established, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potential impact is not of any relevance or significance.

In the current instance it is accepted that the project includes potentially impacting activities, or SOURCES of potential impacts. In addition, a review of the project ES and Addendum, a document detailing all relevant sources of environmental information, indicates that PATHWAYS are extant connecting the project site with downstream designated sites.

That review has indicated that the sole likely significant pathway for indirect impacts is through the water environment which forms an environmental continuum between the proposal site and the designated sites. No other pathways (airborne deposition, noise, visual disturbance etc.) are

[1] Lough Foyle SPA (ROI) Site Code: 004087, Donegal.

[2] River Finn SAC (ROI) Site code: 002301, Donegal

likely (within the proper meaning of the word in an environmental assessment context[3]) to represent significant impact pathways.

The site selection features of Owenkillew River SAC, River Foyle & Tributaries SAC and Lough Foyle Ramsar Site and the related conservation objectives, represent valuable ecological RECEPTORS.

It has been concluded that the source-pathway-receptor mechanism cannot be established for any additional Natura 2000 sites as those sites are distant from, upstream or not hydrologically or ecologically connected to the proposal site. Therefore, the only Natura 2000 sites potentially implicated in terms of indirect impacts as a result of the project are Owenkillew River SAC, River Foyle & Tributaries SAC and Lough Foyle Ramsar Site.

[3] That is, with a genuine probability of occurrence.

4.3 Brief Description of the Natura 2000 Sites

4.3.1 Owenkillew River SAC

Country	Northern Ireland
Unitary Authority	Northern Ireland
Centroid*	H559870
Latitude	54.72777778
Longitude	-7.132222222
SAC EU code	UK0030233
Status	Designated Special Area of Conservation (SAC)
Area (ha)	213.84

4.3.1.1 Summary Site Description

The SAC includes the river (42 km stretch) and its associated riverine flora and fauna and adjacent semi-natural vegetation, primarily woodland flora and fauna.

The river rises at an altitude of 415m and flows into the Strule at an altitude of 35m. It is a fast-flowing spate river; notable for the physical diversity and naturalness of the bank and channel, the richness and naturalness of its plant and animal communities, which includes extensive beds of Stream Water Crowfoot *Ranunculus penicillatus* var. *penicillatus* and the largest Northern Ireland population of the now rare Fresh Water Pearl Mussel *Margaritifera margaritifera*. In addition, the river is important for Otter *Lutra lutra* and Atlantic Salmon *Salmo salar*.

The adjacent woodlands include Drumlea and Mullan Woods ASSI and the Owenkillew and Glenelly Woods ASSI, two of the largest stands of Oak woodland in Northern Ireland. An area of localised waterlogging in the former woodland has resulted in the development of Bog Woodland.

4.3.1.2 BOUNDARY RATIONALE

Defining the extent of site boundaries for rivers is variable across the UK. The four options currently in use are:-

(1) whole catchments;
(2) main river stem from source to mouth, tributaries and upland catchment;
(3) main river stem from source to mouth and tributaries ;
(4) main river stem from source to mouth only.

The option used is dependent on the qualifying features for that site and the current knowledge of distribution of that feature. In the case of the Owenkillew River the main SAC qualifying

features are *Margaritifera margaritifera* and *Ranunculus communities*, which are confined to the main channel. The upper limits of the site have been determined by the restricted size of the channel. Downstream limit is at the confluence with the Strule.

The lateral boundary beyond the river channel follows the same guidelines as that for all ASSIs, which is dependent on the type and quality of adjacent habitat. Much of the SAC has limited adjacent habitat. Therefore, the boundary is frequently restricted to the top of the riverbank. However, in places, there is significant adjoining woodland interest, and this is generally included. In addition, the SAC includes both Drumlea and Mullan Woods ASSI and the Owenkillew and Glenelly Woods ASSI. The boundary uses permanent man-made features where possible. however, along some stretches of the river and woodland edge, such boundaries were absent and recognisable topographical or physical features such as breaks in slope, scrub or tree line were used.

4.3.1.3 Annex I habitats that are a primary reason for selection of this site (Reference Numbers refer to habitat codes utilised in Designations)

3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

The Owenkillew River rises in the Sperrin Mountains in Northern Ireland and flows westwards, forming part of the Lough Foyle system. It is a large river, being ultra-oligotrophic in its upland reaches, and then gradually becoming oligotrophic and oligo-mesotrophic through its middle and lower reaches. The Owenkillew River is notable for the physical diversity and naturalness of the bank and channel, and the richness and naturalness of its plant and animal communities. Beds of stream water-crowfoot *Ranunculus penicillatus* ssp. *penicillatus* occur throughout its middle and lower reaches, typically in association with intermediate water-starwort *Callitriche hamulata* and large-leaved pondweeds such as broad-leaved pondweed *Potamogeton natans* and shining pondweed *P. lucens*.

91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

The Owenkillew River is associated with several woodlands which in combination represent one of the best examples of old sessile oak wood in Northern Ireland. The woods contain a number of associated physical features, including waterfalls, gorges, cliffs and scattered boulder scree, which contribute to the diversity of the woodland communities. The woodland canopy is variable, but is generally dominated by sessile oak *Quercus petraea* with frequent downy birch *Betula pubescens*. The shrub layer consists of rowan *Sorbus aucuparia* and holly *Ilex aquifolium*, with hazel *Corylus avellana* locally frequent and occasional goat willow *Salix caprea*. In places, the ground flora is dominated by grasses, including wavy hair-grass *Deschampsia flexuosa*, and calcifuge mosses such as *Rhytidiadelphus loreus*. Where grazing is absent, bilberry *Vaccinium myrtillus*, great wood-rush *Luzula sylvatica* and bluebell *Hyacinthoides non-scripta* are dominant in the ground flora.

4.3.1.4 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

91D0 Bog woodland * Priority feature

4.3.1.5 Annex II species that are a primary reason for selection of this site

1029 Freshwater pearl mussel *Margaritifera margaritifera*

The Owenkillew River rises in the eastern Sperrin Mountains in Northern Ireland and flows westwards, forming part of the Lough Foyle system. It is a large river, being ultra-oligotrophic in its upland reaches, and then becoming oligotrophic and oligo-mesotrophic through its middle and lower reaches. The freshwater pearl mussel *Margaritifera margaritifera* population, which is estimated to have a minimum number of 10,000 individuals, is confined to 4 km of undisturbed river channel in its upper reaches. It is the largest known population surviving in Northern Ireland.

4.3.1.6 Annex II species present as a qualifying feature, but not a primary reason for site selection

1106 Atlantic salmon *Salmo salar*

1355 Otter *Lutra lutra*

4.3.2 Conservation Objectives

The Conservation Objectives for this site are:

"To maintain (or restore where appropriate) the:-

- Fresh Water Pearl Mussel Margaritifera margaritifera;
- Water courses of plain to montane levels with the Ranunculus fluitans and Callitricho-Batrachion vegetation;
- Old Sessile Oak woods with Ilex and Blechnum in the British Isles;
- Bog Woodland;
- Otter Lutra lutra; and,
- Atlantic Salmon Salmo salar

to favourable condition"

For each feature there are a number of component objectives which are outlined in the conservation objectives document appended to this assessment. These include a series of attributes, measures and targets which form the basis of Condition Assessment to determine

whether the feature is in favourable condition or not. The component objectives for the SAC are detailed below (reproduced from the Owenkillew Conservation Objectives, appended to this assessment),

4.3.3 SAC Selection Feature Objectives

Table 1.2: SAC Selection Features Grades[4] & Conservation Objectives

Feature	Grade	Objective
Freshwater Pearl Mussel Margaritifera margartifera	B	Maintain and if feasible enhance population numbers through natural recruitment.
		Improve age structure of population.
		Improve water quality.
		Improve channel substrate quality by reducing siltation.
		Ensure host fish population is adequate for recruitment.
		Increase the amount of shading through marginal tree cover along those sections of river currently supporting this species.

[4] The global status is an expert judgement of the overall value of the site for the conservation of the relevant Annex I habitat. Sites have been graded A, B or C -in the UK these gradings have been interpreted as follows: A - Sites holding outstanding examples of the habitat in a European context. B - Sites holding excellent stands of the habitat, significantly above the threshold for SSSI/ASSI notification but of somewhat lower value than grade A sites. C - Examples of the habitat which are of at least national interest (i.e. usually above the threshold for ASSI/ASSI notification on terrestrial sites) but not significantly above this. These habitats are not the primary reason for SACs being selected. D – Habitat present but not of sufficient extent or quality to merit listing as SAC feature. There is therefore a distinction between the principal features for which sites have been selected (those graded A or B) and those which are only of secondary interest (those graded C). This is a useful distinction but it is important to note that all three grades are qualifying SAC interest features.

Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation	B	Maintain and if feasible enhance extent and composition of community.
		Improve water quality
		Improve channel substrate quality by reducing siltation.
		Maintain and if feasible enhance the river morphology
Old Sessile Oak woods with *Ilex* and *Blechnum* in the British Isles	B	Maintain and expand the extent of existing oak woodland. (There is an area of degraded bog, wetland and damp grassland which have the potential to develop into oak woodland
		Maintain and enhance Oak woodland species diversity and structural diversity.
		Maintain the diversity and quality of habitats associated with the Oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to Oak woodland
		Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation.
		Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.
Bog Woodland	C	Maintain and expand the extent of existing bog woodland. (There is an area of degraded bog, wetland and damp grassland that have the potential to develop into bog woodland.
		Maintain and enhance bog woodland species diversity and structural diversity.
		Maintain the diversity and quality of habitats associated with the bog woodland, e.g. fen, swamp, especially where these exhibit natural transition to swamp woodland.

		Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation.
		Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.
Otter Lutra lutra	C	Population numbers and distribution to be maintained and if possible, expanded.
		Maintain the extent and quality of suitable Otter habitat, in particular the chemical and biological quality of the water, and all associated wetland habitats
Atlantic Salmon Salmo salar	C	Maintain and if possible, expand existing population numbers and distribution
		Maintain and where possible, enhance the extent and quality of suitable Salmon habitat, in particular the chemical and biological quality of the water

The SAC Natura 2000 Standard Data Form is appended to this document

4.3.4 River Foyle & Tributaries SAC

Country	Northern Ireland
Unitary Authority	Northern Ireland
Centroid*	H353876
Latitude	54.73611111
Longitude	-7.451666667
SAC EU code	UK0030320
Status	Designated Special Area of Conservation (SAC)
Area (ha)	771.8

4.3.5 Summary Site Description

The SAC includes the River Foyle and its tributaries i.e. that part of the River Finn which lies within Northern Ireland, the River Mourne and its tributary the River Strule (up to its confluence with the Owenkillew River) and the River Derg, along with two of its sub-tributaries, the Mourne Beg River and the Glendergan River. In total, the area encompasses 120km of watercourse and is notable for the physical diversity and naturalness of the banks and channels, especially in the upper reaches, and the richness and naturalness of its plant and animal communities. Of particular importance is the population of Atlantic Salmon Salmo salar, which is one of the largest in Europe. Research has indicated that each sub-catchment within the system supports genetically distinct populations.

The area is also important as a river habitat. In their upper catchments, the rivers are all fast-flowing spate rivers with dynamic flow regimes characterised by sequences of rapid, riffle and run. Although the banks may have been modified in the past, the channels are natural and composed of large cobble substrate with scattered boulders and sandy marginal deposits, while cobble side and point bars and discrete sand deposits are common features. At the top end of the River Derg and its two tributaries, the aquatic flora reflect the highly acidic character of the water, with mosses and liverworts dominant. Beds of Stream Water Crowfoot *Ranunculus penicillatus* var. penicillatus occur where the flow is less dynamic.

The River Foyle below Strabane is slow-flowing and is influenced by a tidal regime, rising and falling with the tidal cycle. Aquatic plants in the channel are extremely limited, particularly in the more saline areas; here, fucoids make up the main component. Otter *Lutra lutra* is found throughout the system.

A small population of the now rare Freshwater Pearl Mussel *Margaritifera margaritifera* was still present in the Mourne River in the mid-nineties.

4.3.6 Boundary Rationale

In the case of the Foyle, the qualifying features are its internationally important population of Atlantic Salmon and its *Ranunculus* community, which is found in lower sections of the River Derg and Mourne Beg River and along the Strule and Mourne Rivers down to Strabane. The River Foyle is included downstream to provide a linkage to the sea.

Much of the River Finn system occurs within the Republic of Ireland and will be included within the Republic of Ireland SAC series. Within Northern Ireland, the upper limits for all the tributaries and sub-tributaries are determined by the international border, except for the Strule where it joins with the Owenkillew River SAC. The downstream limit of the site is largely determined by the limit of saline influence (Directive refers to Salmon in freshwater only), but includes a small part of the migration corridor on the Rivers Foyle and Finn SACs.

The lateral boundary beyond the river channel follows the same guidelines as that for all ASSIs, which is dependent on the type and quality of adjacent habitat. Much of the SAC has limited adjacent habitat. Therefore, the boundary is frequently restricted to the top of the riverbank. Due

to the size of the area, the boundary was largely derived from video footage acquired during a helicopter flight. Some information on adjacent habitats was derived from previous surveys. The boundary uses permanent man-made features where possible. However, along some stretches of the river and woodland edge, such boundaries were absent and recognisable topographical or physical features such as breaks in slope, scrub or tree line were used.

4.3.6.1 Annex I habitats that are a primary reason for selection of this site

3260 Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

4.3.6.2 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

Not applicable.

4.3.6.3 Annex II species that are a primary reason for selection of this site

1106 Atlantic salmon *Salmo salar*

The River Foyle and Tributaries is a large, cross-border river in the north-west of Britain and Ireland. The river is notable for the physical diversity and naturalness of the banks and channels, especially in the upper reaches, and the richness and naturalness of its plant and animal communities.

The river has the largest population of Atlantic salmon *Salmo salar* in Northern Ireland, with around 15% of the estimated spawning numbers. The majority of the salmon returning are grilse (single wintering salmon), with a smaller but important number of spring salmon (multi-wintering salmon) also occurring. Research has indicated that individual sub-catchments within the system support genetically distinct salmon populations.

4.3.6.4 Annex II species present as a qualifying feature, but not a primary reason for site selection

1355 Otter *Lutra lutra*

4.3.7 Conservation Objectives

The Conservation Objectives for this site are:

"To maintain (or restore where appropriate) the:-

- Atlantic Salmon Salmo salar
- Water courses of plain to montane levels with the Ranunculus fluitans and Callitricho-Batrachion vegetation
- Otter Lutra lutra

to favourable condition"

For each feature there are a number of component objectives which are outlined in the conservation objectives document appended to this assessment. These include a series of attributes, measures and targets which form the basis of Condition Assessment to determine whether the feature is in favourable condition or not. The component objectives for the SAC are detailed below (reproduced from the Foyle & Tributaries SAC Conservation Objectives, appended to this assessment).

4.3.8 SAC Selection Feature Objectives

Table 4.5: SAC Selection Feature Objectives

Feature	Grade	Objective
Atlantic Salmon Salmo salar	B	Maintain and if possible expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population.
		Maintain and if possible enhance the extent and quality of suitable Salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation	B	Maintain and if possible enhance extent and composition of community.
		Improve water quality
		Improve channel substrate quality by reducing siltation.
		Maintain and if feasible enhance the river morphology
Otter Lutra lutra	C	Maintain and if possible increase population numbers and distribution.
		Maintain the extent and quality of suitable Otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats

The SAC Natura 2000 Standard Data Form is appended to this document

4.3.9 Lough Foyle Ramsar Site

Lough Foyle is situated on the north coast of Northern Ireland immediately downstream and extending to the north-east of the city of Londonderry. The site is comprised of a large shallow sea lough which includes the estuaries of the rivers Foyle, Faughan and Roe. The site contains extensive intertidal areas of mudflats and sandflats, saltmarsh and associated brackish ditches. It is designated as a Wetland of International Importance under the following criteria of the Ramsar Convention; 1, 2, 3, & 6.

4.3.9.1 Justification for the application of each Criterion listed above.

Ramsar criterion 1

This is a particularly good representative example of a wetland complex including intertidal sand and mudflats with extensive seagrass beds, saltmarsh, estuaries and associated brackish ditches. This is a particularly good representative example of a wetland, which plays a substantial hydrological, biological and ecological system role in the natural functioning of a major river basin which is located in a trans-border position.

Ramsar criterion 2

The site supports an appreciable assemblage of rare, vulnerable or endangered species or sub-species of plant and animal. A range of notable fish species have been recorded for the Lough Foyle estuary and the lower reaches of some of its tributary rivers. These include allis shad *Alosa alosa*, twaite shad *A. fallax fallax*, smelt *Osmerus eperlanus* and sea lamprey *Petromyzon marinus*, all of which are Irish Red Data Book species. In addition, important populations of Atlantic salmon *Salmo salar* migrate through the system to and from their spawning grounds.

Ramsar criterion 3

The site supports a diverse assemblage of wintering waterfowl which are indicative of wetland values, productivity and diversity. These include internationally important populations of Whooper Swan Cygnus cygnus, Light-bellied Brent Goose Branta bernicla hrota and Bar-tailed Godwit Limosa lapponica.

Additional wildfowl species which are nationally important in an all-Ireland context are Red-throated Diver *Gavia stellata*, Great crested Grebe *Podiceps cristatus*, mute swan *Cygnus olor*,

Bewick's Swan *C. columbianus*, Greylag Geese *Anser anser*, Shelduck *Tadorna tadorna*, Teal *Anas crecca*, Mallard *Anas platyrhynchos*, Wigeon *A. penelope*, Eider *Somateria mollissima*, and Red-breasted Merganser *Mergus serrator*.

Nationally important wader species are Oystercatcher *Haematopus ostralegus*. Golden Plover *Pluvialis apricaria*, Grey Plover *Pluvialis squatarola*, Lapwing *Vanellus vanellus*, Knot *Calidris canutus*, Dunlin C. aplina, Curlew *Numenius arquata*, Redshank *Tringa tetanus* and Greenshank *T. nebilaria*.

Ramsar criterion 6 species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in spring/autumn:

Whooper swan , *Cygnus cygnus*
Iceland/UK/Ireland

882 individuals, representing an average of 4.2% of the population (5 year peak mean 1998/9-2002/3)

Light-bellied brent goose, *Branta bernicla hrota,*
East Canada/Ireland

2270 individuals, representing an average of 11.3% of the population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

Bar-tailed godwit , Limosa lapponica lapponica,
W Palearctic

2028 individuals representing an average of 1.6% of the population (5 year peak mean 1998/9-2002/3)

5 DIRECT IMPACTS: SOURCE-PATHWAY-RECEPTOR ANALYSIS

The project site is outwith all Natura 2000 sites. In consequence no direct impact pathway exists and no direct impacts will arise.

6 INDIRECT IMPACTS: SOURCE-PATHWAY-RECEPTOR ANALYSIS

It is noted that indirect hydrological impact pathways exist between the proposal site and the implicated Natura 2000 sites and thence the project may give rise to indirect impacts. Where adverse impacts are likely to arise, it must be determined whether such impacts are likely to be significant.

7 POTENTIAL SOURCES OF IMPACT

Potential Sources of impact, whether direct or indirect, must be considered in respect of all phases of the project (construction, operation & closure) .

Construction

The ES and Addendum has considered the interventions in the natural environment which are associated with the construction, operation and decommissioning of the project and which may result in effects upon the receiving environment.

8 IMPACT ASSESSMENT

8.1 Test of Likely Significance

The *project* assessed is as defined in the ES and Addendum. As with any proposal, assessment under Article 6 of the Habitats Directive requires assessment of potential impacts associated with the construction, operation and decommissioning of the project. For each phase, all likely significant sources of potential impacts upon valued ecological receptors are detailed within Chapter 8 (Impact Assessment) of the project ES, with further detail provided in Technical Appendix C8 (Ecology). Readers, particularly competent authorities, should refer to the project ES and accompanying Appendices to gain a full understanding of the potential sources of impact, impact pathways, and specific interactions with and impacts upon the implicated Natura 2000 sites.

An outline Construction Environment Management Plan (CEMP) has been prepared in respect of the proposal and identifies potential impacts upon the natural environment and the specific measures to be taken to eliminate or mitigate each likely significant impact identified.

The objectives of the CEMP are to:

- Ensure that construction activities do not adversely significantly impact amenity, surrounding receptors, traffic, or the environment in the surrounding area.
- Provide a mechanism for ensuring that measures to prevent, reduce and offset the potentially adverse environmental impacts during the construction phase, that have been identified in the ES, are implemented;
- Provide a mechanism to ensure that good construction practices are adopted and maintained throughout the construction phase; and
- Provide a framework against which to monitor and audit environmental performance during the construction phase.

The CEMP also outlines the roles and responsibilities of personnel involved with all aspects of the construction activities. Monitoring programmes required to provide assurance as to the effectiveness of the mitigation measures are described in Chapter 10 of the ES.

The CEMP should be read in full and in conjunction with this document.

Full details of the project site ae contained within Section 2 of the CEMP. While the general layout of infrastructure at the proposed infrastructure site is shown at Figure 2.2 of the CEMP.

The operational phase of the mine will be the extraction of ore below ground and its transportation to and processing on the surface within the infrastructure site. Waste rock and past tailings will be used for backfill within the mine workings or deposited at the DSF.

The closure phase and restoration of the mine site will proceed in accordance with the closure plan following the cessation of processing operations.

It is assumed that the land will be restored to productive use for farming and/or benefits for wildlife, but alternative land uses will be considered during the closure planning process and discussed with regulatory authorities.

The closure phase will include:

- the plugging and securing of underground openings to allow the flooding of the underground workings to minimise future oxidation and metal release from any potentially acid generating waste rock;
- restoration of the DSF;
- removal of surface infrastructure, buildings, utilities, plant and machinery;
- removal of hazardous and contaminated materials and disposal at a suitably licenced waste facility; and
- rehabilitation of the site using stockpiled topsoil.

Table 15 of Appendix C8 details the assessment of predicted effects on the identified and relevant VERs where any impact interactions have the potential to be significant during the construction operation and closure of the mine development. The full table is not reproduced here however as not all impacts concern potential impacts upon Natura 2000 sites The ecological consultants (SLR) consider that the potential ecological impacts arising from the proposed gold mine development fall into three main categories:

- impacts arising during the construction phase;
- impacts arising during the operational phase; and
- impacts arising during the closure phase.

The processes and potential impacts associated with each phase (as detailed by SLR) are reproduced below for convenience in respect of potential impacts acting upon or arising from:-.

Potential impacts identified are detailed below in Table 8.1. Consideration is then given to whether each identified impact is likely (that is a source, pathway and receptor are present in each case) to have a likely significant impact (direct or Indirect) upon the conservation objectives of the designated sites.

Table 8.1 Impacts Identified

Stage one of Habitats Regulations Assessment (The Test of Likely Significance. ToLS) requires that Likely Significant Effects (LSE) upon Natura 2000 sites are identified. In the event that LSEs exist, HRA requires that stage 2 Appropriate Assessment is carried out. Unlike Stage 1 ToLS, Stage 2 Appropriate Assessment takes into account the various mitigation measures included in the scheme design to determine whether they are sufficient to eliminate impacts upon the designated sites.

The table below (Reproduced from Table 15 from The SLR EcIA) considers whether Likely Significant Impacts may arise in respect of the impacts identified. Should such impacts arise, Stage 2 Appropriate Assessment will be required in respect of each impact Identified.

Impact Source	Nature of Impact	Natura 2000 Sites Potentially Affected
Habitat loss, damage and fragmentation	Habitat loss involves the direct destruction or physical take-up of vegetation, or the removal of other features or structures with conservation interest. Habitat loss may also occur indirectly as a result of a change in land-use or water management, for instance the drying-up of ponds or through induced successional events leading to a change in habitat type. Habitat fragmentation is concerned with spatial processes, such as negative edge effects (e.g. colonisation by 'aggressive' species or successional changes), and dispersal problems that can become increasingly severe as habitats are lost and the remaining habitat is divided into smaller units. Fragmented habitats are likely to be more vulnerable to external factors that may have a negative effect upon them; e.g. disturbance, and may be less resilient to change (including climate and management change) than connected habitats because colonising species may be unable to reach the habitat to re-colonise in the event of species loss. Habitat loss can have a direct impact on individual populations and assemblages of species resulting in the direct loss of individuals or populations of animal species, or indirectly by increasing levels of stress placed upon populations of some species through negative edge effects (e.g. predation pressure) and dispersal problems that can become increasingly severe as habitat lost and remaining habitat is divided into smaller units. The zone of influence of the construction phase is assessed to be restricted to areas of above ground development that includes the new gold mine infrastructure at the proposed infrastructure site and the site of the proposed ventilation raises.	Construction Phase: • Owenkillew River SAC
Disturbance from human activity (noise and visual disturbance)	Short-term increases in disturbance levels as a direct result of construction activities can have a range of impacts depending upon the sensitivity of the ecological feature, the nature and duration of the disturbance and its timing. Long-term increases in noise generated and continuous level of disturbance through the operation of the gold mine and its associated infrastructure as well as on and off site traffic movements can affect sensitive receptors remaining within the localised area post construction activities. The response of individual species to increased levels of human disturbance will depend upon a number of factors including: sensitivity, reproductive status, previous exposure to human disturbance, behaviour during the event, species tolerance to disturbance, location in relation to the source, availability of alternative nearby habitat, and environmental factors (i.e. topography, vegetation and atmospheric conditions which can influence noise levels). The level of disturbance will also be dependent upon the existing ambient noise levels and maximum noise levels. It is generally accepted that for noise, certain species or groups of species can be impacted upon up to a distance of up to 300 m from its source for high level and discontinuous disturbance, with these distances reducing for low level and/or continuous disturbance levels. Under AQTAG09[5], where specific noise from industry measured at the habitat/nest site is below an average levels of 55 dB $L_{Aeq,1hr}$ and maximum noise 80 dB $L_{Amax,\ F}$ it is considered unlikely that it	Construction Phase: • Owenkillew River SAC

[5] Ormerod, L., Goodlad, N. and Horton, K. (2005) A*QTAG09 – Guidance on the Effects of Industrial Noise on Wildlife*. Air Quality Technical Advisory Group.

Impact Source	Nature of Impact	Natura 2000 Sites Potentially Affected
	will have an adverse impact on wildlife. The zone of influence of both the construction and the operational phases is assessed to be up to a 300 m radius of the proposed infrastructure site, the sites of the proposed ventilation raises, the site of the existing exploration adit and of the access routes along the Camcosy and Crockanboy Roads.	
Light	Construction lighting can provoke short-term behavioural changes in sensitive species, especially but not limited nocturnal animals, but the level of impact will be dependent upon the type and intensity of lighting and its timing. Permanent fixed on-site lighting could provoke long-term behaviour changes in sensitive species, especially but not limited nocturnal animals that may have remained on and continue to use the site, or parts of the site and its immediate surrounding area. The zone of influence is assessed to be confined within the proposed infrastructure site.	Construction Phase: • Badger • Bats Operational Phase: • Bats
Dust deposition	All phases of the development have the potential to generate fugitive dust: • construction phase from the movement of vehicles, stripping , movement and storage of vegetation, soils and overburden, cut and fill earthworks, loading/unloading of heavy goods vehicles, the deposition of waste rock at the DSF have the potential to generate fugitive dust; • operational phase from the movement and loading/unloading of heavy goods vehicles, the deposition of waste rock and dry stack tailings at the DSF, crushing / milling of rock as part of the processing of this material and from a variety of other sources that could affect sensitive receptors within the localised area post construction activities; and • closure phase from the removal of infrastructure, movement of vehicles, movement and spreading of soils during the remediation of the site. Literature suggests that the most sensitive species are only likely to be affected by dust deposition at levels above 1000 mg/m^2/day[6] which is five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. Fugitive dust from construction sites is typically deposited within 100-200m of the source; the greatest proportion of which, comprising larger particles (greater than 30 microns) is deposited within 100m[7]. Where large amounts of dust are deposited on vegetation over a long time-scale (a full growing season for example) there may be some adverse effects upon plants, restricting photosynthesis, respiration and transpiration. Furthermore it can lead to phytotoxic gaseous pollutants penetrating the plants. The overall effect would be a decline in plant productivity, which may then have indirect effects on the quality of the surrounding habitats and associated fauna. The amounts of dust deposited and its effects are also dependent upon weather conditions as in wet weather less dust will be	Construction Phase: • Owenkillew River SAC

[6] Farmer, A.M. (1993). *The Effects of Dust on Vegetation – A Review*. Environmental Pollution Vol.79, Issue 1, Pages 63-75.

[7] Department of the Environment (1995). The Environmental Effects of Dust from Surface Mineral Workings. Volume 1: Summary Report & Best Practice Guides. HMSO.

Impact Source	Nature of Impact	Natura 2000 Sites Potentially Affected
	generated and that which has been deposited upon foliage is likely to be washed off. In accordance with guidance produced by the UK Institute of Air Quality Management (IAQM)[8] an assessment of the effects of dust will normally only be required where an ecological receptor occurs within 50m boundary of the site or 50m of routes used by construction vehicles on public highways up to 500m from the site entrance.	
Changes in air quality (traffic emissions)	The main pollutants from traffic emissions of primary concern for ecology are from nitrogen oxides (NOx) and eutrophication associated nitrogen deposition upon sensitive ecosystems that can occur when these substances are deposited to land at high rates. Although environmental standards for the protection of vegetation and ecosystems include sulphur dioxide (SO_2), this parameter from traffic emissions is negligible and not of concern near roads[9]. High rates of nitrogen deposition upon sensitive ecosystems can increase the eutrophication of soils and water that can have a detrimental effect on species-rich plant communities and semi-natural habitats that are often associated with a low nutrient status. Eutrophication can decrease species diversity and the dominant plant species can change to those better to respond to increased nitrogen levels. Under the Highways Agency's 2007 Design Manual for Roads and Bridges (DMRB)[10] only where there is an annual average daily total of 200 or more heavy duty vehicles and a designated site within 200 m of the affected road(s) will there be a requirement to undertake further air quality assessment in respect to traffic emissions unless there are likely to be significant changes in environmental baseline conditions as a result of the proposed development.	Construction Phase: • Owenkillew River SAC
Alterations to hydrogeological regime	Dewatering operations during the mine development and production activities can result in the drawdown of groundwaters. The extent of the effects of drawdown can be influenced upon the local geology, soils, topography and climate. The cessation of mining operations and the plugging and securing of underground openings to allow the flooding of the underground workings will potentially alter localised groundwater levels where dewatering operations have occurred over a long period of time. Changes in localised groundwater levels or in aquifers as a result of extraction of rock as part of the mine development can have direct and indirect ecological impacts on groundwater dependent terrestrial ecosystems (GWDTE) and associated habitats / species as well as on surface waters that may also be reliant upon groundwater inputs.	Construction Phase: • Owenkillew River SAC • Operational Phase: • Owenkillew River SAC Closure Phase: • Owenkillew River SAC

[8] Holman et al (2014). *IAQM Guidance on the Assessment of Dust from Demolition and Construction*. Institute of Air Quality Management, London.

[9] Highways Agency (2005). Guidance for the Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs (Supplement to DMRB 11.3.1). Interim Advice Note 61.05. Highways Agency.

[10] Highways Agency (2007). Design Manual for Roads and Bridges Volume 11, Section 2, Part 1 HA207/7 Air Quality. Highways Agency.

Impact Source	Nature of Impact	Natura 2000 Sites Potentially Affected
Alterations to hydrological regime	The development of land through the inclusion of impermeable surfaces has the potential to alter the local hydrological regime, in particular flow regimes within watercourses/waterbodies which could in turn impact on aquatic and riparian species of flora and fauna. Improved drainage and impeded drainage through development can result in the alterations of surface and sub-surface water flows particularly in areas of peatland, which by their nature are controlled by hydrological processes. The level of impact can vary widely depending upon the physical nature of the peat, topography, the vegetation communities present, vegetation structure and coverage, management pressures and other external pressures.	Construction Phase: • Owenkillew River SAC Operational Phase: • Owenkillew River SAC
Changes in water quality (groundwater and surface waters)	Contamination of groundwater can occur through the direct recharge of groundwaters close to the ground surface or of deeper aquifers through percolation and other hydrological pathways that may affect surface waters where there is a potential ground and surface water hydraulic connectivity. Surface water discharges and diffuse pollution from surface water run-off can contribute to a reduction in water quality through a net contribution of nutrients or contamination from a wide range of organic and inorganic compounds. All construction works near water have an associated risk of pollution as a result of fuel spillages, oil leakages and other accidents that could lead to a serious impact on water quality and consequently the habitats and species present in any such affected watercourse. The stripping of vegetation, ground disturbance and improper storage of stripped soils near to a watercourse increases the risk of large volumes of material being washed into watercourses during periods of heavy and prolonged rainfall, or flood events. This indirectly affects water quality through increased turbidity levels and sedimentation, as well as the potential mobilisation of a variety of substances that may be contained within the soils. The four main hazards identified from the proposed gold mine development with the potential to result in changes in water quality include acidification from Acid Rock Drainage (ARD), toxic contamination from the mobilisation of naturally occurring heavy metals, eutrophication from residual nitrates through the use of explosives and from increase rates of sedimentation. Acid Rock Drainage (ARD) ARD is the formation of sulphuric acid through the oxidation of sulphide materials. In most cases, this acid comes primarily from oxidation of iron sulphide (FeS_2, iron pyrite or "*fool's gold*"), which is often found in conjunction with valuable metals and in the case of Curraghinalt the gold deposits. ARD is particularly a major problem with many hardrock areas where the where the metal ore is bound up with sulphur. The metals dissolved by the acid drainage can be highly toxic for most living organisms with potential significant impacts on aquatic ecosystems from sulphuric acid and heavy metals, including arsenic, copper, and lead. Once acid-generating rock is exposed to oxygen and the surface environment, acid generation is very difficult to contain and can continue for very long periods of time. The process of extracting minerals allows these acid and heavy metal generating reactions to occur at much higher rates than those that occur naturally. The increased acidity caused by ARD has a range of negative effects depending on the severity of the pH change. Acidification	Construction Phase: • Owenkillew River SAC Operational Phase: • Owenkillew River SAC Closure Phase: • Owenkillew River SAC • Owenkillew River ASSI • Owenreagh River pASSI

Impact Source	Nature of Impact	Natura 2000 Sites Potentially Affected
	of waters can lead to the leaching of toxic heavy metals such as arsenic from river bed sediments into the water and reduces the ability of streams to buffer against further chemical changes. In addition to the direct negative effects of increased acidity and the increased release of toxic metals, an additional problem can also be created when the acid reacts with the rock that neutralizes it. As the water becomes less acidic, metals and other solids can come out of solution and can form a layer of precipitate on river beds. At pH 8 bicarbonate is the predominant form of carbonate. Below pH 6 carbon dioxide predominates, resulting in reduced calcification with consequently effects on shell formation in molluscs for example the Freshwater Pearl Mussel. Toxic Contamination from Heavy Metals Heavy metals is a general collective term that applies to the group of metals and metalloids naturally occurring in rocks and soils with an atomic density greater than 4 g/cm^3, for example Arsenic (As), Copper (CU), Iron (Fe) and Zinc (Zn). The exploration works have the potential to mobilisation of heavy metals in the environment resulting in an increase in background concentrations in aquatic and terrestrial ecosystems. High concentrations of heavy metals can be toxic to living organisms directly killing or damaging organisms or result in changes of behaviour. The effects on species may be direct on a particularly species or indirectly on a supporting species i.e. on a food source of a particular species. An effect on a food source may cause a reduction in abundance of prey, change in the composition of prey species, or the palatability of prey through tainting. Nutrient and Organic Enrichment The use of explosives may leave behind residual nitrates that have the potential to lead to nutrient enrichment of receiving waters, whether surface or ground. Rivers are highly individual environments with a range of physical, chemical and biological characteristics that alter their respective vulnerability and response to nutrient enrichment. Nutrients stimulate the growth of benthic and microscopic plants. Excessive algal growth can cause oxygen depletion and reduce water clarity which may result in changes in community structures. Organic enrichment can also result in reduced oxygen and produce anoxic sediments. Sedimentation Whilst the effects of increases in sedimentation of riverine habitats is widely known, it can be difficult to quantify the impact of sediment on the ecology of a riverine system with often other factors also likely to contributing to a decline in any ecological status of a particular species or habitat-type. Usually it is only when there is a significant sedimentation that an ecological impact can be measurable. Different types of river can show variable sensitivity to increased sediment loadings and is dependent upon topography, geology and soils and the local climate all of which can interact to influence the transport of sediments. The amount of sediment, the particle sizes and whether it is organic or inorganic in nature will interact with the sensitivity of the receiving water to determine the potential for ecological impacts.	

8.2 Test of Likely Significance: Conclusions

The stage 1 Test of Likely Significance has identified that a range of Likely Significant Effects are extant. The Stage 1 test has concluded that all such effects are indirect, and that no direct effects are likely upon designated sites should the proposal proceed.

Stage 2 Appropriate Assessment is required in respect of the effects identified in Stage 1.

8.3 Stage 2 Appropriate Assessment

This section comprises Stage 2 Appropriate Assessment of the Likely Significant Effects identified in Stage 1. In Stage 2, Appropriate Assessment takes into account the various mitigation measures included in the scheme design to determine whether they are sufficient to eliminate impacts upon the designated sites.

Each impact identified above is assessed below, by reference to the Project ES and to published standards and guidelines as appropriate.

Changes in water quality (groundwater and surface waters)

The Stage 1 ToLS has identified changes in surface and groundwater water quality as having likely significant effects upon the Natura 2000 Network. The project CEMP details [at 3.2] the following measures to be taken to sever the potential impact pathway between the proposal site and the implicated Natura 2000 sites. The CEMP states: -

'Water Pollution Prevention, Vegetation Clearing and Soil Conservation Controls

The main risks to the water environment during the construction phase of the development include increased potential for sediment loading in runoff water due to ground disturbance, discharge of high pH wash water from cement truck deliveries, blast residues leaching to water, and/or accidental spillage of oils and other substances from on-site use. These risks predominantly apply to the proposed infrastructure site.

The key environmental guidance that will be adhered to during all construction activities, as described in Section 3.4, will include the following:

- *PPG1: Understanding Your Environmental Responsibilities – good environmental practices;*
- *PPG6: Works at Construction and Demolition Sites;*
- *GPP5: Works and Maintenance in or near Water;*
- *CIRIA Report C532 Control of Water Pollution from Construction Sites;*
- *CIRIA Report C649 Control of Water Pollution from Linear Construction Projects. Site Guide.*
- *CIRIA Handbook C651 Environmental Good Practice on site checklist*
- *CIRIA Report C692 Environmental Good Practice on site 3rd Edition*
- *CIRIA Report C697 – The SuDS Manual*
- *CIRIA Report C689 – Culvert Design and operation guide.*
- *On the basis of this guidance, and in recognition of the catchment sensitivity, ground disturbance will be undertaken at the proposed infrastructure site only following incorporation of the following minimum requirements or principles.*

Detailed procedures and methods covering the planning, design, management and monitoring of silt control measures, explosives management, and spill mitigation/prevention/response measures will be agreed in advance with the Northern Ireland Environment Agency Water Management Unit (NIEA WMU);

Exposure of bare ground will be undertaken in essential areas only and in a controlled and phased manner in line with the 2-year construction period described;

Management of surface water runoff, with the aim of mimicking pre-development runoff conditions, will be undertaken;

Filter strips of ≥20 m will be left in place between surface water features and temporary or permanent stockpiled material. Silt fencing will be Hy-Tex Terrastop or equivalent and will be placed within this area in accordance with the supplier's guidelines for installation (see Appendix B).

Site drainage will be managed using sustainable drainage techniques to provide conveyance and treatment of runoff at or close to the source;

High flow velocities from working area will be avoided and silt mitigation measures will be positioned so that clean runoff water is diverted from the working area and no potentially silt laden water or pollution is permitted to enter a watercourse. This approach will require full control of flow rate, quantity and quality; and

Works likely to generate silt, and works adjacent to water courses, will be timed to avoid spells of extreme wet weather.'

Figure 3- 5 of the CEMP provides a detailed overview of the locations of mitigation measures to be undertaken as part of the Drainage Management Plan for the Construction Phase. The CEMP indicates that the proposals, and the technical specification of the measures to be utilised in mitigation, derived from a detailed review of impacts identified within the project ES and Addendum, are sufficient to sever hydrological impact pathways between the proposal site and the implicated Natura 2000 sites

The ES Addendum states [at 4.2.2 and 4.2.3]

'4.2.2: Surface water'

Based on the changes to the mine aspects outlined above the following have the potential to further impact on surface water flow and water quality in addition to those impacts identified in the ES in relation to the 2017 design:

Removal of cyanide from the process - this is a positive change in two ways:

- *it will remove any risk associated with cyanide impacting the water environment;*
- *it results in lower make-up water requirements in the processing of ore, resulting in lower fresh water inputs to the mine and lower risk of water shortages during drought.*

Further optimisation of the mine design (described in the Mine Design Parameters document at Appendix B1): this will impact on the rate of dewatering of the underground workings with a likely increase in dewatering rates as the mine expands (see next section; "Groundwater"). There is the potential to negatively impact baseflows and water quality in small watercourses close to the existing infrastructure area during operations and closure, including the Curraghinalt Burn and Attagh Burn.

Potential changes to the baseflows in small watercourses close to the existing infrastructure site were assessed in detail through groundwater modelling for the ES based on the 2017 design. The watercourses potentially impacted by changes in baseflow are small and the changes in flow were predicted to be minor to negligible. Based on a qualitative assessment, changes to baseflows due to the 2019 update are not anticipated to change the conclusions of the surface water impact assessments for these streams and no additional mitigation measures are required.

There are no changes to the spatial extent of the proposed infrastructure site, or the DSF and water management infrastructure therein. As the mine site water balance is dominated by runoff from the DSF and other mine site infrastructure, the changes will not impact the conclusions of the water balance and surface water hydrology impact assessment for the proposed infrastructure site. Any additional contributions from the mine dewatering will also be minor compared to the overall water balance at the site.

The sizing of water management ponds for storm water is based on surface water runoff from the mine site area. As there are no changes to the mine site area, there are no changes to the design conditions for the ponds.

No change is proposed to how contact water will be captured and treated before discharge to the Pollanroe Burn. The proposed water treatment facility is designed to be able to achieve the proposed water discharge criteria for the mine. The surface water quality impact assessment for the proposed infrastructure site considered discharges from the mine at the proposed water discharge criteria limits. With the exception of the removal of cyanide these will not change and therefore the conclusion of no significant impact remains unchanged.

As described in the Mine Design Parameters Statement (Appendix B1), predicted impacts to surface water flow and quality will be reviewed and updated during operations as mining progresses.

4.2.3 Groundwater

Based on the changes to the mine aspects outlined above the following aspects have the potential to further impact on groundwater resources in addition to those impacts identified in the ES in relation to the 2017 design:

Removal of cyanide from the process - the removal of cyanide leaching tanks from the process removes any risk of cyanide impact to groundwater. This is a positive change for the project.

Reduction of sulphide and finer grind size of tailings reporting to paste plant – there is an overall reduction of total sulphide content in the tailings, which is a positive change that will reduce the potential for generation of low pH water and metal mobilisation.. Although the finer grind size is potentially a negative change, as this will increase surface area of particles available to contact water and leach metals, the sulphides will be better locked into the paste such that environmental leaching is not expected to be any worse than previous predictions. The modifications to the production process are therefore not expected to significantly affect the water quality source term used in the groundwater impact assessment s.

Further optimisation of the mine design (described in the Mine Design Parameters document at Appendix B: - the shallower and more laterally extensive underground mine workings will have a negative impact on the dewatering rates of the underground workings. This is expected to lead to a minor increase in dewatering rates from those previously predicted by the end of mine life and there is potential for a minor increase in the impact of changes to groundwater baseflows to nearby watercourses, such as the Attagh Burn.

Greater drawdown in shallow abstractions nearer the new mine workings is predicted, with reduced drawdown in deeper abstractions. As a result, a shallow well and a spring located in close proximity to the western extension of the 2019 mine design workings are expected to have increased drawdown impacts. It is possible that these sources could be impacted to the point where compensation and/or replacement of supply would be offered.

Changes in the underground mine backfill in upper mine levels, resulting in coarser material which will promote drainage in the upper part of the mine, is expected to have an overall positive impact to groundwater quality. Following mine water rebound after mine closure, a greater proportion of contact water is expected to migrate to the existing adit control point due to the increased connectivity that the coarser backfill material would provide. The remaining proportion migrating via the groundwater pathway towards local rivers and streams will be reduced.

In respect of groundwater flow, baseflow and groundwater level, impacts are anticipated to increase for certain streams and private groundwater supplies in the west of the mine extraction area. As described in the Mine Design Parameters Statement (Appendix B1), predicted impacts to groundwater flows and quality will be reviewed and updated during operations as mining progresses'

8.3.1 Habitat loss, damage and fragmentation.

The Project ES considers this potential impact in detail. The ES states:- (at Table 16)

"The proposed works and activities associated with the construction phase of the mine development will not result in any direct loss, damage or disturbance to any habitats within the defined boundaries of the Owenkillew River SAC. The site of the existing exploration adit and infrastructure site do not support any Annex I habitats, as cited for the Owenkillew River SAC, that will be lost and which could be considered to contribute to those qualifying habitats within the SAC.

The retention of the existing exploration adit and its associated infrastructure will not result in any fragmentation of habitats within the Owenkillew River SAC which would directly or indirectly impact upon any of the Annex II qualifying species as a result of the proposed works and activities associated with the construction phase of the mine development."

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise in respect of habitat loss, damage and fragmentation is required or proposed.

8.3.2 Disturbance from human activity (noise and visual disturbance)

The Project ES considers this potential impact in detail. The ES Addendum has noted [at 4.2.7]

'Based on the 2019 update, the following areas may influence the conclusions of the 2017 noise impact assessment:

- *Marginal increase in construction traffic;*
- *The transport of ore - Blasted waste rock (un-mineralised material) and ore (mineralised material) from the underground mining activities will be conveyed to surface on covered conveyors to the designated covered storage and the process building on surface. On average, approximately 1,200 to 1,500 tonnes of ore and waste will be conveyed to surface daily. The conveyors will replace the previously proposed use of haul trucks;*
- *Crushing - Crushing of the ore will now take place underground. Crushed ore from the mine will be delivered to surface on covered conveyors to the designated covered storage and the process building prior to grinding in the SAG Mill and Ball Mill. Ore sorter reject material will also be conveyed to surface via the covered conveyor;*
- *The haulage of waste on trucks to the DSF - Waste rock will be placed in the DSF from the ore rejects area using haul trucks. The DSF will contain both waste rock and filtered tailings from the process building.*

Based on the above changes, the noise impact assessment was updated, and the methodology and results are presented in the Noise Impact Assessment Addendum (Appendix C18 Addendum to Noise Impact Assessment).

Construction

The appropriate construction noise mitigation measures which should be implemented as part of a site-specific Construction Site Management Plan are outlined in Section 8 of the Noise Impact Assessment report and will remain unchanged from the 2017 ES (See Section 8.1 Construction Mitigation Measures).

In terms of the perceived change and loudness, the increase in daily construction traffic flows on the surrounding roads will result in a 'moderate short-term impact' along Camcosy Road and a 'minor short-term impact' along Crockanboy Road. It is therefore considered that the change in traffic flows during the construction phase is considered to be insignificant.
Operations
The increase in daily and peak hour operational traffic flows will result in a 'negligible' increase in noise levels along Crockanboy Road. It is therefore considered that the change in traffic flows during the operation phase is considered to be insignificant.

The operational noise impact has also been updated from the 2017 ES. The updated assessment has focussed on the following changes to the proposed Curraghinalt Project:

- *The use of a covered conveyor will replace the previously proposed use of haul trucks to convey waste rock and ore from the underground mining activities to surface.*
- *The crushing process has been moved underground.*
- *The conveyor towers building envelope design.*
- *Noise berms – the haul route 5m noise attenuation berm remains unchanged. An additional waste rock berm around the proposed 'ore rejects to drystack' area will also be constructed to reduce noise from the truck movements taking waste ore from the conveyor to the DSF.*
- *The DSF and ventilation raise design remain unchanged from the previous noise assessment.*

In summary, when compared to the measured baseline noise levels in the area of the proposed Curraghinalt Project, the increased noise level at nearby properties will cause a minor noise impact at the nearest noise sensitive receptors throughout the lifetime of the gold mine and processing operations. At all locations in excess of 1,000m from the proposed Curraghinalt Project the noise impacts will be negligible.'

8.3.3 Disturbance from Vibration

The Project ES considers this potential impact in detail. The ES Addendum states [at 4.2.8]

'Construction and operation vibration impacts for the project remain unchanged from the 2017 ES. As such, the proposed Construction and Operational Mitigation Measures outlined in Section 6 of the Vibration Impact Assessment for the project remain unchanged from the 2017 ES.

Consistent with the findings of the 2017 ES, no significant residual adverse vibration impacts will occur during operation of the Curraghinalt Project. Continuous monitoring of vibration in proximity to the nearest residential properties will ensure that the recommended vibration thresholds and the relevant Planning Condition vibration limits are not exceeded. '

The Vibration Impact Assessment Report Addendum can be found in Appendix C.11.

8.3.4 Dust Deposition

The Project ES considers this potential impact in detail. The ES Addendum states: -

'In summary, there is no change from the predicted residual impacts and conclusions as outlined in Section 8 in the 2017 ES. However, additional mitigation measures will apply. The air quality and dust levels from the construction and operation of the proposed Curraghinalt Project are predicted to be lower than the relevant air quality and dust standards and guideline limit values. When compared to the measured baseline Air Quality & Dust levels in the area of the proposed Curraghinalt Project, the increased air quality and dust levels at nearby properties to the proposed infrastructure site will be negligible and at the nearest air quality and dust sensitive receptors throughout the lifetime of the gold mine and processing operations.'

The levels of dust deposition is not predicted to result in any significant increase in sedimentation rates within the channel of the Owenkillew River where there would be a likely measurable impact on any freshwater pearl mussels (primary reason for site selection) within the localised area of the existing surface infrastructure site, or on Atlantic salmon (secondary reason) and especially in terms of damaging potential spawning gravels.

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise and no mitigation in respect of dust deposition is required or proposed.

8.3.5 Changes in air quality (traffic emissions)

The Project ES Addendum considers this potential impact in detail. The ES Addendum states [at 4.2.14]

'Following a review of changes to air quality predictive modelling outputs, detailed within the Air Quality Impact Assessment addendum, it is concluded that changes in concentration contributions for a range of pollutants (PM10, PM2.5 and NO2) would remain well within air quality objectives set to protect the environment and health, and would not be of a magnitude sufficient to quantify

any measurable adverse health outcome during construction and operation of the proposed project. This conclusion is consistent with the original HIA.'

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise and no mitigation is required or proposed.

8.3.6 Alterations to hydrogeological regime

The Project ES considers this potential impact in detail. The ES states :-

'Assessment of Effects:

Hydrogeological studies would suggest that there is some hydraulic connection between groundwater and the Owenkillew River in the upper layers of weathered bedrock and alluvium deposits. However, given the low transmissivity of the upper layers of weathered bedrock it is considered not likely that the flows in this river are dependent upon any groundwater contributions.

Modelling predicts that during the construction phase, the impacts of the mine development and any dewatering is not likely to have any significant effects on groundwater levels, or on the localised hydrogeological regime. Therefore the mine development and any dewatering operations is not predicted to result in any significant effects on groundwater contributions, either directly to the Owenkillew River, or via its smaller tributaries that includes the Curraghinalt and Attagh Burns, during the construction phase and where there would be any significant alterations to base flows in this river. Consequently no significant effects are predicted on the qualifying Annex I habitats and/or Annex II species for which the Owenkillew River SAC is of European importance from any alterations to the hydrogeological regime during the construction phase of the gold mine development.

During the construction phase, water will continue to be pumped from the underground mine workings and treated at the existing surface infrastructure site before being discharged to the Curraghinalt Burn. This will continue until such time as the decline is in place and water can be pumped to the surface water system at the proposed infrastructure site.

The retention and continuance of use of the existing surface infrastructure site are not anticipated to significantly increase any surface water run-off contribution to the Curraghinalt Burn and where there would be any measurable effects or alterations to base flows in the Owenkillew River.

All wastewater generated from dewatering operations during the mine development will be discharged to the Owenkillew River via the existing water treatment system in operation at the existing surface infrastructure site. The current rate of discharge of treated wastewater from the existing surface infrastructure site is on average 3.5 litres per second (l/s) with a maximum

capacity of 11 litres per second (L/s). As the mine is developed it is anticipated that the rate of any discharge will increase to 7 L /s and up to 10.3 L /s during high flow conditions leaving some freeboard to the maximum capacity of the water treatment plant. However, any increase in the rate of discharge up to the maximum of 10.3 L/s is not anticipated to result in any significant alterations to the base flows in the Owenkillew River. Consequently no effects are predicted on the qualifying Annex I habitats and/or Annex II species for which the Owenkillew River SAC is of European importance.'

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise.

8.3.7 Changes in water quality

The Project ES considers this potential impact in detail. The ES states:-

' Assessment of Effects:

The Owenkillew is assessed as being of 'moderate' quality status upstream of Glenhull Bridge improving to 'good' downstream of this structure and to the Drumlea Bridge before being assessed as moderate downstream of this point under the Water Framework Directive (WFD) .

Monitoring of baseline water quality in the Owenkillew River and its tributaries would indicate that for a number of parameters the mean values recorded for Biochemical Oxygen Demand (BOD), free ammonia (NH3), nitrate (NO3), phosphate (PO4) and total suspended solids (TSS) are elevated above the defined water quality guidance criteria as set for freshwater pearl mussels in a draft sub-basin management strategy for freshwater pearl mussel based on a catchment wide scale for the Owenkillew , and subsequently by a new standard for freshwater pearl mussel catchments developed by a working group of European freshwater pearl mussel experts, under the auspices of the European Committee for Standardization (CEN). The standard was published in December 2016, as EN 16859:2017, and was implemented in the UK in February 2017 in the form of a British Standard (BS), as BS EN 16859:2017 . This new standard focuses on methods for monitoring freshwater pearl mussel populations, the fish populations that provide hosts for glochidia, physical habitat structure, flow regimes, and aspects of water quality (but not any prescribed limit values) known to be important for sustaining fresh pearl mussel populations.

For other parameters, monitoring would indicate mean exceedances in WFD Environmental Standards for cyanide (CN Free), Copper (Cu) and iron (Fe) but with maximum values for a number of other metals above WFD environmental standards thresholds levels (please refer to SRK's Hydrology Baseline Report).

An assessment of biological water quality would indicate that the Owenkillew River is typically 'good' to 'very good', as presented in Annex P.

A water treatment plant currently operates at the existing surface infrastructure site for the treatment water emanating from the exploration adit (groundwater) and surface water run-off from the waste rock storage area before being discharged under licence to the Curraghinalt Burn. Monitoring of the quality of the water discharged to the Curraghinalt Burn would indicate that all parameters fall within the discharge consent limits.

The current discharge limits have been set to take into account the mixing effect and assimilative capacity (AC) of the Owenkillew River where possible. Whilst baseline levels for a number of parameters are in exceedance of environmental standards, it is considered that the water discharged from the existing surface infrastructure site is not a contributing factor to these standards not being met within the Owenkillew River but rather a number of factors and pressures are responsible throughout the catchment of this river.

It is proposed that the water treatment system will be upgraded to a reverse osmosis system that will treat any wastewater to an agreed and acceptable standard by NIEA (drinking water standards) to and ensure compliance with any new discharge consent.

The retention and continuance of use of the existing surface infrastructure site and continued discharge of treated wastewater will continue to be within any consented parameters and is not likely to result in any changes in baseline water quality in the Owenkillew River and where there would be any significant direct or indirect effects on freshwater pearl mussels downstream of the confluence of the Curraghinalt Burn, or on the secondary Annex II species of Atlantic salmon and otter, until such time as the new portal and infrastructure have been constructed and water is pumped from the mine to the proposed infrastructure site"

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise.

8.4 Impact Assessment:- Operation

8.4.1 Disturbance from vibration

The Project ES considers this potential impact in detail. The ES states at Table 17}

'Assessment of Effects:

Any below ground blasting operations required during the mine production activities will be underground, relatively small and would be similar to the blasting operations historically carried out as part of the exploration activities and during the mine development. All blasting events are anticipated to be below a PPV of 1 mm/second with an estimated number of two blasts per day during the lifetime of the mine.

No blasting will take place directly below the Owenkillew River SAC. At predicted levels below 1 mm/second, it is considered that there would be no discernible surface vibration or noise from any such blasting event and is not likely to have any significant effects on the freshwater pearl mussel or the other the Annex II qualifying species present but not a primary reason for site selection, namely Atlantic salmon and otter for which the Owenkillew River SAC is of European importance, or any other species of importance for which the Owenkillew River ASSI and the Drumlea and Mullan Woods ASSI are of conservation importance.'

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise and no mitigation in respect of dust deposition is required or proposed.

8.4.2 Alterations to hydrogeological regime

The Project ES considers this potential impact in detail. The ES states:-

'Groundwater levels are close to the surface in the unconsolidated alluvial material of the Owenkillew river valley up to 10m in depth and in the weathered bedrock up to depths of 50 to 70m.

Groundwater flows to the Owenkillew River are typically in the unconsolidated alluvial material with little input from the weathered bedrock.

The mine will be dewatered throughout its operational life. Modelling of dewatering operations predicts a change in groundwater levels when the mine is deepest and dewatering activities are at their peak towards the end of the operational life of the mine.

Dewatering operations are predicted to result in a reduction in surface base flow of 0.50 L/s (<1% change to mean summer flow) in the Owenkillew River as well in the two tributaries flowing to this river where the mine is proposed namely: the Attagh Burn with a loss of 0.02 L/s (<1 % change to mean summer flow); and the Curraghinalt Burn with a loss of 0.4 L/s (<3 % change to mean summer flow).

During the operational phase all wastewater generated during dewatering operations will be pumped to the west pond at the proposed infrastructure site where it will be treated before being discharged to the Pollanroe Burn. The discharge from the existing surface infrastructure site will cease with a predicted reduction of flow in the Curraghinalt Burn, in-combination with the

reduction in groundwater contribution, from 6.9 L/s to 5.3 L/s representing a 23 % change in its 95 %ile annual low flows. Surface water run-off from the existing surface infrastructure site will continue to be treated and discharged to the Curraghinalt Burn at an average rate of 0.4 L/s.

The Curraghinalt Burn is a minor watercourse and any reduction in base flows from the cessation of the discharge of water generated from dewatering operations is considered negligible and not likely to decrease the base flow in the Curraghinalt Burn.

Based on the figures above, any reduction of groundwater contribution to the surface base flows in the Owenkillew River is not likely to result in any significant changes in the hydrological regime of this river. Therefore it is assessed that the below ground mine development and associated drawdown in groundwaters is not likely to have any significant effects on freshwater pearl mussels within the river sections downstream of the Curraghinalt Burn, or on the different habitats required by salmon to including holding, spawning and nursery areas for which the SAC is of European importance, or on any other species for which the Owenkillew River ASSI and the Drumlea and Mullan Woods ASSI are of conservation importance.'

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise.

8.4.3 Changes in water quality

The Project ES considers this potential impact in detail. The ES Addendum states [4.2.14]

'Surface Water

On the basis that cyanide will no longer be used in the process and no change is proposed to how contact water will be captured and treated before being discharged into nearby surface water bodies, it is predicted that the proposed water discharge criteria for the mine will still be achieved. As a result, there will be no change to the original surface water quality impact assessment conclusion and therefore no measurable risk to health.

Groundwater

The overall impact on groundwater quality will be positive on the basis that cyanide will no longer be used in the process, there will be a reduction in sulphide content in the rougher tailings and the use of coarser material in the upper part of the mine will increase the proportion of contact water that is expected to migrate to the existing adit control point, promoting drainage away from local rivers and streams. The only negative impact on groundwater quality would be associated with use of finer grind size as there will be increased surface area of particles available to contact water

and leach metals; however, this change is not expected to significantly affect the groundwater quality assessment outcomes. As such, the conclusion of the original HIA is still valid and there would be no measurable risk to health.'

8.5 Impact Assessment:- Closure

The project EcIA [at 5.6] considers that potential impacts on habitats and species during the closure phase are considered likely to be similar to those arising during the operational phase but are likely to have a positive effects through the restoration of the site providing new habitats and increase in carrying capacity of the site for various individual and groups of species.

Table 18 of the project EcIA details the assessment of predicted effects on the identified and relevant important ecological features where any impact interactions have the potential to be most significant during the closure phase of the mine development; and the mitigation measures to prevent, reduce or offset any potential effects.

8.5.1 Alterations to hydrogeological and hydrological regime

Table 18 of the EcIA states:-

'The cessation of dewatering will result in a rebound of groundwater levels during the mine closure phase and which are expected to return to near natural conditions approximately 100 years post-closure. Hydraulic bulkheads will be installed at close to contain any mine water by reducing the inflow of shallow groundwater to the deeper mine workings and allow a slow recharge from depth. This is estimated to take between 80 to 95 years. This rebounding of groundwater is not predicted to result in any significant increase in base flow rates in the Owenkillew River.

Following the closure of the mine, flows of groundwater will re-commence from the existing adit to the Curraghinalt Burn. The rate of flow is anticipated to be 7.4 L/s increasing base flows in the Curraghinalt Burn by 25%. However, at this predicted flow rate no significant changes in surface base flow rates are predicted in the Owenkillew River.

No significant effects are predicted on habitat or species associated with the Owenkillew River from the proposed closure of the mine'.

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise.

8.5.2 Changes in water quality

In respect of this issue Table 18 of the EcIA states:-

'The interaction between groundwater, as it rebounds, with the mine walls and stored paste backfill and waste rock has the potential to cause the leaching and mobilisation of various substances into the mine water. Dilution calculations predict that at year 100 the concentrations of hazardous substances in the mine water and localised groundwater will be discernible based on background groundwater concentrations, with the exception of very minor exceedance of mercury.

Dilution calculations for the Owenkillew River taking into account any recommencement of adit flows to the Curraghinalt Burn and groundwater contributions show no exceedance of current water quality standards in the Owenkillew river with the exception of the parameters that are currently exceeded in the baseline conditions. Concentrations are not predicted to exceed baseline conditions plus 10% of the water quality standards for the Owenkillew River or 3% for parameters where baseline levels exceed a standards or guideline.

It is therefore assessed that post-closure the mine is highly unlikely to have a significant effect on water quality in the Owenkillew River.

No significant effects are predicted on habitat or species associated with the Owenkillew River from the proposed closure of the mine.'

As a consequence of this finding, supported by comprehensive assessment, no significant impacts will arise.

9 CUMULATIVE IMPACT ASSESSMENTS

Section 53.7.1 of the project EcIA has considered all potential impacts with the potential to give rise to cumulation within 5km of the proposal sites, with the exception of major projects, where a 15km radius was considered appropriate. NO projects with the potential to give rise to cumulative impacts were identified during this process.

10 STAGE 2 APPROPRIATE ASSESSMENT: CONCLUSIONS

This review of the project has concluded that no significant ecological impacts upon Natura 2000 Sites are likely to arise should the project proceed with current committed mitigation.

All current, recently consented and proposed planning applications within the area ecologically linked to the implicated site have been considered for the purposes of this assessment. A list of such proposals can be found at Chapter 8 of the environmental statement.

As no significant or perceptible impacts are predicted as a result of the 'project' it is reasonable to assume that impacts are *de minimis* and that no cumulative or synergistic impacts will arise.

The preceding Stage 2 Appropriate Assessment has demonstrated that the project:

- Will have no direct adverse impacts on Owenkillew SAC, Foyle & Tributaries SAC; and, Lough Foyle Ramsar Site.

- Will have no indirect adverse impacts Owenkillew SAC, Foyle & Tributaries SAC; and, Lough Foyle Ramsar Site; provided the mitigation strategies proposed are fully implemented.

- Will have no transboundary impacts; provided the mitigation strategies proposed are fully implemented.